Testing the Efficacy of a Computerized Behavioral Activation Treatment of Depressive Disorders

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TESTING THE EFFICACY OF A COMPUTERIZED BEHAVIORAL ACTIVATION TREATMENT OF DEPRESSIVE DISORDERS

by

Alyssa H. Kalata

A Dissertation
Submitted to the Faculty of The Graduate College in partial fulfillment of the requirements for the Degree of Doctor of Philosophy in Department of Psychology
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Western Michigan University
Kalamazoo, Michigan
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TESTING THE EFFICACY OF A COMPUTERIZED BEHAVIORAL ACTIVATION TREATMENT OF DEPRESSIVE DISORDERS

Alyssa H. Kalata, Ph.D.

Western Michigan University, 2010

The present study sought to examine the feasibility and preliminary efficacy of a computerized behavioral activation treatment for depressive disorders (IMM-BA), while also investigating potential mechanisms of action involved in the treatment of depression through the use of behavioral activation. Nine adults who met criteria for either Major Depressive Disorder or Dysthymic Disorder were recruited from Kalamazoo, Portage, and surrounding areas in Southwestern Michigan. All participants received ten sessions of IMM-BA treatment. Symptoms of depression and related information were assessed at pretreatment and one-week, one-month, three-month, and six-month follow-up through the use of the Beck Depression Inventory – II (BDI-II), the Revised Hamilton Rating Scale for Depression (RHRSD), the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID), the Behavioral Activation for Depression Scale (BADS), the Automatic Thoughts Questionnaire (ATQ), and the Quality of Life Scale (QOLS). It was hypothesized that IMM-BA treatment would lead to significant decreases in symptoms of depression and positive changes in quality of life. Furthermore, it was hypothesized that changes in the patterns and nature of overt behavior of participants would be the primary mechanism by which treatment effects were observed.
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CHAPTER I
INTRODUCTION

Major Depressive Disorder is a mood disorder characterized by a two-week period of either depressed mood or anhedonia, accompanied by at least four additional symptoms, including (1) weight loss or weight gain, (2) insomnia or hypersomnia, (3) psychomotor retardation or agitation, (4) fatigue or loss of energy, (5) feelings of worthlessness or guilt, (6) diminished ability to think or concentrate, and (7) recurrent thoughts of death or suicide (American Psychiatric Association, 2000). This debilitating disorder affects 20.9 million (9.5%) American adults each year (National Institutes of Mental Health, 2009) and 121 million people worldwide (World Health Organization, 2009). Dysthymic Disorder is another common mood disorder, characterized by a two-year period during which an individual experiences depressed mood more often than not, accompanied by at least two additional symptoms, including (1) poor appetite or overeating, (2) insomnia or hypersomnia, (3) low energy or fatigue, (4) low self-esteem, (5) poor concentration or difficulty making decisions, and (6) feelings of hopelessness (American Psychiatric Association, 2000). The lifetime prevalence of Dysthymic Disorder is estimated to be 6%, with 3% of the population suffering from Dysthymic Disorder at any given time (American Psychiatric Association, 2000). In addition to the presence of unpleasant symptoms that characterize these depressive disorders, these disorders often also have
substantial negative impacts on the social, academic, physical, familial, occupational, and sexual functioning of those individuals suffering from these disorders. Additionally, depressive disorders are costly on a societal level, in terms of diminished productivity in the workplace, value of lifetime earnings lost due to suicide, and expenses associated with treatment (National Institutes of Mental Health, 2009).

