Using Peer-support Coaching to Improve Adherence to Online Acceptance and Commitment Therapy Self-help for College Mental Health: A Randomized Controlled Trial

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Abstract

Online self-help programs such as the Acceptance and Commitment Therapy (ACT) Guide address significant barriers to receiving therapy but suffer from low adherence rates. Peer-delivered coaching, using undergraduate students as coaches, is an innovative alternative to traditional coaching methods which may improve adherence in a more scalable format. To test the efficacy of peer-support coaching for college students using ACT Guide in a naturalistic setting, we conducted a pragmatic randomized controlled trial with three conditions (phone coaching, text message coaching, and a no support control group; *N* = 230). Participants were block randomized, and program adherence (i.e., number of modules completed) was the primary outcome. Participants completed significantly more ACT Guide modules in phone (*M* = 7.1, *SD* = 4.9) and text (*M* = 5.7, *SD* = 5) coaching than the no support control condition (*M* = 1.6, *SD* = 3.3, *p* < .001). Participants who received phone coaching experienced significant improvements across almost all measured outcomes as compared to the control group, while participants who received text coaching improved only on some outcomes compared to control (*p*s < .05). These results support peer-support coaching, particularly when delivered through phone calls, as an efficacious method for improving adherence to and outcomes from online self-help programs.

Keywords: *Acceptance and Commitment Therapy, online therapy, coaching, treatment compliance, treatment outcomes, college students*

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College students, defined in this context as students engaged in post-secondary education who are typically between the ages of 18 and 24, face a deleterious intersection of life circumstances that place them at considerable risk for mental health problems. These include school-induced stress, limited income, and common age of onset for psychopathology. A total of 35.5% of college students in the United States were diagnosed with a mental health disorder in 2017, with this proportion increasing over time (Lipson et al., 2019). Attitudinal and structural barriers to accessing therapy services exacerbates this issue, as 50-80% of college students struggling with mental health do not seek treatment (Oswalt et al., 2020). College students who seek treatment encounter additional barriers that delay or minimize services, such as extended waitlists and provider shortages (Xiao et al., 2017). While counseling/therapy services are the most common mental health resource offered by colleges (Balon et al., 2015), alternative formats for mental health treatment are becoming increasingly implemented.

**Online Self-help Programs**

Online self-help is one alternate format that can increase access to mental health services for college students (Lattie et al., 2019). Self-help apps or websites allow users to learn valuable skills for managing psychological problems, similar to a self-help book, while providing greater tailoring or engagement than what a self-help book can often provide (Andersson et al., 2008). They can serve a range of functions in enhancing and increasing access to services such as preventative care, low-intensity treatment, a resource for clients who are waiting to begin therapy, an adjunctive resource to enhance therapy, or as a resource for use after therapy has been terminated to help maintain gains from therapy (Harrer et al., 2019; Levin et al., 2015; Levin, Hicks, et al., 2020). This allows for increased flexibility and accessibility regarding how students can receive help, as these programs can be accessed at one’s own convenience, in a scalable format that limits the burden on providers or counseling centers. Additionally, students are generally interested in these technology-driven interfaces for self-help, with 53% of college students having downloaded a mental health app at some point in time (Melcher et al., 2020).

Online self-help has been shown to be highly effective for improving college student mental health, with meta-analyses targeting college samples having demonstrated significant decreases in stress, anxiety, and depression, and significant improvements in interpersonal relationships (Conley et al., 2016). Universal programs developed for use with students, as well as programs tailored towards specific mental health conditions, have been found to be effective. This demonstrates the wide application of online self-help for students across varying levels of need. While most of these programs use a traditional cognitive behavioral therapy (CBT) based framework, programs based in acceptance and commitment therapy (ACT) are becoming increasingly common with evidence supporting effectiveness (Thompson et al., 2021).

However, the impact that online self-help programs have on college student mental health is significantly reduced due to low rates of adherence (Donkin et al., 2011; Fleming et al., 2018). Attrition rates for online mental health programs in randomized controlled trials (RCTs) commonly exceed 50%, as users are more likely to lose interest or forget about the program as compared to face-to-face treatment (Wangberg et al., 2008). Rates of engagement are even poorer in real-world settings, with one systematic comparison finding adherence to be four times worse during natural use as compared to when the program was assessed in an RCT (Baumel et al., 2019).

**Coaching for Online Self-help Programs**

The gold standard approach to improving engagement in online self-help is through coaching delivered via phone calls or asynchronous messaging systems delivered by graduate students or staff. The most common functions of coaching are to provide reminders to use the program, reinforce program usage, and to provide information on how to use the program or on other resources (Shim et al., 2017). Initial examination through meta-analyses of differences between studies that used coaches, and studies that did not, suggested that coaching provides positive effects for improving engagement and mental health (Andrews et al., 2010). Additionally, online interventions implemented in real-world settings that include coaching or were used adjunctively with therapist support have evidenced significantly better adherence rates than those that have not (Baumel et al., 2019; Titov et al., 2017).

However, more recent RCTs directly comparing coaching to no-coaching have produced much more mixed results, with many studies failing to demonstrate that coaching improves adherence rates or mental health outcomes (Shim et al., 2017). These mixed results have been attributed to heterogeneity among the examined studies. Furthermore, these coaching methods are often not feasible to implement on a wide-scale basis, due to the resources required to hire a large staff of graduate students or professional psychologists as coaches (Shim et al., 2017). Prior research has suggested that whether coaching is delivered by clinicians or lay technicians without post-graduate training does not influence the effectiveness of the coaching on treatment outcomes. This indicates that a high level of prior professional training in a mental health related field is not a necessary prerequisite to produce effective coaches (Kobak et al., 2015).

