Computer-Based Intervention for Anxious and Depressive Symptoms in a Non-Clinical Population

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Abstract This research was designed to examine the efficacy of a brief cognitive-behavioral psychoeducation model as an intervention for depressive and anxious symptoms, based on the Cognitive-Behavioral Analysis System of Psychotherapy (CBASP). One hundred fifty two participants were randomly assigned to the control and prevention groups. These participants completed symptom ratings of depression and anxiety at baseline, and again eight weeks later. Multivariate Analysis of Covariance (MANCOVA) revealed a significant effect of group, with the intervention group showing lower symptom scores at the follow-up session. The implications of this study include the development of the CBASP method as a computer-based prevention and intervention strategy.

Keywords Intervention · Anxiety · Depression · Computer-based · CBASP

Introduction

Major Depressive Disorder (MDD) and anxiety disorders represent a significant proportion of mental illness in adult populations. The National Comorbidity Survey lifetime prevalence rate of MDD is 17.1%, with a 12-month prevalence of 10.3% (Kessler, McGonagle, Zhoa, & Nelson, 1994). The lifetime prevalence rate of anxiety disorders is 24.9%, with a 12-month prevalence of 17.2%. Comorbidity estimates for MDD and anxiety disorders approach 50% (Sanderson, Beck, & Beck, 1990). These disorders cause marked distress in the individuals affected, with additional disturbance in several areas of
functioning. The onset of MDD and anxiety disorders frequently occurs in the late teens or early twenties. A variety of factors are associated with risk for anxiety and depression. These risk factors include having a parent with a mood disorder, living in poverty, low social support, child sexual abuse, genetic vulnerability, temperament, severe stressors (e.g., loss, divorce, marital separation), low self-esteem or low self-efficacy, and a sense of helplessness and hopelessness (Beardslee & Gladstone, 2001; Donovan & Spence, 2000; Lewinsohn, Roberts, Sealey, & Rohde, 1994b).

Traditionally, research and treatment on depression and anxiety has focused on clinical trials and longitudinal outcome studies for participants with the full disorder criteria rather than on reduction of mild symptoms associated with these disorders. The importance of reducing mild or sub-clinical symptoms has been highlighted by longitudinal research indicating that individuals with these symptoms are at-risk for immune deficiency, coronary heart disease, smoking and nicotine dependence, and relative risk of death (Cuijpers & Smit, 2002; Kubzansky et al., 1997; Sonntag, Wittchen, Höfler, Kessler, & Stein, 2000; Zorrilla, Redei, & DeRubeis, 1994). Recent work has made it possible to develop intervention strategies likely to reduce symptoms prior to the onset of the full syndrome. These early interventions include cognitive therapy (CT), cognitive-behavioral therapy (CBT), interpersonal psychotherapy, and mindfulness-based CT (e.g., Beardslee, Versage, Wright, & Salt, 1997; Clarke, Hawkins, Murphy, & Sheeber, 1995; Dubow, Schmidt, McBride, & Edwards, 1993; Lewinsohn, Clarke, Sealey, & Rohde, 1994a; Lewinsohn et al., 1994b). The effective use of intervention strategies to reduce mild or sub-clinical symptoms has implications for prevention science. The identification of strategies and techniques that effectively reduce mild symptoms will lead to adaptations that make it possible for implementation with large groups of individuals with varying risk status. For example, teaching a random sample of college student’s techniques drawn from CBT could allow them to more effectively cope with stressors and negative life events.

Several intervention programs for depressive symptoms have been conducted with adolescents. Clarke and colleagues (1995) developed a program designed to encourage adaptive cognitive styles in adolescents with low self-esteem and hopelessness. These ninth and tenth graders were randomly assigned to the Coping With Stress (CWS) program or a typical care group receiving no intervention information. The CWS course included 12 two-hour group sessions aimed at modifying cognitive distortions. One year following the intervention, adolescents receiving the CWS program reported significantly lower levels of depression and dysthymia than those in the typical care group. A similar program was developed by Seligman and colleagues that targeted 10- to 13-year-old (Jaycox, Reivich, Gilham, & Seligman, 1994). Participating adolescents were randomly assigned to a 12 session cognitive training program, a 12 session social-problem solving program, a 12 session combined program, or a control group. Adolescents in each of the treatment groups reported lower levels of depressive symptoms post-treatment and at six-month follow-up than did adolescents in the control group. Beardslee et al. (1997) have implemented an intervention program aimed at impacting family factors associated with depression in adolescents. Results indicated that adolescents of parents reporting greater benefit from the program experienced greater change than other adolescents.

These efforts have also been directed at adults who are experiencing stressors associated with the onset of depression. Seligman, Schulman, DeRubeis, and Hollon (1999) conducted CT with college students endorsing hopelessness, negative explanatory style, and dysfunctional attitudes. Three years following the eight-week program,
the intervention group had significantly lower rates of Generalized Anxiety Disorder, fewer depressive episodes, and lower rates of reported anxiety than the control group. This group also showed greater improvement in hopelessness, negative explanatory style, and dysfunctional attitudes. Munoz and colleagues (1995) completed a study with low-income adults reporting pessimistic thinking and negative affect. Participants in the eight-week (16 h) CBT group showed significant reductions in pessimism and negative automatic thoughts with increases in reported engagement in pleasurable activities when compared to the control condition. Similarly, Price and colleagues (Price, van Ryn, & Vinokur, 1992) designed an eight session (24 h) program for adults who experienced job loss, and found increases in self-efficacy, self-esteem, sense of control, and job search skills compared to control participants.