Although the costs of depressive disorders are immense, at both an individual and societal level, fewer than 25% of all individuals suffering from depressive disorders have access to effective treatment (World Health Organization, 2009). Interestingly, this statistic cannot be accounted for by a lack of empirically supported treatments for depressive disorders. In an extensive review and evaluation of treatments for common psychological disorders, Chambless and colleagues (1998) determined that three treatments for depressive disorders (behavior therapy, cognitive therapy, and interpersonal therapy) met criteria to be considered “well-established” treatments and an additional five treatments for depressive disorders (brief dynamic therapy, cognitive therapy for geriatric patients, reminiscence therapy for geriatric patients, self-control therapy, and social problem-solving therapy) met criteria to be considered “probably efficacious” treatments. Furthermore, although the clinical efficacy of antidepressants above that observed by individuals receiving placebos in medication-based clinical trials has recently been contested (e.g. Kirsch, Deacon, Huedo-Medina, Scoboria, Moore, & Johnson, 2008), antidepressants are also a commonly considered to be an additional effective treatment for depressive disorders.
A number of variables may account for the alarming lack of access to effective treatment for individuals suffering from depressive disorders. Financial burdens on the individual seeking treatment may play a substantial role, as services may only be available during hours that an individual is scheduled to work (Alegrfa, Chatterji, Wells, Cao, Chen, Takeuchi, et al., 2008) or as individuals may have insurance plans that limit coverage for mental health services or require high per session copays (Castellblanch & Abrahamson, 2003). Lack of access or desire to seek specialty services, coupled with long wait times for individuals who do choose to seek specialty services, also impacts access to treatment (Coyle, Doherty, Matthews, & Sharry, 2007; Pomerantz, Cole, Watts, & Weeks, 2008). Although the United States has some of most developed mental health care systems in the world, there are still only 10.5 psychiatrists, 14 psychologists, 32.95 psychiatric nurses, and 15.7 social workers per 100,000 people (Saxena, Thornicroft, Knapp, & Whiteford, 2007). Lack of availability of qualified mental health practitioners may be compounded by living in a rural location or in an area that is typically underserved in terms of mental health services (McGinty, Saeed, Simmons, & Yildirim, 2006). Even if qualified mental health practitioners are available, the locations in which these individuals practice may be inconvenient to individuals who would benefit from mental health services. A limited number of treatment outcome studies have addressed this issue by making services available in more convenient locations, including homes of individuals seeking services (e.g. Yon & Scogin, 2009) and local supermarkets (e.g. Swartz, Shear, Frank, Cherry, Scholle, & Kupfer, 2002), however
availability of services in non-traditional locations has yet to become common practice. In addition to all of these factors, other issues influencing the likelihood that someone will receive effective treatment for their depressive symptoms include the extent to which they are impacted by social stigmas associated with seeking mental health services, mistrust of mental health professionals on the part of the individual seeking services, individual demographic variables (e.g. race, age), and lack of accurate screening for depressive disorders in primary care settings (Alegría, Chatterji, Wells, Cao, Chen, Takeuchi, et al., 2008; Coyle, Doherty, Matthews, & Sharry, 2007; Pandiani, Banks, Bramley, Pomeroy, & Simon, 2002; Pomerantz, Cole, Watts, & Weeks, 2008).

Information available at the present time suggests that the reasons individuals are not receiving effective treatments for depressive disorders has little to do with the existence of effective treatments for depression. A number of treatments with demonstrated efficacy exist for this debilitating group of mood disorders. Instead, the primary barriers to treatment include dissemination of principles of effective assessment to primary care providers and dissemination of principles of effective treatment to mental health practitioners, the existence of ample mental health practitioners to meet demand, and the presence of affordable and local treatment options. These barriers necessitate a novel approach to the treatment of depressive disorders.
CHAPTER II
LITERATURE REVIEW

*Description of Behavioral Activation.* As mentioned previously, behavior therapy is one of three well-established treatments for depressive disorders. Encompassed within behavior therapy is a specific approach to treatment, known as behavioral activation. Early versions of behavioral activation focused primarily on encouraging patients to engage in activities that are commonly assumed to be pleasant, such as taking a walk or having dinner with a friend. A number of more nuanced, contemporary iterations of behavioral activation have since developed, each of which have some unique aspects, but most of which include a few common features. First, all versions of behavioral activation include some type of scheduling of various daily activities that have a functional relationship to the symptoms of depression of the individual seeking treatment. These activities may have a number of intended effects, including evoking a sense of mastery and/or pleasure (Jacobson, Dobson, Truax, Addis, Koerner, Gollan, et al. 1996), disrupting patterns of avoidance (Jacobson, Martell, & Dimidjian, 2001), regulating the daily routines of the individual in treatment (Jacobson, et al., 2001), and/or helping the individual to behave in a way that is more consistent with his or her values (Lejuez, Hopko, & Hopko, 2001). Second, all versions of behavioral activation emphasize the importance of engaging in scheduled and unscheduled daily activities, regardless of one’s mood or desire to
engage in these activities (Jacobson, et al., 2001). Behavioral activation is based on the premise that in order to feel differently, one must first behave differently, instead of the premise that in order to behave differently, one must first think and feel differently (Jacobson, et al., 2001). Finally, most contemporary behavioral activation approaches include supplemental behavioral treatment components intended to address specific maintaining or exacerbating factors of the symptoms of depression for the individual seeking treatment (Jacobson, et al., 1996; Lewinsohn, Sullivan, & Grosscup, 1980). These components may include training in assertiveness, social skills, relaxation, time management, behavioral contracting, problem-solving, goal-setting, distraction from distressing cognitions and rumination, and implementation of graded task assignments (Jacobson, et al., 1996; Jacobson, et al., 2001; Lejuez, et al., 2001; Lewinsohn, et al., 1980).