One possible alternative would be the utilization of undergraduate college students as volunteer peer-support coaches.Undergraduate volunteers provide a cost-effective method for phone coaching, making large-scale implementation feasible while providing valuable training opportunities for students. Additionally, undergraduates receiving coaching from another undergraduate student may potentially be more acceptable than from a mental health professional (Levin et al., 2017) and help normalize help seeking. Despite these benefits, peer-support has yet to be studied as a tool for increasing adherence to online mental health programs, and has instead typically been used as the primary intervention itself (Fortuna et al., 2019). Thus, the proposed study aims to test the efficacy of an innovative peer-support coaching model.

**The Current Study**

A novel peer-support coaching model was tested in a RCT, in which undergraduate students used the online self-help program ACT Guide (https://ACTGuide.usu.edu) for 10 weeks with random assignment to receive peer-support phone coaching, text-message coaching, or no coaching. The ACT Guide program had been widely deployed at the university since December 2019 as a freely available self-help mental health service for students, with over 1,500 registered users since its launch, and thus this study aimed to evaluate scalable methods to increase adherence to a naturalistically deployed online service. This was tested using a novel ACT-based coaching protocol, which leveraged key acceptance, mindfulness, and values-based strategies that have been found effective in improving face-to-face treatment adherence (e.g., Moitra & Gaudiano, 2016), but have not been previously applied to online self-help adherence. Peer-delivered coaching over the phone was compared to briefer coaching via text messaging to determine if phone coaching was more effective despite potentially being less efficient to deliver than text-based coaching. Synchronous and asynchronous formats have been directly compared in previous studies (e.g., Renfrew et al., 2020), but not phone coaching and text coaching specifically.

Our hypotheses included that participants who receive peer-support phone coaching would complete more ACT Guide modules (primary outcome) and report greater improvements in secondary outcomes of mental health and ACT processes of change (psychological flexibility) relative to the text messaging and no coaching conditions. Participants in the text messaging condition were hypothesized to demonstrate better adherence and greater improvements in mental health and psychological flexibility than the no coaching condition. The results of this study would thus determine the potential benefits of the novel ACT-based peer coaching model as well as whether effects were equivalent or weaker when using a potentially more efficient text-messaging format.

**Method**

**Study Design**

The present study was preregistered through ClinicalTrials.gov (NCT04573465), and all procedures took place online. Data were collected throughout the 2020-21 academic school year during the COVID-19 pandemic, with data collection staring on 9/28/2020 and ending on 3/17/2021. This end-date was selected so that participation would not continue into the academic summer, which could potentially alter participant behavior and influence results. To test the effects of peer-support coaching on ACT Guide adherence rates and outcomes, a RCT with three conditions was conducted. Participants were randomly assigned to either use ACT Guide while supported by weekly peer phone coaching, ACT Guide while supported by briefer peer coaching through text-messages, or ACT Guide with no additional support. Participants were block randomized to their respective treatment in blocks of 15 to ensure balance across the three conditions. Peer-support coaches were randomly assigned using block randomization as well, with the block size depending on the number of coaches currently volunteering at a given time (e.g., block size of 16 for 8 coaches). Generation of the random allocation sequence, participant enrollment, and participant assignment were all conducted by the study coordinator. However, the actual enrollment and randomization procedures were fully automated, with participants self-enrolling through an online survey which informed them of their assigned condition once completed. The study coordinator would then manually inform the coach of their new assignment through email.

Adherence was designated as the primary outcome, measured by the number of ACT Guide modules completed which is automatically tracked by the program. Online self-report measures were administered at baseline and 10 weeks to assess total psychological distress and subsequent subscales (i.e., depression, anxiety, and stress), positive mental health, psychological inflexibility, and psychological flexibility and subsequent subscales (i.e., openness to experience, behavioral awareness, and valued action).

**Participants**

Participants were recruited from a mid-sized university in the Mountain West region of the United States. In order to participate in the study, interested individuals must have 1) been a current college student, 2) been age 18 or older, and 3) have not used ACT Guide in the past. A total of 237 participants completed enrollment, as compared to our targeted enrollment rate of 300. However, seven participants were excluded from analyses, on account of procedural errors or study withdrawals with specific requests from participants to not use their data. Thus, 230 participants were included in the analyses, with 78 having been assigned to the control condition, 77 to the phone coaching condition, and 75 to the text messaging condition (see Figure 1). Of the 230 participants that were included in analyses, 32% were recruited through the ACT Guide sign-up workflow, 8% were recruited through SONA, and 60% were recruited through other avenues such as class announcements or flyers.

 Students who began the registration process for the ACT Guide program, which is available as a free service to students at the university where the study took place, were offered the opportunity to take part in the study. Of the 228 students who were invited into the study through the ACT Guide sign-up process, 90 (39%) expressed interest in the study, with 74 (32%) completing enrolling. Participants were additionally recruited through class announcements, digital signs, campus flyers, university homepage advertisements, and a psychology department study participant pool (SONA). The sample was primarily female identifying and White. Most participants were full time students and a majority were employed at least part time. See Table 1 for a full listing of demographics by treatment condition.

**Procedures**

To enroll in the study, prospective participants were instructed to complete an eligibility screener, informed consent, a baseline assessment, and to create an ACT Guide account. Participants then gained access to ACT Guide, and received either no coaching, weekly synchronous phone coaching, or weekly synchronous text coaching based on their randomly assigned condition. Those who were assigned to a coaching condition were randomly matched with an available coach, who initiated contact through text message to either schedule the first coaching call or engage in the first text coaching conversation.