To date, studies examining the efficacy of intervention programs for mild or sub-clinical depressive and anxious symptoms in college samples have been relatively sparse. However, the onset of significant life stressors during the college years, together with the usual age of onset of mood and anxiety disorders, suggests that this would be one of the best times to implement programs to reduce mild symptoms. In a large, community-based sample of adolescents, Lewinsohn, Clarke, Sealey, and Rohde (1994) indicate that the mean age of onset of first depressive episode was 14.9 years. Numerous studies have documented that early onset of depressive symptoms is associated with longer and more frequent episodes of depression, personality disorder comorbidity, lifetime substance use disorders, and psychiatric hospitalization (Klein et al., 1999; Lewinsohn et al., 1994a, b). Therefore, by teaching young adults with mild symptoms appropriate methods of thinking about and dealing with stressors in their lives, there may be a reduction in depressive behaviors and depressogenic cognitive styles. A challenge to this area of research is the development and implementation of strategies that are cost-effective and easy to apply to ensure that efficacious early intervention strategies are broadly applied.

Though originally developed as an intervention for chronic depression, Cognitive-Behavioral Analysis System of Psychotherapy (CBASP; McCullough, 1984) can be easily adapted to a variety of problems and mastered quickly and without significant allocation of resources. This treatment includes Situational Analysis (SA), a technique which involves repeatedly analyzing specific incidents to determine and change patterns of maladaptive thinking and behaving, so that desired outcomes become more likely. Specifically, SA includes five steps: description of the situation, interpretation of the situation, behaviors during the situation, actual outcome of the situation, and desired outcome of the situation. Using this format allows exploration of factors contributing to problematic interactions for individuals. When using CBASP, a clinician will ask the client to generate alternatives to problematic interpretations and behaviors that are more consistent with the client’s desired outcome. The client will then be asked to determine whether these new interpretations and behaviors are consistent with the desired outcome. In this way CBASP illustrates important concepts of CBT in a way that is tied not to symptoms, but to social interactions and desired outcomes.

The interpersonal nature of SA applies to most people, regardless of anxious and depressive symptoms. In addition, SA worksheets help participants clearly think about their thoughts and behaviors, and how these are related to the attainment of their desired outcomes. Previous use of SA has indicated that most clients experience great satisfaction at seeing these connections between their thoughts, behaviors, and situational outcomes (Cukrowicz, Burns, Minnix, Reitzel, & Joiner, 2005; Cukrowicz & Joiner, 2005; Driscoll, Cukrowicz, Reardon, & Joiner, 2004; McCullough, 1984; McCullough, 1991). In addition, the interpersonal focus is relatively easy for most clients
to understand and results in a straightforward method of examining their everyday interactions. These principles typically generalize across situations over time (Keller et al., 2000; McCullough, 2000).

Previous research has indicated that CBASP is an efficacious intervention for clients with long-lasting episodes of dysthymia and/or depression (Keller et al., 2000; McCullough, 2003; Riso, McCullough, Blandino, 2003; Schatzberg et al., 2005). Keller et al. (2000) assigned patients to a CBASP only group, Nefazodone (Serzone) only group, or CBASP plus Nefazodone. Clients in the CBASP groups received 16 weeks of the intervention, those in the Nefazodone only group received 10–12 weeks of treatment, and the combined group received both. Response (both remission and satisfactory response) was achieved for approximately 50% of clients in the CBASP only and Nefazodone only groups. Clients in the combined treatment group responded to treatment approximately 85% of the time. These results illustrate the impact of this treatment when combined with effective medication. The 50% response rate for clients with particularly chronic episodes of dysthymia and/or depression is also impressive. Further, a follow up study (Klein et al., 2004) has indicated that patients treated with CBASP who received monthly CBASP after the trial described above had significantly lower rates of recurrence than those randomized to assessment only during this time period.

To determine whether CBASP is efficacious for reducing mild symptoms of anxiety and depression, a computer-based intervention program was developed for this study to guide intervention participants through the fundamentals of CBASP. Computer-based methodology was chosen, in part, because college students are increasingly connected to computers in educational settings (i.e., in the classroom, with ipods, email, and web-based courses). This also increased the ease of completion of the material for the students and allowed them to move at their own pace in mastering the material. Finally, it ensured that all students were presented identical material. This intervention program included basic education on anxiety disorders and depressive disorders, as well as elements designed to teach the components of CBASP. As previously stated, the simplicity and interpersonal nature of the intervention program made it relevant to these participants. The CBASP method was an ideal method for college students whose experiences revolve around peer interactions. The college environment includes a greater quantity of social interactions (i.e., in class, dorms, sororities, parties, etc.) than most people experience at any other time in life.