Theoretical Framework of Behavioral Activation. The theoretical underpinnings of behavioral activation are rooted in radical behaviorism, a theoretical framework elucidated by B. F. Skinner and his contemporaries. Based on this framework, a number of authors have hypothesized about factors that may be responsible for the maintenance of behaviors commonly observed in individuals suffering from depressive disorders. Ferster (1973) was one of the first individuals to identify behavior patterns of depressed individuals that are now targeted in behavioral activation. The model of depression he put forth identifies two patterns that characterize the behavior of depressed individuals: (1) a low rate of positively reinforced social behaviors, such as eye contact and verbal communication, and (2) a
high rate of escape and avoidance behaviors, such as avoidance of social situations or requests for help. In turn, Ferster hypothesized that a decreased amount of activity on the part of the depressed individual would lead to a weakening in the connection between an individual’s action and the reinforcers sustaining them, which may further exacerbate symptoms of depression. Within his model, Ferster also outlined a number of possible etiologies of symptoms of depression, some of which reflect the prevalence of traditional psychoanalytic theories at the time (e.g. fixated personality development), but were discussed in a more behaviorally-oriented framework, and others of which seem to arise out of a solely behavioral framework (e.g. low rates of positively reinforced behavior due to a loss of a potent reinforcer).

From Ferster’s model, which was focused primarily on discussions of possible etiology of depression and descriptions of the behavior of depressed individuals, Lewinsohn (1974) developed a model of depression upon which early formulations of behavioral activation were based. In Lewinsohn’s model, a low rate of response-contingent reinforcement is believed to be an important antecedent in the development of symptoms of depression, which in turn results in the low rates of behavior observed in depressed individuals, as a paucity of reinforcement leads to adaptive behaviors being extinguished. Additionally, this lack of reinforcement is hypothesized to lead to an increase in depressed mood and dysphoric feelings (Lewinsohn, et al., 1980). Response-contingent reinforcement is believed to be a function of three factors: (1) the number of events believed to be positively reinforcing to the affected individual, (2) the availability of these positively
reinforcing events in the affected individual's environment, and (3) the availability of a behavioral repertoire within the affected individual that is needed to obtain positive reinforcement from the environment. Furthermore, the potency of reinforcing events may also be reduced. Additionally, Lewinsohn, et al. (1980) hypothesized that punishment may also play an important role in the etiology and maintenance of depression, such that there may be a high rate of punishing events occurring in the individual's environment and the individual may lack the necessary repertoire to reduce the frequency or intensity of these punishing events. From this model, Lewinsohn developed the first iteration of behavioral activation, which focused on monitoring pleasant and unpleasant events, scheduling pleasant events, and teaching social skills. While this approach to the treatment of depression had some limited success, critics of this approach note that it pays little attention to increases in behaviors maintained by negative reinforcement (Kanter, Callaghan, Landes, Busch, & Brown, 2004). Furthermore, contemporary iterations of behavioral activation are rooted in functional contextualism, which expands beyond the model proposed by Lewinsohn and includes a specific focus on the idiographic, functional relationship between specific activities and symptoms of depression (Kanter, et al., 2004). While this is an improvement upon the initial theoretical frameworks upon which behavioral activation is based, Kanter, et al. (2004) still note that in-vivo application is another important component of a more complete behavioral treatment, and thus have directed some of their attention to supplementary approaches (e.g. Functional
Analytic Psychotherapy) to the treatment of depression in order to address this component.

It follows naturally from historical and contemporary behavioral theories of the etiology and maintenance of symptoms of depression that the hypothesized mechanism of action in behavioral activation is changes in overt behavior. Authors have put forth two hypotheses about specifically how changes in overt behavior may decrease symptoms of depression. First, addressing qualitative and quantitative deficits in overt behaviors may increase the availability of reinforcers in the environment of the depressed individual (Hopko & Mullane, 2008), which has been called the “activation hypothesis” by Jacobson and colleagues (1996). A study conducted by Hopko and Mullane (2008) found that mildly depressed individuals engaged in fewer physical, educational, and social activities and more employment activities than non-depressed individuals. These data suggest that both amount of behavior emitted, as well as types of behavior emitted, are relevant when developing interventions to address symptoms of depression. As depressed individuals engage in activities prescribed as part of behavioral activation treatment, they are likely to encounter reinforcement for non-depressed behavior, which in turn increases the likelihood that they will engage in non-depressed behavior and decreases the likelihood that they will engage in depressed behavior in the future (Lejuez, et al., 2001). Second, changes in overt behavior may decrease symptoms of depression through countering avoidance patterns that are commonly observed in individuals experiencing depression (Lejuez, et al., 2001). Depressed individuals frequently
engage in behaviors that serve to reduce or avoid imminent distress, at the expense of eliminating access to potential reinforcers (Hollon, 2001; Jacobson, et al., 2001).