Participants were then instructed to use ACT Guide over the following 10 weeks, and those in one of the two coaching conditions received up to 10 weeks of coaching. After 10 weeks, participants completed a post-treatment assessment. Incentives included $5 upon completion of baseline assessment and $10 upon completion of post-treatment assessment, or 1 SONA credit each for completion of baseline and post-treatment assessment.

**Intervention**

 ACT Guide (https://actguide.usu.edu) is an online, self-guided mental health program delivered over a website that helps users learn ACT skills to address mental health concerns. Participants in all three conditions were instructed to work on ACT Guide over the course of 10 weeks, completing one to two modules a week in order to complete the full 12 modules. The program targets acceptance, mindfulness, and values-based processes that have been consistently found to improve a wide range of mental health concerns relevant to college students (A-Tjak et al., 2015). Previous studies have supported the effectiveness of the ACT Guide, with student participants showing improvements in overall distress, anxiety and depression symptoms, and positive mental health (Levin, Krafft, et al., 2020; Petersen et al., 2021).

Modules are completed linearly, with each module taking approximately 20-40 minutes. Each module focuses on teaching specific ACT skills (e.g., identifying personal values, defusing from difficult thoughts, accepting difficult emotions, setting values-based goals) and then assigning a practice assignment for the user to complete before the next module. ACT skills are taught in modules through a combination of interactive exercises (e.g., multiple choice prompts, sorting tasks, short writing activities), text, and multimedia (e.g., videos, audio-guided exercises). Program content is heavily tailored based on responses in interactive exercises. Participants also receive automatic emails containing tips for using ACT Guide, with one email being sent per week for the first four weeks upon registration.

***Phone Peer-Support Coaching Condition***

Participants assigned to the phone coaching group received weekly, 10-15 minute phone coaching from a trained peer-support coach over the ten weeks that they used ACT Guide. The content of coaching excluded discussing specific mental health problems the participant may have been struggling with, in order to differentiate coaching from therapy. Instead, coaching consisted of reinforcing adherence, identifying and problem-solving non-adherence, strengthening and generalizing ACT skills, and using ACT skills to increase commitment to ongoing program adherence. Coaches used a newly developed ACT-based protocol to guide their coaching, which included general guidelines for ACT consistent coaching (e.g., respond to participants’ unhelpful thoughts with defusion; use participants’ values as a source of motivation) as well as content specific to each module a participant may have completed (see Supplement 1). This protocol expanded upon Mohr et al.'s (2011) model of supportive accountability for human support in the context of online interventions, adding additional content such as principles for ACT consistent coaching, instructions for navigating non-adherence using ACT skills, and content related questions to facilitate discussion of the skills that were being learned from ACT Guide.

The first coaching call was to be made prior to the participant starting ACT Guide, in which the coach would introduce themselves, explain the purpose and format of coaching, explain privacy and confidentiality limitations, discuss what the participant would like to get out of using ACT Guide, and problem-solve anticipated barriers to using ACT Guide. Each subsequent peer-coaching phone call, aside from the last call, was to follow the same format of asking the participant what modules were completed, if the participant completed the associated practice assignment(s), asking questions related to the modules that were completed, addressing any remaining questions from the participant, and setting a goal for how many modules the participant plans to complete before the next call. If the participant did not complete any modules, the coach was to address non-adherence using the “Choice Point” model (Harris, 2018), and/or use problem-solving strategies. If the participant completed at least one module but did not do any associated practice assignments, the coach was to do a brief version of the practice assignment together with the participant. Final coaching calls were intended to serve as an opportunity to review what the participant had learned from ACT Guide and reflect on how the participant may continue to implement the skills they had learned.

Prior to coaching participants, coaches completed a training sequence that included didactic lectures on coaching principles, CITI research ethics trainings, and readings on ACT. Coaches additionally each completed ACT Guide as part of the training process, and took turns practicing the coaching protocol on one another in both call and text format for each individual module. These activities totaled to approximately 25 hours of training in total, carried out over a course of two to four weeks, given that training schedules slightly varied by coach cohort. All training activities remained the same across coach cohorts, with only the pacing of activities varying.

***Text Message Peer-Support Coaching Condition***

 Participants assigned to the text messaging condition received weekly text messages from their peer-support coach. These text messages reflected the content delivered in the phone coaching group, but through a briefer protocol that accounted for the abbreviated, asynchronous nature of texting. Text messages similarly focused on reinforcing adherence, problem solving non-adherence, strengthening ACT skills, and using ACT to increase program adherence. However, these areas were covered in brief messages and with more limited exchanges between participants and coaches. Coaches initiated conversation with their assigned text condition participants once a week, however text-message conversations frequently occurred over a span of multiple days on account of the asynchronicity of text messaging.

The first text coaching conversation consisted of the coach introducing themself, providing a link to a document that explained the purpose and format of coaching as well as privacy/confidentiality limitations, and problem-solving anticipated barriers to using ACT Guide. Subsequent text message conversations followed a consistent format of asking the participant which modules they were able to complete, along with a simple question related to the modules that were supposed to be completed (e.g., what thoughts did you notice yourself getting hooked on throughout the week?), followed by setting a goal for how many modules the participant intends to complete within the next week. The final text message conversation would involve reviewing what skills the participant intends to keep using and practicing.

***Control Condition***

The control condition received no coaching intervention, and no additional contact from the research team aside from prompts to complete the post-treatment assessment. Thus, the only intervention provided was access to the same ACT Guide program that was provided to the phone and text peer-support coaching conditions. Also, the control condition received the same four weekly automated emails containing tips for using ACT Guide that the other two conditions received as a built-in feature of ACT Guide.