The format of the computer-based elements of this study was similar to a recently developed computer-assisted intervention by Schmidt and Vasey (2000, 2002). Though the full results of these efforts are not yet available, initial results from this study indicate that computer-assisted intervention strategies are an effective means of treatment delivery. Newman and colleagues (Kenardy et al., 2003; Newman, 2002; Newman, Consoli, & Taylor, 1997; 1999; Newman, Kenardy, Herman, & Taylor, 1997; Przeworski & Newman, 2004) have indicated that computer-based treatment (i.e., Palmtop computers, computer augmentation) is associated with similar treatment outcomes as therapy delivered in a more traditional treatment setting with a live therapist. Newman (2002) indicates that the use of computer technology may increase the effectiveness of traditional, therapist delivered CBT by facilitating increased compliance with self-monitoring and skills generalization.

The purpose of this study was to ascertain the efficacy of a CBASP intervention program delivered by computer as a means of decreasing mild symptoms of depression and anxiety in a non-clinical adult population of college students. It was hypothesized that there would be significant differences between the intervention group and the
control group, with the intervention group showing lower symptom scores at follow-up. The impact of the program material on participants was also assessed to determine the relative benefit of the material for participants who demonstrated high mastery compared to those with low mastery of the materials. It was hypothesized that students with low mastery scores would experience less significant change in symptom ratings.

**Method**

**Participants**

Two hundred thirty-eight participants ($M = 19.2$ years old, $SD = 1.9$) were recruited from the Florida State University Psychology Department’s undergraduate student participant pool. Students participated as part of an introductory psychology course research requirement and received one credit point for each hour of participation. Participants were treated in accordance with the “Ethical Principles of Psychologists and Code of Conduct” (American Psychological Association, 1992). The sample was composed of 169 women and 69 men. Seventy-one percent of the sample was Caucasian, 13% African-American, 11% Hispanic, and 5% other. The composition of this sample is consistent with the general population of students taking introductory psychology at Florida State University.

Participants were included in the final sample who met the following inclusion criteria: complete data for the baseline and follow-up assessments, baseline Beck Anxiety Inventory (BAI) scores less than or equal to 18, and Beck Depression Inventory (BDI) scores less than or equal to 19. These BAI and BDI cutoffs were established to ensure that participants were not currently experiencing significant symptoms of anxiety and depression. According to the BAI manual (Beck & Steer, 1993), scores less than or equal to 18 fall within the “normal” or “mild” range; according to the BDI manual (Beck & Steer, 1987), scores less than or equal to 19 fall into the “minimal” or “mild” range. These inclusion score cutoffs were chosen as scores above these cutoffs are in the moderate range of these symptoms. This was important because our goal was to decrease mild symptoms, not to treat participants with significant anxiety or depressive disorders. Of the complete sample of 238 participants, 23 participants did not complete the follow-up assessment (a 90% return rate). Eleven of these participants were in the control group and 12 were in the prevention group. 7-tests were completed for scores on all baseline questionnaires between those completing the follow-up assessment and those who did not. These tests were not significant. In addition to those who did not return for the follow-up assessment, 50 participants were excluded due to higher than allowable BAI and/or BDI scores. In addition, significantly outlying data points were identified on one or more measures at one or both time points for 13 individuals (see Results section for additional detail); therefore their data were not included. Thus, the final sample of participants included in subsequent analyses is 152. This sample includes 71 participants from the control group and 81 from the prevention group. The control group consisted of 55 women and 16 men and the prevention group consisted of 57 women and 24 men.

Approximately 95% of the sample consisted of participants between 18 and 21 years of age. The age range selected for this study was guided by indications in the literature suggesting that the ages of 18–24 may provide an optimal period during which to identify individuals who are experiencing, or have previously experienced, clinical and/
or sub-clinical levels of anxiety and depression due to biological and person-
environment changes experienced before and during this time period.

Materials

*Beck Anxiety Inventory (BAI)*

The BAI, a 21-item self-report inventory, was used to assess the presence of general symptoms of anxiety within the previous 2 weeks. Scores on symptoms associated with anxiety were rated from 0 (not at all) to 3 (severely [I can barely stand it]). In a variety of populations, the BAI’s reliability, convergence with other anxiety measures, and discriminant validity have been documented (e.g., Beck & Steer, 1993).

*Beck Depression Inventory (BDI)*

The BDI, a 21-item self-report inventory, was used to assess the presence of depressive symptoms within the previous two weeks. Scores on symptoms associated with depression were rated 0–3 to indicate which statement best described the way the participant had been feeling during the past 2 weeks. Although the BDI is not indicative of the full clinical syndrome of depression, it has yielded adequate reliability estimates, and has been well validated as a measure of depressive symptomatology (see Beck & Steer, 1987, for a review).

*Positive and Negative Affect Schedule (PANAS)*

The PANAS includes two 10-item scales, one for Positive Affect (PA; e.g., enthusiastic, active, alert) and one for Negative Affect (NA; e.g., anger, disgust, guilt). Participants completed this scale with respect to the previous 2 weeks. Two total scores were computed for the PANAS: PA and NA. The PA score is composed of the sum of the positive affectivity items, thus the higher total score for this scale indicates better functioning. The NA score is composed of the sum of the negative affectivity items, thus higher scores indicate lower functioning. The validity and reliability of the PANAS have been well demonstrated (Watson, Clark, & Tellegen, 1988).