While these behaviors may be functional in the short-term, they ultimately exacerbate symptoms of depression over the course of time, in addition to creating new difficulties in other areas of the depressed individual’s life (e.g. social, occupational) (Jacobson, et al., 2001). Behavioral activation may work through countering these patterns of avoidance and withdrawal, which creates the possibility of encountering sources of reinforcement (Hollon, 2001; Jacobson, et al., 2001).

Unfortunately, studies that have explicitly attempted to examine potential mechanisms of action in behavioral activation are limited. Jacobson and colleagues (1996) were the first group to attempt to examine mechanism of action in their component analysis of cognitive-behavioral therapy for depression. Participants in their study were assigned to three treatment conditions: behavioral activation alone, behavioral activation plus treatment components aimed at modifying negative automatic thoughts, and behavioral activation plus treatment components designed to address negative automatic thoughts and maladaptive core schemas. Participants in all three conditions demonstrated increases in frequency and perceived enjoyment of pleasant activities, decreases in negative automatic thoughts, and decreases in attribution of negative life events to internal, stable, and global factors. In terms of temporal relationships, Jacobson, et al. (1996) noted two interesting observations. First, participants in the behavioral activation condition who experienced changes in their cognitive schemas earlier in treatment displayed greater decreases in their
symptoms of depression later in treatment. Second, participants in the condition that included behavioral activation and treatment components targeting negative automatic thoughts and maladaptive core schemas who increased their frequency of pleasant events earlier in treatment experienced greater decreases in their symptoms of depression when measured later in treatment. These observations conflict with the hypothesis that changes in overt behaviors are responsible for changes in symptoms of depression in behavioral activation.

Gaynor and Harris (2008) attempted to investigate potential mechanisms of action of behavioral activation at more frequent time intervals than used in the Jacobson, et al. (1996) study. Gaynor and Harris (2008) noted that one of the potential limitations regarding the way in which Jacobson, et al. (1996) examined potential mediators of treatment effects was that variables pertaining to potential mediators were only measured at pre-treatment, mid-treatment, and post-treatment, which may obscure changes that were occurring on a week-to-week basis. Gaynor and Harris (2008) presented data on four depressed adolescents who experienced remission of symptoms of depression following a course of values-based behavioral activation. Potential mediators of changes in symptoms of depression were measured on a weekly basis through the use of the Negative Self-Concepts and Negative Expectations subscale of the Automatic Thoughts Questionnaire and through the active coping and behavioral disengagement subscales of the COPE. Three of the four participants demonstrated increases in activation when the values-based behavioral activation was introduced and for two of the four participants, the
introduction of values-based behavioral activation preceded changes in symptoms of depression. This suggests that for these two participants, increased activation is a plausible mediator of observed treatment effects. Furthermore, changes in dysfunctional thinking did not appear to be a plausible mediator for any of the four participants.

Behavioral Activation Treatment Outcome Data. Although research on treatment approaches resembling contemporary behavioral activation or components of contemporary behavioral activation has been occurring since the late 1960s (Kanter, et al., 2004), behavioral activation was not recognized as a standalone treatment of depression until the aforementioned seminal component analysis study of cognitive-behavioral therapy for depression conducted by Jacobson and colleagues (1996). One hundred and forty-nine outpatients diagnosed with major depression were randomly assigned to one of three treatment conditions. The behavioral activation (BA) condition included monitoring of daily activities and ratings of mastery and pleasure associated with these activities, graded task assignments, cognitive rehearsal of scheduled activities, social skills training, and behavioral interventions for specific problems. The activation and the modification of dysfunctional thoughts (AT) condition included all the components of the BA condition, plus a specific focus on the modification of automatic dysfunctional thoughts and cognitive distortions. The cognitive-behavioral therapy (CT) condition included all the components of the AT condition, as well as a focus on addressing broader patterns of thought that are believed to be responsible for automatic
dysfunctional thoughts and cognitive distortions. Of the 149 individuals randomized to one of these three treatment conditions, 137 individuals completed treatment. At the end of acute treatment, all three interventions performed equally across all outcome measures, including the BDI, HRSD, and measures of dysfunctional thinking. All three interventions also had comparable effects at six-month follow-up, indicating that all three were equally as successful in terms of relapse rates. Furthermore, a subsequent data analysis conducted by Gortner, Gollan, Dobson, and Jacobson (1998) showed that this finding regarding relapse rates was maintained at two-year follow-up.