**Measures**

***ACT Guide Adherence***

Adherence to the ACT guide program served as the primary outcome. This was automatically recorded by the program, defined as the number of modules completed at the end of week 10.

***Mental Health Continuum Short Form (MHC-SF)***

The MHC-SF is a 14 item measure of positive mental health, consisting of the subscales emotional, psychological, and social well-being (Keyes, 2005). Items are rated on a 6-point Likert scale from 0 (*never)* to 5 (*every day*). A total score is summed, ranging from 0 to 70, with higher scores indicating greater emotional wellbeing. The three factor model of positive mental health used by the MHC-SF has been supported in college students (Lamers et al., 2011), and items within the MHC-SF display good internal consistency, appropriate test-retest reliability, and sensitivity to change (Keyes, 2005; Lamers et al., 2011). Our sample demonstrated an excellent Cronbach alpha of 0.92 for the total score.

***Depression/Anxiety/Stress Scale (DASS-21)***

The DASS-21 is a 21 items measure of general psychological distress, consisting of the subscales depression, stress, and anxiety (Lovibond & Lovibond, 1995). Items are rated on a 4-point Likert scale from 0 (*did not apply to me at all*) to 3 (*applied to me most of the time*). Responses are summed and then multiplied by two for each subscale to produce subscale scores, with a composite total summed from subscales to represent negative affectivity (Osman et al., 2012). Prior evidence has suggested that the DASS-21 is sensitive to clinically relevant change in response to online ACT (Levin et al., 2015; Petersen et al., 2021), and the measure has demonstrated good internal consistency among U.S. college populations (Osman et al., 2012). Our sample demonstrated an excellent Cronbach alpha of 0.93 for the full scale.

***The Acceptance and Action Questionnaire (AAQ-II)***

The AAQ-II includes 7 items that measure psychological inflexibility (the inverse of psychological flexibility) with a primary focus on experiential avoidance, rated on a 7-point Likert scale from 1 (*never true*) to 7 (*always true*; Bond et al., 2011). Previous analysis of the AAQ-II’s factor structure suggests that it measures a unidimensional construct and that it has acceptable internal consistency among college students (Bond et al., 2011). We found an excellent Cronbach alpha score of 0.91 within the current sample. However, the AAQ-II has shown limited treatment sensitivity as compared to other measures of psychological inflexibility (Benoy et al., 2019). Despite this and other limitations, the AAQ-II remains the most common measure for psychological flexibility, and thus provides a useful point of reference for comparison with other studies (Ong et al., 2020).

***Comprehensive Assessment of Acceptance and Commitment Therapy Processes (CompACT)***

The CompACT is a 23 item measure of psychological flexibility, consisting of three subscales including openness to experience, behavioral awareness, and valued action (Francis et al., 2016). Items are rated on a 7-point Likert scale from 0 (*strongly disagree*) to 6 (*strongly agree*), with higher scores indicating greater psychological flexibility. Like the AAQ-II, the CompACT conceptualizes psychological flexibility and the processes subsumed under it as unipolar constructs (e.g., high psychological flexibility is equated with low psychological inflexibility). The CompACT has demonstrated good to excellent internal consistency in a general adult sample (Francis et al., 2016), as well as good discriminant validity (Ong et al., 2020). Our own sample demonstrated a good Cronbach alpha of 0.85 for the full scale. Both discriminant validity and treatment sensitivity of the CompACT appear to be better than that of the AAQ-II (Ong et al., 2020; Rogge et al., 2019).

**Statistical Analyses**

Statistical analyses were conducted with R (v 4.1.2; R Core Team, 2021) in RStudio (v 2021.09.0; RStudio Team, 2021). We took an intention-to-treat approach to data analysis, including all participants who had been randomized to a condition, irrespective of intervention adherence or retention in post-treatment assessments. For each individual analysis, a listwise deletion approach was taken to missing data, in which participants who were missing data necessary to run the analysis were excluded. The exception to this were our multilevel models, which do not require completion of both baseline and posttreatment assessments for a participant to be included in the analyses. No subgroup analyses were conducted, and no additional covariates (e.g., age, race, gender, etc.) were accounted for in the models.

A power analysis was conducted to determine our target sample size, which indicated that a sample size of 240 would allow us to detect a small effect size of d = .20 (power = .80; α = .05) when conducting a one-way ANOVA. Thus, we decided on a target sample size to 300, which would allow for a conservative attrition rate of 20% (i.e., 240 study completers). It should be noted that while a one-way ANOVA was the initially planned analysis determining whether assigned condition has an effect on treatment adherence (e.g., number of modules completed), a non-parametric Kruskal-Wallis test was conducted instead due to violated normality assumptions.

A Shapiro-Wilk test and Levene’s test was conducted with each outcome to test whether normality and homoscedasticity assumptions were met. Only positive mental health, psychological inflexibility, and psychological flexibility followed a normal distribution across conditions. Rather than transforming non-normal variables to fit a normal distribution, non-parametric tests (i.e., Mann-Whitney U, Kruskal-Wallis) were used when appropriate (Feng et al., 2014). This approach was chosen on account of the number of modules completed variable following a bimodal distribution, given that transformation for correcting normality is only effective with unimodal distributions.

Multilevel models were used to test whether assigned condition had an effect on mental health outcomes when controlling for baseline scores using the lmerTest package and lmer() function (Kuznetsova et al., 2017). All data was included, regardless of whether the post-treatment assessment was completed for a given individual. A separate model was run for each individual outcome. Post-hoc analyses were conducted using the emmeans package and emmeans() function, to compare the phone and text coaching conditions as an additional contrast (Lenth et al., 2022). All p-values were corrected using the Benjamini-Hochberg procedure to prevent family-wise error.