*State Trait Anxiety Inventory—State (STAI-S)*

The STAI-S is a 20-item self-report inventory designed to measure a propensity to experience anxiety or experience stressful situations as threatening. The STAI-S measures current or transient anxiety. Items on the STAI-S are worded such that for some items a high score is positive and for some it is negative; thus, reverse scoring was necessary for the items where a high score is positive. After reverse scoring of items, high scores on this scale represent high levels of state anxiety. Test–retest reliability and concurrent validity have been established (Speilberger, 1983).

Procedures

Participants signed up for specific time intervals during which to complete the baseline assessment materials and the prevention and control programs. At the start of the study session, all participants were told, “The study you are going to participate in today is..."
about anxiety and depression. You will fill out several questionnaires relating to anxiety and depression; then you will complete a presentation. This presentation is designed to teach you about anxiety and depression." These study sessions were conducted in a computer lab to facilitate computer-based administration of all assessment instruments, as well as the prevention and control programs. Each study session involved the baseline assessment of between 2 and 27 participants. This session involved administration of the baseline symptom ratings for all participants. Participants whose data were included in the analyses were students who were not currently experiencing significant symptoms of anxiety or depression. This approach ensured that symptomatic participants were not singled out or denied access to a prevention program that may have been helpful to them.

Participants were administered the BAI, BDI, PANAS, and STAI-S which took less than 30 min to complete. Participants were then randomly assigned to one of two conditions, CBASP intervention program or control program. Participants completed the intervention or control programs immediately following completion of the baseline assessment instruments. The programs lasted approximately 2 h with a 10 min break at the halfway point.

Intervention participants went through six 20 min segments designed to teach them background information on depression and anxiety, the purpose of CBT principles, CBASP as an intervention model, the five steps of CBASP, generalization of these principles to many situations, and review. Students interacted with the computer program in a manner that encouraged mastery of the CBASP method. Specifically, each segment related to CBASP required the participant to answer questions to ensure mastery of the method.

The control participants completed a program consisting of similar but extended educational information on anxiety disorders and depressive disorders; however, no additional intervention material was presented. Participants completed six 20 min segments.

For each group, each segment was followed by questions to ensure mastery of the material. Incorrect answers were linked to a short review of the previously presented material. At the end of the programs a short review was included with an overall summary of all presented material and a quiz to determine the level of mastery by the participant. All participants were also given a folder with a copy of the slides with the material they were presented. Intervention participants also received eight copies of the SA worksheet. The SA worksheet asked the participant to described important aspects of a recent, stressful encounter. The participant recorded what happened, what their thoughts or interpretations were during the situation, their behaviors and body language during the situation, what they wanted to get out of the situation (i.e., desired outcome), and what actually happened (i.e., actual outcome). Following completion of the worksheets, participants were instructed to review their thoughts and behaviors to see if they could generate alternatives that would have led to their desired outcome, rather than their actual outcome. Intervention participants also were given a flowchart to aid in completion of the worksheet and the revision of problematic thoughts and behaviors. All participants also received reminder emails once a week during the eight-week period to remind them of the principles they learned during the computer-based session (e.g., for control group, "As you previously learned, depression is often associated with stressful events in life, and is associated with difficulty carrying out daily activities." For the intervention group, "As you previously learned, SA can be a really helpful way to
deal with stressful situations in life. Remember to use the SA worksheet the next time you have a stressful interpersonal encounter.

Approximately two months after the initial study session was completed, control and intervention participants were contacted to complete follow-up symptom ratings on the BAI, BDI, PANAS, and STAI-S and a mastery test. The mastery test included several questions pertaining to material covered in the respective program completed previously. Participants also completed a brief questionnaire that assessed the degree to which they found the material from the first session helpful. Those in the intervention group also indicated whether they used SA for any problematic encounters and how many SA worksheets they completed. Total time for completion of all phases of the study was approximately 3–4 h for all participants.

Data analysis

For the first hypothesis—predicting significant differences between the intervention and control groups on depression and anxiety—group status (control and prevention) was entered into a Multivariate Analysis of Covariance (MANCOVA) analysis as the independent variable (IV). Score on the baseline administration of the BAI, BDI, NA, PA, and STAI-S were entered as covariates, and scores on the follow-up administration of the BAI, BDI, NA, PA, and STAI-S were entered as dependent variables (DVs). This type of analysis was chosen in lieu of Repeated Measures MANOVA as a result of recommendations by Tabachnick and Fidell (1996), who indicate that MANCOVA is preferred in situations with two time points, whereas Repeated Measures MANOVA is more appropriate for analyses with greater than two time points. It was predicted that there would be a significant group effect, with the intervention group showing lower symptom scores at follow-up.

For the second hypothesis—students with lower mastery scores would experience less significant change in symptoms on the symptom ratings previously mentioned—mastery was determined by the score on the quiz at the end of the program. Mastery was operationalized as an either/or variable, whereby participants falling into the upper half on the mastery quiz had “high” mastery, compared to those in the bottom half, with “low” mastery. A limitation of this approach to measuring mastery is the limited variability between participants near the mean who were quantified differently based on correct or incorrect answers to one or two questions. The authors considered utilizing the top and bottom 25% of participants for “high” and “low” mastery groups; however, the authors felt that the benefit of including all participants outweighed this concern. To arrive at a dichotomous mastery score, a median split was computed for all mastery quiz items with those falling into the bottom half comprising the low mastery group and those in the upper half comprising the high mastery group. The analysis was structured similarly to the first, but now with the dichotomized mastery score and group status entered into a MANCOVA as the IVs, baseline scores on the previously mentioned anxiety and depression questionnaires entered as covariates, and scores on the follow-up administration of the questionnaires entered as DVs. It was predicted that there would be a significant group by mastery interaction, with participants in the high mastery intervention group showing lower symptom scores at follow-up.