Although numerous smaller behavioral activation treatment outcome studies were conducted subsequent to the Jacobson, et al. (1996) treatment outcome study, the next large-scale investigation of the efficacy of behavioral activation was conducted by Dimidjian and colleagues in 2006. Two hundred and forty-one adults with major depressive disorder were randomized to one of four conditions: behavioral activation (BA), cognitive therapy (CT), antidepressant medication (ADM), or pill placebo (PLA). The BA condition involved an expanded version of the behavioral activation protocol utilized in the Jacobson, et al. (1996) study and included additional components to address avoidance behaviors, regularized routines, and rumination. The CT condition targeted behavioral dysfunction, situation-specific negative thinking and cognitive distortions, and underlying maladaptive cognitive schemas. The ADM condition involved the use of antidepressant medications administered under triple-blind conditions for the first eight weeks of the study and
single-blind conditions for the remaining eight weeks of acute treatment. In this condition, participants saw a pharmacotherapist on a weekly basis for the first four weeks of treatment and then on a bi-weekly basis for the remainder of the acute treatment phase. As with the ADM condition, the PLA condition involved the use of a pill placebo administered under triple-blind conditions for the first eight weeks of treatment. After eight weeks, the blind was broken and participants in the PLA condition were allowed to select any of the active treatments being provided in the study. Of the 241 individuals randomized to treatment, 172 were treatment completers. The rate of attrition was significantly higher in the ADM condition, in comparison to the BA and CT conditions. Significant improvement among “low-severity” participants on the BDI and HRSD was observed across all active treatment conditions, with no differential outcomes observed between groups. Among “high-severity” participants, BA and ADM significantly outperformed CT. Furthermore, BA led to greater remission rates and lower attrition rates than ADM. Data from this study suggesting that BA may be a more efficacious treatment than CT for more severely depressed individuals was further supported in a reanalysis of the Dimidjian, et al. (2006) data conducted by Coffman and colleagues (2007). Coffman, et al. (2007) examined data from a subset of individuals randomized to the CT condition who had an extreme non-response to cognitive therapy. A number of common characteristics among these individuals were identified, including longstanding depression symptoms, significant functional impairment, and difficulties with primary support groups. Interestingly, individuals with similar characteristics who were
assigned to the BA condition did not experience the same extreme non-response to behavioral activation therapy, providing further support for the hypothesis that behavioral activation may be particularly helpful for individuals endorsing severe levels of depressive symptoms.

The literature examining the efficacy of behavioral activation has been summarized in three recent meta-analyses. Spates, Pagoto, and Kalata (2006) conducted a qualitative and quantitative analysis of eight studies investigating behavioral activation from the Jacobson, et al. (1996) study through studies conducted in 2006. Studies were evaluated based on seven “gold standards” for treatment outcome studies outlined by Foa and Meadows (1997) and based on the Agency for Health Care Policy and Research (AHCPR) standards for level of evidence supporting health care interventions. Furthermore, effect sizes for each of the studies included in the meta-analysis were also conducted. On average, the studies included in the meta-analysis met five out of the seven criteria outlined by Foa and Meadows (1997) and achieved either an “A” or “B” rating based on the AHCPR standards, suggesting that the studies included in the meta-analysis were of relatively high quality. Effect sizes for improvement in symptoms of depression, as measured by the Beck Depression Inventory, ranged from medium to very large at post-treatment and small to very large at follow-up. Of note, six of eight studies had very large effect sizes at post-treatment and five of eight studies had very large effect sizes at follow-up. Effect sizes for improvements in symptoms of depression, as measured by the Hamilton Rating Scale for Depression, ranged from large to very large at both
post-treatment and follow-up. Attrition rates for studies included in the meta-analysis ranged from 9% to 33%, with a mean of 18.71%, which is comparable to those observed in treatment outcome studies utilizing other treatment approaches for depression. Based on these data, the Spates, et al. (2006) concluded that the quality of existing treatment studies for behavioral activation is relatively high and that the data are strongly suggestive that it is an efficacious treatment for depression.