Reliable change index (RCI) was used to evaluate whether individual participants showed clinically relevant change (Wise, 2004). RCIs were calculated using Ley’s formula through the rci() function in the ClinicalSig package (Ziegler, 2016). Given the nature of RCIs, only data from participants who completed both baseline and post-treatment assessments were included. To calculate RCIs, test-retest correlations and standard deviations from non-clinical samples were found within prior literature for the DASS (test-retest: Bottesi et al., 2015; SD: Crawford & Henry, 2003), MHC (Lamers et al., 2011), AAQ-II (test-retest: Gloster et al., 2011; SD: Bond et al., 2011), and CompACT (test-retest: soleimani et al., 2022; SD: Trindade et al., 2021). Chi-square tests were used to determine whether rate of reliable change differed between conditions for each outcome, followed by post-hoc analyses using a Bonferroni correction for p-values.

Additionally, exploratory moderation analyses were conducted to test whether any effects of peer-coaching differed between individuals. Age and baseline psychological distress were examined as moderators for both adherence and treatment effects. Given the exploratory nature and potential limitations in sample size for running such models, they were run separately from the previously described analyses. Both main effects and interactions were included in the models, and both age and baseline psychological distress were mean centered for these specific analyses. For analyzing effects on mental health outcomes, all interaction effects additionally included time, thus the interactions assessed were three-way interactions between time, condition, and the given moderator.

**Results**

**Preliminary Analyses**

All baseline demographic and outcome variables were assessed for potential differences between conditions using chi square tests and one-way ANOVAs (see Tables 1 & 2). No significant differences were detected between conditions (*p* > .05 for all comparisons). An acceptable proportion of participants completed the post-treatment assessment (76%; see Figure 1). There was no significant difference in completion rate between conditions (*X2*(2) = 1.21, *p* = .547). However, using a generalized linear model to perform logistic regression, we did find that individuals who completed more modules of ACT Guide were more likely to complete the post-treatment assessment (*Z* = 5.08, *p* < .001).

**Adherence Effects**

Participants could complete up to 12 modules of ACT guide in total. Assigned condition had a large effect on number of modules completed, with participants in the phone call (*Mdn* = 8; *p* < .001) and text messaging (*Mdn* = 6; *p* < .001) conditions completing significantly more modules than participants in the control condition (*Mdn* = 0; *H*(2) = 52.1, *p* < .001, *η*² = .221). A significant difference in module completion between the phone call and text message conditions was not detected (*p* = .39). A total of 5.1% of participants in the control condition completed all 12 modules, which was a significantly lower proportion (*X2*(2) = 21.7, *p* < .001) as compared to the phone condition (35.1%; *p* < .001) and the text condition (28%; *p* < .001), with no significant difference between the phone and text condition (*p* = .999). A total of 66.7% of participants in the control condition completed no modules at all, which was a significantly higher proportion (*X2*(2) = 42.58, *p* < .001) as compared to the phone condition (19.48%; *p* < .001) and the text condition (26.7%; *p* < .001), with no significant difference between the phone and text condition (*p* = .878).

**Treatment Effects**

For a full listing of MLM results, see Table 3. Time on its own was found to have no effects on evaluated outcomes (*p* > .05 for all outcomes), indicating that significant time by condition effects can be attributed to the effects of the assigned coaching intervention. Participants receiving coaching through phone calls experienced significantly greater gains in mental health than the control group for psychological distress (*p* = .007), positive mental health (*p* = .006), psychological inflexibility (*p* = .032), and psychological flexibility (*p* < .001). For those receiving coaching through text messages, psychological flexibility (*p* = .032) significantly improved compared to the control condition. Text coaching had no significant effect on psychological distress, positive mental health, or psychological inflexibility relative to the control condition (all *p* > .05). No significant differences were found between the phone and text coaching conditions (all *p* > .05).

Assigned condition had a clinically significant effect on reliable improvement in psychological distress (*X2*(2) = 10.49, *p* = .005) and psychological flexibility (*X2*(2) = 9, *p* = .011). No significant clinical effect was found for positive mental health (*X2*(2) = 4.38, *p* = .112) or psychological inflexibility (*X2*(2) = 3.74, *p* = .154). Post-hoc analyses suggest that participants in the phone condition were significantly more likely to experience a reliable improvement in psychological distress (25%; *p* = .005) and psychological flexibility (10%; *p* = .040) as compared to the control condition (rates of reliable improvement ranging from 0-27%, see Table 4). No significant differences were found between the phone and text conditions, or the text and control conditions (all *p* > .05).

**Exploratory Moderation Analyses**

 There was a significant interaction between age and the text coaching condition in predicting ACT Guide adherence (*p* = .025), suggesting that text coaching has a weaker effect on program adherence for those who are older in age. Specific to those in the text coaching condition, for every one standard deviation increase in age (*SD* = 5.99), the individual is predicted to complete approximately one less module as compared to if they were the average age. No other significant moderation effects were found in predicting adherence (all *p* < .05).There was a significant interaction between the phone condition and baseline psychological distress (*p* < .001), such that the relationship between phone coaching and improvements in psychological distress was weaker for those who entered the study with a higher level of psychological distress. This was the only significant moderation effect found when predicting treatment outcomes (all *p* < .05).

**Discussion**

 This study assessed the efficacy of undergraduate delivered peer-support coaching as an aide to increase adherence (and improve outcomes) when using an online ACT self-help program, ACT Guide. Coaching via phone calls and via text messaging were tested against a control condition which received no coaching, with participants in all three conditions being given 10 weeks to use ACT Guide. Phone and text coaching were effective interventions for increasing adherence to ACT Guide as compared to standard ACT Guide without coaching. Both phone and text coaching improved key psychological flexibility processes of change, however only phone coaching improved mental health outcomes relative to ACT Guide without coaching.