Participants in the intervention group provided information regarding their utilization of the material presented at the initial session when they returned for the follow-up assessment. During the initial session participants in the intervention group were given eight copies of the SA worksheet to complete for any problematic encounters they
experienced. Utilization was defined as whether the participant answered "yes" or "no" to having completed SA worksheets between the initial and follow-up sessions. This dichotomous approach to measurement and analysis was chosen in an effort to include all participants in the analysis. As with the mastery score, it may have been interesting to examine differences between those completing no SA worksheets and those completing four or more; however, we elected not to utilize this approach so that all participants would be included in the multivariate analysis. It was predicted that there would be a significant group by utilization interaction, with participants who reported completing SA worksheets between the two sessions showing lower symptom scores at follow-up. The same prediction was made for those reporting that the material was helpful.

Results

Preliminary analyses

To investigate the likely presence of outliers and deviations from normality, descriptive statistics were computed with the addition of skew and kurtosis. For the baseline assessment, three outliers were identified on NA. For the follow-up assessment, four BDI outliers, three BAI outliers, and three NA outliers were identified. Because subsequent analyses were conducted with two time points, correction of outliers would decrease the estimation of pre-intervention to follow-up changes in scores; therefore, all participants with outlying data were deleted from subsequent analyses.

Following the deletion of cases with outlying data, results of evaluation of assumptions of normality, homogeneity of variance-covariance matrices, linearity, and multicollinearity were satisfactory. Mild heteroscedasticity was apparent in the scatterplots including NA; however, given that MANCOVA is robust to minor heteroscedasticity, no transformations were computed. Correlations between covariates and DVs between baseline and follow-up are included in Table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Follow-up BDI</th>
<th>Follow-up BAI</th>
<th>Follow-up STAI S</th>
<th>Follow-up PANAS NA</th>
<th>Follow-up PANAS PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline BDI</td>
<td>.44***</td>
<td>.25**</td>
<td>.01</td>
<td>.37***</td>
<td>-.14</td>
</tr>
<tr>
<td>Baseline BAI</td>
<td>.33***</td>
<td>.55***</td>
<td>.05</td>
<td>.35***</td>
<td>.00</td>
</tr>
<tr>
<td>Baseline STAI S</td>
<td>.39***</td>
<td>.25***</td>
<td>.11</td>
<td>.40***</td>
<td>-.36***</td>
</tr>
<tr>
<td>Baseline PANAS</td>
<td>.35***</td>
<td>.24**</td>
<td>.09</td>
<td>.51***</td>
<td>-.20*</td>
</tr>
<tr>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline PANAS PA</td>
<td>-.14</td>
<td>-.02</td>
<td>-.08</td>
<td>-.10</td>
<td>.63***</td>
</tr>
</tbody>
</table>

Note: * = p < .05, ** = p < .01, *** = p < .001

BDI = Beck Depression Inventory, BAI = Beck Anxiety Inventory, STAI-S = State Trait Anxiety Inventory—State, PANAS NA = Positive and Negative Affectivity Schedule, Negative Affectivity, PANAS PA = Positive and Negative Affectivity Schedule, Positive Affectivity

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Table 2 Descriptive statistics for the intervention and control groups at the baseline and follow-up assessment for anxiety and depression

<table>
<thead>
<tr>
<th>Time and group</th>
<th>N</th>
<th>BDI M</th>
<th>BDI SD</th>
<th>BAI M</th>
<th>BAI SD</th>
<th>STAI-S M</th>
<th>STAI-S SD</th>
<th>PANAS NA M</th>
<th>PANAS NA SD</th>
<th>PANAS PA M</th>
<th>PANAS PA SD</th>
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</thead>
<tbody>
<tr>
<td>Baseline</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Control</td>
<td>71</td>
<td>7.7</td>
<td>4.7</td>
<td>9.0</td>
<td>4.7</td>
<td>39.1</td>
<td>10.5</td>
<td>16.4</td>
<td>4.7</td>
<td>33.5</td>
<td>7.6</td>
</tr>
<tr>
<td>Intervention</td>
<td>81</td>
<td>7.6</td>
<td>5.1</td>
<td>7.6</td>
<td>5.0</td>
<td>40.9</td>
<td>10.9</td>
<td>17.1</td>
<td>5.4</td>
<td>30.4</td>
<td>8.3</td>
</tr>
<tr>
<td>Follow-up</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Control</td>
<td>71</td>
<td>8.2</td>
<td>4.6</td>
<td>9.0</td>
<td>7.9</td>
<td>39.8</td>
<td>11.1</td>
<td>16.5</td>
<td>4.7</td>
<td>33.5</td>
<td>8.5</td>
</tr>
<tr>
<td>Intervention</td>
<td>81</td>
<td>5.6</td>
<td>5.7</td>
<td>5.3</td>
<td>4.7</td>
<td>38.4</td>
<td>10.7</td>
<td>15.9</td>
<td>6.0</td>
<td>27.3</td>
<td>8.2</td>
</tr>
</tbody>
</table>