Ekers, Richards, and Gilbody (2007) conducted a subsequent meta-analysis of the behavior therapy literature that reviewed seventeen randomized controlled trials involving 1,109 subjects. Twenty studies conducted prior to January 2006 were initially identified for inclusion, however three were ultimately eliminated from the data analysis due to insufficient data reporting. The meta-analysis demonstrated large effect sizes favoring behavior therapy when compared to waitlist/control, brief psychotherapy, and supportive therapy conditions. No differences were observed in treatment outcome data between behavior therapy and cognitive/cognitive-behavioral therapy. Based on these data, Ekers, et al. (2007) concluded that behavior therapy is an effective treatment for depression that may have the additional advantage of being a particularly parsimonious treatment that is relatively simple to deliver.

Finally, Cuijpers, van Straten, and Warmerdam (2007) conducted a meta-analysis looking more specifically at the effects of activity scheduling on symptoms of depression. Sixteen studies involving 780 subjects conducted between 1966 and March 2005 were included in their meta-analysis. The authors noted that the quality of many of the studies included in their analysis was not optimal, although many of
the studies did include blinding of individuals who were assessing outcome. Dropout rates ranged from 2% to 39% across the studies that reported this information. The pooled effect sizes between activity scheduling and control conditions, activity scheduling and other psychological treatments, and activity scheduling and cognitive therapy were 0.87, 0.13, and 0.02, respectively. These data indicate a large effect size favoring activity scheduling in comparison to control conditions and a non-significant effect size favoring activity scheduling when compared to alternative psychological interventions. Changes from post-treatment to follow-up in the activity scheduling conditions were non-significant, suggesting that improvements in symptoms of depression were maintained. Based on these data, Cuijpers, et al. (2007) concluded that activity scheduling is a viable treatment option for symptoms of depression that performs comparably to alternative psychological treatments.

When considering the literature as a whole, it appears as though behavioral activation is an efficacious treatment for depression. Furthermore, in considering individual studies, behavioral activation seems to be effective for a variety of populations (e.g. university students, elderly individuals), in a variety of formats (e.g. single-session, individual, group), and for depression that is co-morbid with other conditions and illnesses (e.g. cancer, obesity) (Gawrysiak, Nicholas, & Hopko, 2009; Hopko, Bell, Armento, Hunt, & Lejuez, 2005; Houghton, Curran, & Saxon, 2008; Pagoto, Bodenlos, Schneider, Olendzki, Spates, & Ma, 2008; Porter, Spates, & Smitham, 2004; Yon & Scogin, 2009). However, much of the research in these areas is more limited, suggesting that future replications of these studies are indicated.
Computerized Treatments for Depressive Disorders Treatment Outcome Data.

Although researchers have been creating programs designed to replicate therapeutic interactions since the 1960s, Selmi, Klein, Greist, Sorrell, and Erdman (1990) were the first group to conduct an empirical investigation of the efficacy of a computerized treatment for depression. Thirty-six participants with major or minor depressive disorder were randomly assigned to a computer-administered cognitive-behavioral therapy condition, a therapist-administered cognitive-behavioral therapy condition, or a wait-list control condition. The two active treatment conditions consisted of six sessions of therapy focusing on the relationship between automatic thoughts and emotions, increasing mastery and pleasure of daily activities, techniques to control automatic thoughts, and analysis of core beliefs. Participants assigned to the wait-list control condition were told that they would be allowed to begin treatment after fourteen weeks. There were no dropouts in any of the three conditions. Both active treatment conditions demonstrated statistically significant improvements in comparison to the control condition on the BDI, HRSD, ATQ, and depression and global scales of the SCL-90. These improvements were maintained at two-month follow-up.