Phone and text coaching both appeared to be effective interventions for increasing ACT Guide program adherence. However, the effects of text coaching may be more limited for those of older age. We found peer-support coaching to have a stronger effect on program adherence than the small effect size suggested by a prior meta-analysis (Musiat et al., 2021). The program adherence rates exhibited by the control group (ACT Guide without coaching) approximated the low rates found in naturalistic use of online mental health outside of studies (Baumel et al., 2019). This is consistent with the focus of the study on evaluating methods to increase adherence to a naturalistically deployed online mental health program on a college campus and with key design features such as the broad inclusion criteria (any student interested in using the program) and automated enrollment process (the process from learning of the study through randomization did not involve contact with study staff). This study may offer relatively high external validity that affords a fairly realistic view of program use. It is likely the low adherence rates found within the control group are responsible for the minimal treatment response found within this group.

The addition of either phone or text coaching statistically, significantly improved psychological flexibility processes targeted in ACT. Additionally, the phone coaching group experienced a significantly higher rate of clinically significant improvement in psychological flexibility, with 10% of the phone coaching group clinically improving compared to 0% or 2% of the control and text coaching groups respectively. It is possible that greater adherence to ACT Guide on account of coaching increases the effectiveness of the intervention, promoting retention and practice of psychological flexibility related skills, particularly in the case of phone coaching. However, another explanation may be that the ACT-based elements of the coaching protocol (e.g., coach using ACT consistent language, discussion of ACT Guide content, use of the Choice Point for non-adherence) are what promote these psychological flexibility skills within coached participants. Interestingly, the phone coaching but not text coaching condition had a statistically significant effect on psychological inflexibility, the inverse of psychological flexibility. Neither coaching group were more likely to experience clinically significant improvement in psychological inflexibility as compared to the control. This may be a reflection of limitations within the AAQ-II as compared to the CompACT (Ong et al., 2020), or demonstrate weaknesses within text coaching as compared to phone coaching. Given that psychological flexibility is the driving process of change within ACT, understanding how ACT-based interventions influence psychological flexibility is critical. Future research utilizing mediation analysis may shed light on whether increased adherence, or use of an ACT-based coaching protocol, better explain effects on psychological flexibility.

It is noteworthy that only phone coaching significantly improved mental health outcomes relative to standard ACT Guide. These outcomes include psychological distress and positive mental health regarding statistical significance, but only the psychological distress in the regards to clinically significant rates of improvement, with 25% of the phone coaching group significantly improving as compared to 4% and 16% of the control and text coaching groups respectively. This may suggest that synchronous phone coaching is an effective intervention, but the effectiveness of text coaching is weaker or impacts a more limited set of variables (e.g., adherence, processes of change). This is congruent with previous literature in which findings on the effectiveness of coaching overall across multiple formats is mixed (Shim et al., 2017). Prior reviews and meta-analyses have not parsed out differences in outcomes between differing formats of coaching (Baumeister et al., 2014; Shim et al., 2017), and trials that have directly compared synchronous versus asynchronous modes of coaching have not found significant differences in outcomes (Renfrew et al., 2021). There are several possibilities for why text coaching may be less effective, including less time spent discussing ACT Guide as compared to phone coaching, weaker relationship with the coach, being less acceptable to older students, or cognitive attention on the conversation being more focused in the case of phone calls. However, it is possible that a more complex relationship exists between format of coaching and effect on outcomes, and that further investigation regarding under which circumstances (e.g., when format is self-selected, if there are moderation effects) different formats are effective is warranted (Renfrew et al., 2021).

The present study offers important implications regarding coaching as a supplement to online self-help programs, and its effects on program adherence and program effectiveness. Given the efficacy of implementing undergraduate students as peer-support coaches, this could be very practical intervention to offer to college students alongside online self-help. Relevant training and implementation materials could be readily disseminated for use by universities seeking to implement this service alongside ACT Guide or a similar program, given the only required personnel needing a professional training background (i.e., a graduate student or mental health professional) is a coordinator to recruit, train, and oversee the volunteer coaches. While some financial costs are potentially associated with this model, given any pay that would be allocated to a peer-support coaching coordinator, college campuses may still be incentivized to implement such a program. For example, these coordinating responsibilities fit well with already existing positions, such as college counseling center coordinators, predoctoral interns, or clinical graduate student assistantships. Additionally, prior economic analyses have found online interventions to be a cost-effective resource (Mitchell et al., 2021) with one study supporting guided online interventions to be particularly efficient (Buntrock et al., 2021). At present, distinctions between phone and text coaching are somewhat unclear, but our results appear to provide greater support for the former.

**Limitations**

 Several limitations should be taken into consideration when evaluating the results of the present study. Completion rates for post-treatment assessment were not ideal, with 76% of participants completing this step of the study. Given that participants who completed fewer modules of ACT Guide were significantly less likely to complete the post-treatment assessment, non-adherers may be underrepresented within our results. Reasons for drop-out (e.g., failure to complete the post-treatment assessment) are also unknown, making it unclear as to whether data is missing at random.