Note: BDI = Beck Depression Inventory, BAI = Beck Anxiety Inventory, STAI-S = State Trait Anxiety Inventory—State, PANAS NA = Positive and Negative Affectivity Schedule, Negative Affect, PANAS PA = Positive and Negative Affectivity Schedule, Positive Affect

Analyses for intervention effects

For the first analysis, a between-subjects MANCOVA was performed on five DVs associated with anxiety and depression of respondents: BAI, BDI, NA, PA, and STAI-S at follow-up. Adjustment was made for five covariates: BAI, BDI, NA, PA, and STAI-S at baseline. IV was group (control and intervention). With the use of the Wilk’s Lambda criterion, the combined DVs were significantly related to group, \( p (5, 141) = 7.21, p < .001 \) (see Table 2).\(^1\)

Lower anxiety and depression at follow-up was found among intervention participants compared to control participants.\(^2\) Cohen’s \( d \) for the BAI, BDI, NA, PA, and STAI-S measures were .50 (ES = .24), .57 (ES = .27), .11 (ES = .06), .74 (ES = .35), and .13 (ES = .06). According to Cohen’s (1988) criteria for small, medium, and large effects, these effect sizes were medium, medium, negligible, medium, and negligible, respectively. Univariate Analysis of Covariance (ANCOVA) revealed significant group effects for BAI, \( p (1, 145) = 7.84, p < .01 \), BDI, \( p (1, 145) = 9.64, p < .01 \), and PA, \( p (1, 145) = 11.12, p = .001 \). Following the recommendations for determination of reliable clinical change (Jacobson & Truax, 1991), calculations for the Reliable Change Index (RCI) were conducted. These calculations were conducted such that an RCI was calculated for each participant based on their change from baseline to follow-up assessments. The formula also includes a correction for the test–retest reliability of the measure. Jacobson and Truax indicate that RCI scores with a magnitude greater than 1.96 are unlikely to occur (\( p < .05 \)) without actual change. For the measures included in this sample (with the exception of PANAS PA), a reduction in symptoms resulted in a decrease from baseline to follow-up; therefore, with Jacobson and Truax’ formula \( (x_2-x_1)/d_{p} \), scores less than negative 1.96 represent reliable improvement. PANAS PA scores greater than positive 1.96 represent reliable improvement (due to increased PANAS PA representing improvement). As can be seen from Table 3, the percentage

\(^1\) The authors also conducted these analyses with the inclusion of only participants with scores in the “minimal” range (Beck & Steer, 1987; Beck & Steer, 1993) on the BAI and BDI to ensure that the observed effect of the intervention was not driven primarily by those at the higher range of symptoms. The pattern of results was similar, indicating that the magnitude of reduction in symptoms occurs uniformly across the distribution of severity.

\(^2\) Analyses indicated no significant gender or ethnicity effects; therefore these variables were not included as IVs.
Table 3 Percent improvement derived from the reliable change index scores for participants in the control and intervention groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDI</td>
<td>19.7%</td>
<td>24.7%</td>
</tr>
<tr>
<td>BAI</td>
<td>8.0%</td>
<td>22.2%</td>
</tr>
<tr>
<td>STAI-S</td>
<td>4.2%</td>
<td>2.5%</td>
</tr>
<tr>
<td>PANAS NA</td>
<td>4.2%</td>
<td>13.6%</td>
</tr>
<tr>
<td>PANAS PA</td>
<td>1.4%</td>
<td>2.5%</td>
</tr>
</tbody>
</table>

Note: BDI = Beck Depression Inventory, BAI = Beck Anxiety Inventory, STAI-S = State Trait Anxiety Inventory—State, PANAS NA = Positive and Negative Affectivity Schedule, Negative Affect, PANAS PA = Positive and Negative Affectivity Schedule, Positive Affect

of participants in the intervention group crossing Jacobson and Truax’ (1991) threshold for reliable improvement was greater for the BDI, BAI, and PANAS PA and NA. Interestingly, the percentage of participants in the control group crossing the threshold for improvement on the STAI-S was greater than for those in the intervention group. Although unexpected, this may indicate that participants in the intervention group experienced mild improvement, but the magnitude did not cross Jacobson and Truax’ threshold. Alternatively, changes in baseline and follow-up scores may have been impacted by measurement error to a greater degree than other measures due to lower test–retest reliability.

Analyses for program mastery

A between-subjects MANCOVA was performed to determine the impact of mastery on the five dependent variables associated with anxiety and depression of respondents: BAI, BDI, NA, PA, and STAI-S at follow-up. Adjustment was made for five covariates: BAI, BDI, NA, PA, and STAI-S at baseline. IVs were mastery (low and high) and group. The combined DVs were not significantly related to mastery, F (5, 139) = 3.74, P > .05, or the interaction of mastery and group, F (5, 139) = .91, P > .05 (see Table 4).