Since the Selmi, et al. (1990) study, two primary computerized treatments for depression (Overcoming Depression and Beating the Blues) have emerged, although other computerized treatments for depression (e.g. ODIN, MoodGYM) have also been empirically tested and will be discussed briefly. The initial investigation of the efficacy of the Overcoming Depression computer-assisted CBT program was
conducted by Bowers, Stuart, MacFarlane, and Gorman (1993). Twenty-two inpatients diagnosed with major depression were assigned to one of three conditions: therapist-delivered CBT plus treatment-as-usual, computer-assisted CBT plus treatment-as-usual, or treatment-as-usual alone. Treatment-as-usual included the administration of antidepressant medications and participation in therapeutic activities offered on the inpatient unit (e.g. milieu therapy, vocational rehabilitation). The therapist-delivered CBT condition involved treatment-as-usual, plus eight sessions of CBT administered over two weeks by a therapist. The first four sessions of therapy focused on behavioral interventions (e.g. activity scheduling, graded task assignments) and the final four sessions focused on identifying, monitoring, and challenging negative automatic thoughts and cognitive distortions. The computer-assisted CBT involved treatment-as-usual, plus eight sessions of CBT administered by the Overcoming Depression computer program. The Overcoming Depression program focused on psychoeducation about depression and modifying negative automatic thoughts and cognitive distortions. Of note, it did not include the behavioral interventions used in the therapist-delivered CBT condition. There were no dropouts in any of the three conditions. Participants in the therapist-delivered CBT condition showed statistically significant improvements on the HRSD and BDI from pre-treatment to post-treatment in comparison to individuals in the computer-assisted CBT condition. The authors hypothesized that these between-group differences may be accounted for by the lack of behavioral interventions in the Overcoming Depression program or by non-specific therapeutic factors.
Whitfield, Hinshelwood, Pashely, Campsie, and Williams (2006) conducted a subsequent study of a modified version of the *Overcoming Depression* program, which had more favorable results than those observed in the Bowers, et al. (1993) study. Unlike the iteration of *Overcoming Depression* utilized in the Bowers, et al. (1993) study, the version of the program tested by Whitfield and colleagues (2006) included an emphasis on behavioral skills to combat maladaptive behaviors and inactivity, in addition to other components included in the previous version of the program. Whitfield, et al. (2006) offered computerized CBT to 78 individuals referred to a mental health clinic for symptoms of depression and anxiety, while they were on a four-month waitlist to receive clinical services. Of the 78 individuals who were offered computerized CBT, 20 individuals attended at least one session of computerized CBT and 14 individuals completed all six sessions of computerized CBT. The computerized CBT treatment was offered in three locations: a clinical psychology department, a university reading room, and a community health center located within a shopping center. Participants who completed the computerized CBT program were minimally assisted by a self-help support nurse over the course of treatment. Treatment completers showed clinically and statistically significant decreases on the BDI-II, with average scores decreasing from the severe range to the mild range. Treatment completers also showed decreases on the BAI, from the moderate to severe range to the mild range. Furthermore, scores on the BDI-II and BAI continued to decrease through follow-up.
Of note, 72% of referred patients in the Whitfield, et al. (2006) study refused computerized CBT services while on the waiting list to receive therapist-administered services, suggesting that some aspect of computerized CBT is unappealing to consumers seeking therapy services. To investigate attitudes toward computerized CBT, Mitchell and Gordon (2007) conducted a two-stage study examining perceived credibility, expectancy for improvement, likelihood of using computerized CBT, preferences for therapy modalities, and perceived advantages and disadvantages of computerized CBT. In the first stage of the study, 122 university students were given a series of self-report measures about the aforementioned topics. These students rated the perceived credibility of computerized CBT as a 12.20 out of 27 possible points, the average expected improvement in symptoms as a result of using computerized CBT as 34.7%, and the average likelihood of using a computerized CBT program as 47.6%, all of which were considered to be poor ratings. In the second stage of the study, 20 students who were involved in the first stage of the study met with a researcher and received a half-hour demonstration of the Overcoming Depression program. After receiving a demonstration of the computerized CBT program, median credibility ratings increased from 13.50 to 20.50, median expectancy for improvement increased from 40% to 60%, median likelihood of using computerized CBT increased from 40% to 80%, and preference for using computerized CBT increased from 15% to 30%. These data suggest that favorable perceptions of computerized CBT can be increased through relatively minimal intervention.
The other well-known computerized CBT program for depression that has emerged is *Beating the Blues*. *Beating the Blues* is an eight-session CBT program that includes behavioral components, focusing on pleasant activity scheduling, problem-solving, sleep hygiene, graded exposure, and breaking down tasks, as well as cognitive components, including identifying and challenging thinking errors, negative automatic thoughts, and maladaptive core beliefs. Proudfoot and colleagues initially tested this program with 274 patients presenting in a primary care setting with symptoms of depression and/or anxiety (Proudfoot, Ryden, Everitt, Shapiro, Goldberg, Mann, et al., 2004). Patients were randomly assigned to computerized CBT or treatment-as-usual. The treatment-as-usual condition was not controlled, such that patients in this condition could receive any treatment recommended by their general practitioner, as well as treatment that they opted to seek on their own. Antidepressant use was allowed in both conditions. Dropout rates in the computerized CBT condition were 35% for the first phase of the study and 22% for the second phase of the study, which is comparable to rates reported for face-to-face CBT. Patients in the computerized CBT condition demonstrated statistically significant improvement on the measures of depression, negative attributional style, and work and social adjustment. Furthermore, they also demonstrated improvements in symptoms of anxiety that approached significance. These gains were maintained at follow-up through six months.