Our sample also disproportionality represents those identifying as female (75%) as well as White (90%). This was expected given that women are more likely to engage in help-seeking behaviors than men (Seidler et al., 2017), and that the recruitment source was a predominantly White institution with 84% of the student body identifying as White. Thus, further research is warranted regarding the efficacy of peer-support coaching with more diverse samples. This is critical so that analyses can test whether treatment effects are consistent or differ across subgroups. To help address this, we conducted exploratory moderation analyses to examine the potential generalizability of results on key variables that had adequate representation to reasonably conduct these analyses. Interestingly, findings suggested the effects of text coaching on adherence may be weaker among older students while the effects of phone coaching on psychological distress may be weaker among students who begin the program in higher distress. However, these were not planned analyses and the sample distribution and size was not recruited to power these analyses, so these results are preliminary and limited. Future research designed to test whether effects are moderated by key demographic variables is needed to further examine the generalizability of results to specific populations, particularly minoritized and underserved students.

The very low adherence rates to ACT Guide without coaching may suggest issues with the program and its deployment, or with the study sample, that reduce generalizability to other programs. That said, these low rates are consistent with the focus on evaluating a widely deployed, publicly available program and rates found in other naturalistic deployments of online mental health programs (Baumel et al., 2019). Thus, this study may provide a more accurate representation of adherence rates and more generalizable findings for interventions seeking to increase adherence. It is also important to consider that the study included a combination of participants who signed up for ACT Guide as part of standard marketing for the service, and participants who may have signed up primarily for course credits or monetary incentives.

Future research would benefit from more precise evaluation of strategies to increase adherence solely in the context of “real world” users of a publicly deployed online mental health service, ideally without any incentives for participation. Additionally, future research regarding treatment mediators and mechanisms, as well as mid-treatment variables for greater intervention tailoring, is warranted. While a thorough examination of the acceptability of coaching options to college students is outside the scope of this effectiveness trial, it is noteworthy that we were unable to secure our target sample size of 300, instead recruiting 237 participants. Given that 32% of the 228 students who signed up for ACT Guide during the recruitment period enrolled in in the study when invited to, there appears to be some interest in coaching services from ACT Guide student users. However, the majority of ACT Guide registrants still chose not to sign up for coaching, even when compensation (i.e., course credits or up to $15 in gift cards) that may have artificially inflated interest was offered. One prior study demonstrated that not all users of mental health programs are interested in talking to a coach, either due to discomfort or preferred anonymity, lack of time, or the perception that they will do well in the program without a coach (Werntz et al., 2022). Similar reasons for opting to not sign-up for coaching may apply to the participants of our own study. Further research on who is less likely to be receptive to coaching and how to increase initial interest in coaching is warranted, so that the promising benefits of the service may be extended to a larger audience.

Finally, it is unclear how many of the 12 ACT Guide sessions users needed to complete in order to receive any, or complete, benefits. Likely 12 sessions is longer then the program needs to be given there are multiple sessions focused on each component of ACT, and this number exceeds many other online mental health programs. Thus, the relatively long length of the ACT Guide program may explain why few participants in the coaching condition completed all 12 sessions, particularly within the 10 week intervention period (originally conceived as completing 2 sessions each week).

There has even been evidence supporting the efficacy single-session online interventions, particularly with adolescent populations. (Schleider et al., 2022). Given that these online single-session interventions have demonstrated effect sizes approximately equivalent to those produced by therapist-delivered single-session interventions (Schleider & Weisz, 2017), but online multi-session interventions tend to produce smaller effect sizes compared to therapist-delivered multi-session interventions (Thompson et al., 2021), it is possible that differences between online and therapist-delivered programs becomes more apparent with longer treatments. Poorer adherence witnessed within online programs are one way these difference manifest, and thus coaching may help bridge the gap between these two formats by compensating for the human element present in therapist-delivered treatment to promote greater adherence. These issues raise questions to the broader field regarding the relationship between dose and response, optimal program length and adherence, as well as treatment mechanisms, calling for further research.

**Conclusion**

The results of the present study support peer-support coaching as a viable intervention to increase the adherence and effectiveness of online self-help programs in a college student sample. Peer-support coaching via weekly phone calls was particularly promising, given that higher program adherence rates and improvements among mental health variables were observed as compared to coaching delivered over text messaging. Online self-help programs in combination with peer-support coaching is thus a promising intervention to integrate into the resources offered by college counseling centers. Implementing this type of intervention is feasible to scale-up relative to coaching delivered by staff or mental health professionals. Future research should continue to investigate mechanisms through which coaching has its effects, as well as potential avenues for improving coaching such as matching users to or allowing user’s choice between coaching formats.

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**Tables**

Table 1

*Baseline demographics by condition*

|  |  |  |  |
| --- | --- | --- | --- |
|  | Control (n = 78) | Phone coaching (n = 77) | Text coaching (n = 75) |
| Age (*M* (*SD*)) | 23.9 (7.4) | 22 (4.9) | 21.7 (5.2) |
| Gender (%) |  |  |  |
|  *Female* | 74.4 | 74 | 76 |
|  *Male* | 23.1 | 24.7 | 22.7 |
|  *Other* | 2.6 | 1.3 | 1.3 |
| Race/Ethnicity (%) |  |  |  |
|  *White* | 92.3 | 87 | 89.3 |
|  *Hispanic/Latinx* | 2.6 | 2.6 | 1.3 |
|  *Asian* | 0 | 0 | 2.7 |
|  *Black/African American* | 1.3 | 2.6 | 0 |
|  *Native Hawaiian/Pacific Islander* | 0 | 1.3 | 1.3 |
|  *Multiracial* | 3.8 | 5.2 | 5.3 |
|  *Preferred not to share* | 0 | 1.3 | 0 |
| Employment status (%) |  |  |  |
|  *Full-time* | 12.8 | 22.1 | 9.3 |
|  *Part-time* | 59 | 54.5 | 62.7 |
|  *Unemployed* | 28.2 | 23.4 | 28 |
| Student enrollment status (%) |  |  |  |
|  *Full-time* | 92.3 | 84.4 | 85.3 |
|  *Part-time* | 7.7 | 15.6 | 13.3 |
|  *Not enrolled in classes* | 0 | 0 | 1.3 |
| Academic year (%) |  |  |  |
|  *First year* | 23.1 | 32.5 | 29.3 |
|  *Second year* | 32.1 | 22.1 | 26.7 |
|  *Third year* | 19.2 | 23.4 | 22.7 |
|  *Fourth year* | 15.4 | 15.6 | 14.7 |
|  *Fifth year or higher* | 6.4 | 2.6 | 4 |
|  *Graduate student* | 3.8 | 3.9 | 2.7 |
| Treatment seeking status\* (%) |  |  |  |
|  *Currently working with a MHP* | 23.1 | 19.5 | 18.7 |
|  *Have worked with a MHP in the past* | 35.9 | 42.9 | 41.3 |
|  *Have never worked with a MHP* | 41 | 41.6 | 38.7 |