Eighty percent of the participants in the intervention group and 45% of the control participants answered “yes” to the question: Did you find the program you completed helpful?\(^3\) Sixty percent of the participants in the intervention group reported completing at least one SA worksheet to work through a problematic interpersonal encounter. An additional MANCOVA was conducted for the intervention group to determine whether there was a significant effect for use of SA between the baseline session and the follow-up session. This analysis was significant (F (5, 70) = 2.37, P < .05). Specifically, ANCOVA revealed a significant effect of utilizing SA for BDI, F (1, 74) = 9.45, P < .01, suggesting that intervention participants who used SA had lower depression scores at follow-up.

\(^3\) Due to the large difference in the percentage of people who found the material helpful, the above analyses were run a second time with the addition of the helpfulness variable as a covariate. Results and conclusions were similar to those reported above.
Table 4 Descriptive statistics for the intervention and control groups at the baseline and follow-up assessment for anxiety and depression

<table>
<thead>
<tr>
<th>Time and group</th>
<th>N</th>
<th>BDI</th>
<th></th>
<th></th>
<th>BAI</th>
<th></th>
<th></th>
<th>STAI-S</th>
<th></th>
<th></th>
<th>PANAS NA</th>
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<th></th>
<th>PANAS PA</th>
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<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
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</tr>
<tr>
<td>Low mastery</td>
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</tr>
<tr>
<td>Baseline</td>
<td>68</td>
<td>7.3</td>
<td>4.9</td>
<td>9.1</td>
<td>4.8</td>
<td>39.6</td>
<td>10.7</td>
<td>17.3</td>
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<td>31.6</td>
<td>8.0</td>
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</tr>
<tr>
<td>Follow-up</td>
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<td>7.4</td>
<td>6.1</td>
<td>8.1</td>
<td>7.5</td>
<td>40.00</td>
<td>10.0</td>
<td>17.4</td>
<td>6.3</td>
<td>29.2</td>
<td>8.8</td>
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<tr>
<td>Baseline</td>
<td>84</td>
<td>7.9</td>
<td>4.9</td>
<td>7.5</td>
<td>4.9</td>
<td>40.4</td>
<td>10.7</td>
<td>16.5</td>
<td>4.8</td>
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</tr>
<tr>
<td>Follow-up</td>
<td>84</td>
<td>6.3</td>
<td>4.7</td>
<td>6.1</td>
<td>5.6</td>
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</tbody>
</table>

Note: BDI = Beck Depression Inventory, BAI = Beck Anxiety Inventory, STAI-S = State Trait Anxiety Inventory—State, PANAS NA = Positive and Negative Affectivity Schedule, Negative Affect, PANAS PA = Positive and Negative Affectivity Schedule, Positive Affect

Discussion

The expansion of CBASP for the reduction of mild symptoms of depression and anxiety comprises a new and innovative intervention strategy. The results of this study provided preliminary support for the first hypothesis, that there would be a significant group effect, with the intervention group showing lower symptom scores at follow-up. This indicates that participants who completed the intervention program experienced a greater reduction in symptoms at the follow-up assessment. Specifically, while control participants generally showed no change or a slight increase in symptoms, those in the intervention group showed a decrease in symptoms of both anxiety and depression. The effect sizes for these group differences were medium for several of the measures of depression and anxiety. The mean differences for the intervention group reflect approximately one-half a standard deviation change from baseline to follow-up. Change in symptom severity from baseline to follow-up was analyzed individually for all participants using Jacobson and Truax' (1991) RCI formula to determine if changes reflected primarily regression to the mean and/or measurement error. As reported previously, a greater percentage of participants in the intervention group experienced true improvement on measures of depressive and anxious symptoms. This suggests that the intervention reduced symptoms beyond the level of change that would be expected as a function of measurement error.

As indicated previously, approximately 80% of the participants in the intervention group and 45% of the control participants stated at the follow-up assessment session that they found the material helpful. For the control group, this may indicate that simply receiving information about everyday feelings, such as anxiety and low mood, was useful to some participants in helping them deal with these feelings when they arose. For the intervention group, additional information revealed that approximately 60% of the participants used SA to deal with a problematic interpersonal encounter. Though many indicated that they have used the SA worksheets provided to them only once or twice, others completed as many as six of them. In general, participant comments revealed that the computer-based administration of the material was very user-friendly and convenient. They also indicated that specific examples and the step-by-step instructions were especially helpful in aiding them in utilizing the material outside of the training session. This suggests that rather than the completion of the intervention program
leading to immediate benefit for the participants, it may have been their utilization and later application of SA that influenced their symptoms at the follow-up assessment session.

The impact of the intervention program on participants was also assessed to determine the relative benefit of the program material for participants who demonstrated high mastery compared to those with low mastery. We expected that students with low mastery scores would experience less significant change in symptom ratings. This hypothesis was not supported by the results. The results indicated that individuals with high and low mastery reported similar change in symptoms. A possible explanation for this is that participants who missed quiz items then reviewed the related material a second time, resulting in equivalent mastery to those with higher scores.

The results of this study are consistent with studies suggesting positive outcomes for interventions that incorporate elements of CT and CBT. Specifically, these studies have suggested that psychosocial and CBT-based strategies are among the most effective of intervention techniques. Intervention efforts including social problem solving, cognitive training, coping skills, and interpersonal skill acquisition are effective means of reducing mild symptoms of depression and anxiety (Dubow et al., 1993; Jaycox et al., 1994). Munoz and colleagues (1995) have further indicated that CBT strategies impact cognitions associated with anxiety (i.e., pessimism and negative automatic thoughts). Although the group differences in this study were modest, it is possible that the CBASP technique impacts symptoms of anxiety and depression through a variety of cognitive and behavioral mechanisms. First, social problem solving may be improved following the mastery of CBASP. Nezu and Ronan (1985) indicated that deficits in social problem solving moderate the effects of stressful life events on the onset of depression. Thus, CBASP may improve problem solving by decreasing factors that impair these abilities (e.g., avoidance, rumination, low self-efficacy). Another possible mechanism of action for the modest symptom decreases associated with a CBASP intervention is a lessening of risk factors for anxiety and depression. By increasing awareness of negative thoughts and situational assumptions, participants may have experienced an increase in self-esteem and self-efficacy, and a decrease in helplessness, hopelessness, and stress associated with severe stressors.

This study provides preliminary evidence that CBT techniques may be effective as a primary intervention with young adults. The relative simplicity of this intervention program made it appropriate for a computer-based intervention program for students with little or no background in either the symptoms of anxiety or depression, or in the components of the intervention program itself. As previously stated, the simplicity and interpersonal nature of the CBASP intervention program made it relevant to participants regardless of current levels of anxiety and depression. The utilization of the computer-based technology made it possible to administer this CBASP intervention to all interested participants. The resources necessary to deliver this type of intervention in a one-on-one or group format would have required significant time and monetary resources.

It is important that this study was able to achieve documented positive outcomes with relatively little time devoted to the materials. Specifically, this intervention consisted of one session lasting approximately 2 h, whereas many other intervention studies have required numerous sessions, totaling at least 6 h, usually substantially more. Even so, effect sizes and symptom change associated with the intervention were similar between this and other cited studies (though our follow-up interval was shorter, a limitation that will be noted next).
These results have implications for prevention science with young adults. This study indicated that young adults with mild symptoms are willing to participate in a study that examines psychoeducational and cognitive-behavioral approaches to depressive and anxious symptoms. Further, students indicated finding the computer-based approach user friendly. This suggests that a similar approach would be an efficient way to approach prevention of anxiety and depression in college students. Based on the results of this study, it would be feasible and acceptable to at-risk young adults to complete a prevention program that utilizes the CBASP approach and computer or web-based technology. This approach would be a cost-effective and efficient way to disseminate the CBASP approach as a method for dealing with situations and events that are known risk factors for the onset of anxious or depressive disorders.

The limitations of this study are primarily the result of time and resource constraints. Specifically, this study did not identify and target an at-risk sample (e.g., high cognitive vulnerability, low self esteem, hopelessness) for intervention. This choice was made to increase the generalizability of findings to a general population of young adults with mild anxiety or depression; however, identifying participants with risk factors for the onset of depression or anxiety would increase the extent to which this intervention may decrease risk for subsequent symptoms. Further, doing so would have allowed us to draw more definitive conclusions regarding the mechanisms by which this intervention led to modest decreases in symptoms (i.e., by increasing self esteem, etc.). A second limitation is the inclusion of a relatively brief two-hour intervention program. It is possible that a longer, more personalized program may have led to greater symptom reduction. In particular, the 20% of intervention participants who did not find the intervention helpful may have obtained additional help in applying the CBASP strategy to their own problematic encounters. The participants who did not utilize the SA worksheets may have also found it easier to do so if more individualized attention was offered in filling them out and reviewing them. Another limitation was the length of time between the baseline and follow-up assessment. A longer follow-up period with would have constituted a more stringent test of the intervention effect, a key avenue for future work. Specifically, future studies will be conducted with follow-up periods of 6 months to 1 year, to determine whether benefits are maintained over time. It is interesting to note that the ratio of intervention program duration (2 h in our study) to follow-up interval (2 months in our study) was 1 h per month. This ratio is similar to or less intensive than many other studies, many of which obtain effect sizes similar to those found here.

Future studies should expand this intervention strategy in a number of ways. First, a prevention framework should be pursued wherein participants are identified who are at-risk for depression or anxiety as a result of known risk factors. In addition, an expansion of the computer-based approach should be developed to make it possible for participants to further adapt the content of the intervention (i.e., SA worksheet examples) to their own personal situations. Though an attempt was made to make the material in this intervention relevant to the participant group, it may not have resonated with all participants. Third, investigation should ascertain whether this intervention may be conducted with web-based technology, thereby further enhancing the ease of utilization for participants. This would also allow participants repeat access to the information in a way that makes it possible for the investigator to track site usage. A more intensive intervention program should also be developed whereby participants obtain a greater dose of the intervention, with the addition of therapist availability in the event of problems using the technique, with multiple follow-up assessment sessions.
If the future studies above document support for this intervention, a final direction is the expansion of the characteristics of study participants. Specifically, participants may be selected from a less homogeneous population (i.e., not just college students). This will increase the generalizability of conclusions regarding the effectiveness of this intervention strategy.

References