\*Participants could select more than one option

*Note.* MH = mental health professional

Table 2

*Descriptive statistics of outcome variables by condition*

|  |  |  |  |
| --- | --- | --- | --- |
| Measure | Control (n = 78)*M* (*SD*) | Phone coaching (n = 77)*M* (*SD*) | Text coaching (n = 75)*M* (*SD*) |
|  | BL | PT | BL | PT | BL | PT |
| *Outcome Measures* |  |  |  |  |  |  |
| DASS-21 | 50.8 (27) | 45.4 | 49 (25.1) | 33.6 (22.2) | 45.8 (28.4) | 33.8 (24.4) |
| MHC-SF | 40.5 (13.1) | 44 (13.2) | 41.3 (12.9) | 48.4 (13) | 40.4 (13.2) | 44.8 (13.4) |
| *Process Measures* |  |  |  |  |  |  |
| AAQ-II | 28.2 (8.8) | 25 (8.7) | 27.3 (8.9) | 22.3 (7.4) | 25.9 (10) | 23.3 (9) |
| CompACT | 71.6 (16.5) | 76.5 (18.4) | 71 (16.9) | 86.1 (15.9) | 73.9 (17.8) | 83.9 (21.1) |

*Note.* BL = baseline; PT = post-treatment; DASS-21 = Depression/Anxiety/Stress Scale; MHC = Mental Health Continuum Short Form; AAQ-II = Acceptance and Action Questionnaire; CompACT = Comprehensive Assessment of Acceptance and Commitment Therapy Processes

Table 3

*Time by condition multilevel models for mental health outcomes*

|  |  |  |  |
| --- | --- | --- | --- |
| Measure | Control vs. Phone coaching | Control vs. Text coaching | Phone coaching vs. Text coaching |
|  | *β* | Standardized *β* | Corrected *p*-value | *β* | Standardized *β* | Corrected*p*-value | *β* | Standardized *β* | Corrected*p*-value |
| *Outcome Measures* |  |  |  |  |  |  |  |  |  |
| DASS-21 | -11.81 | -0.45 | .007\*\* | -8.45 | -0.32 | .051 | 3.36 | 0.13 | .399 |
| MHC-SF | 5.41 | 0.41 | .006\*\* | 2.51 | 0.19 | .151 | -2.90 | -0.22 | .096 |
| *Process Measures* |  |  |  |  |  |  |  |  |  |
| AAQ-II | -3.02 | -0.33 | .032\* | -0.67 | -0.07 | .582 | 2.35 | 0.26 | .078 |
| CompACT | 12.31 | 0.66 | < .001\*\*\* | 6.88 | 0.37 | .032\* | -5.44 | -0.29 | .075 |

*Note.* \**p* < .05; \*\**p* < .01; \*\*\**p* < .001.BL = baseline; PT = post-treatment; DASS-21 = Depression/Anxiety/Stress Scale; MHC = Mental Health Continuum Short Form; AAQ-II = Acceptance and Action Questionnaire; CompACT = Comprehensive Assessment of Acceptance and Commitment Therapy Processes

Table 4

*Frequency of reliable change by condition*

|  |  |  |  |
| --- | --- | --- | --- |
| Measure | Control (n = 56)*N* (%) | Phone coaching (n = 60)*N* (%) | Text coaching (n = 58)*N* (%) |
|  | RI (+) | RD (-) | NC | RI (+) | RD (-) | NC | RI (+) | RD (-) | NC |
| *Outcome Measures* |  |  |  |  |  |  |  |  |  |
| DASS-21 | 2 (4%) | 3 (5%) | 51 (91%) | 15 (25%) | 2 (3%) | 43 (72%) | 9 (16%) | 0 (0%) | 49 (84%) |
| MHC-SF | 1 (2%) | 2 (4%) | 52 (94%) | 6 (10%) | 0 (0%) | 54 (90%) | 2 (4%) | 0 (0%) | 55 (96%) |
| *Process Measures* |  |  |  |  |  |  |  |  |  |
| AAQ-II | 15 (27%) | 6 (11%) | 35 (62%) | 26 (44%) | 2 (3%) | 31 (53%) | 21 (36%) | 8 (14%) | 29 (50%) |
| CompACT | 0 (0%) | 1 (2%) | 55 (98%) | 6 (10%) | 0 (0%) | 52 (90%) | 1 (2%) | 0 (0%) | 57 (98%) |

*Note.* RI = reliable improvement; RD = reliable deterioration; NC = no change; DASS-21 = Depression/Anxiety/Stress Scale; MHC = Mental Health Continuum Short Form; AAQ-II = Acceptance and Action Questionnaire

**Figures**

Figure 1

*Flow of participants in study*