Cavanagh, Shapiro, Van Den Berg, Swain, Barkham, and Proudfoot (2006) conducted a subsequent naturalistic, non-randomized treatment outcome study of
Beating the Blues. Two hundred and nineteen individuals presenting with depression and/or anxiety at primary or secondary care settings were given the option to receive computerized CBT. Of the 219 individuals who completed pre-treatment measures, 62% completed all eight sessions of the computerized CBT program and 47% completed at least one post-treatment assessment. Statistically and clinically significant improvements were observed among treatment completers and individuals included in an intent-to-treat analysis on measures of self-reported depression, self-reported anxiety, work and social adjustment, and a broader measure of psychological well-being. These improvements were maintained at six-month follow-up.

Clarke, Reid, Eubanks, O'Connor, DeBar, Kelleher, Lynch, et al. (2002) were the first group of researchers to test a computerized treatment for depression administered via the Internet with no clinician monitoring or assistance. The Overcoming Depression on the Internet (ODIN) program is an Internet-based, self-help program that focuses on cognitive techniques for treating depression, with a focus on cognitive restructuring. The program was based on existing group cognitive-behavioral therapy manuals and involved seven “chapters” that presented cognitive techniques, as well as provided interactive examples, practice opportunities, and feedback about improvement over time. Clarke, et al. (2002) recruited participants for their study by sending brochures to 6,994 depressed adults and 6,996 nondepressed adults who were enrolled in a nonprofit HMO. Two hundred and twenty-three depressed individuals and 76 nondepressed individuals responded to the brochure and were randomized to the experimental condition (n=144) or a no-access
control group (n=155). Mean intake scores on the CES-D indicated that participants were in the severely depressed range at the beginning of the study. While enrolled in the study, participants were allowed to seek any additional treatment-as-usual care for their depression, as they deemed necessary. Participants were allowed to access the ODIN program as many times as they desired over the course of the study. The CES-D was administered at 4-, 8-, 16-, and 32-weeks after enrolling in the study.

Participants in the ODIN condition accessed the website infrequently, with a range of one to 20 times accessed and a mean of 2.6 times accessed. No overall differences were observed between experimental and control conditions over time, however post-hoc analyses of individuals with low levels of depression at intake revealed a modest effect at 16- and 32-week follow-ups. Clarke, et al. (2002) hypothesized that the lack of main effects observed in this study may be accounted for by low usage of the ODIN website and the severely depressed nature of individuals who enrolled in the study.

A subsequent study of the ODIN program, conducted by Clarke, Eubanks, Reid, Kelleher, O'Connor, DeBar, et al. (2005) revealed some positive effects for the program. Six thousand and thirty individuals who had received either medication or psychotherapy services for depression in the past thirty days and 6,021 individuals who had not received any services for depression were recruited from a nonprofit HMO through the use of mailed brochures. Two hundred depressed individuals and 55 nondepressed individuals were randomized to one of three conditions: treatment-as-usual (n=100), ODIN with postcard reminders to use the website (n=75), and
ODIN with telephone reminders to use the website (n=80). Reminders to access the ODIN program were given in both treatment groups at 2-, 8-, and 13-weeks post-enrollment and included similar content. Reminders to complete follow-up assessments were e-mailed to all participants at 5-, 10-, and 16-weeks post-enrollment. Both groups that received access to the ODIN program experienced statistically and clinically significant improvements in comparison to the control group on the CES-D. Additionally, those individuals who were more severely depressed at intake experienced more significant decreases in depression, with an effect size of 0.537 compared to 0.277 for the entire sample of individuals in the experimental groups. The authors hypothesized that the significant findings observed in this study could likely be accounted for by increases in accessing the ODIN website, in comparison to their initial test of the ODIN website, which demonstrated no positive effects of the program relative to the control group.

After the development of the ODIN program, another group of researchers developed a different computerized treatment for depression called MoodGYM. Similar to ODIN, MoodGYM is a self-help program administered via the Internet without clinician assistance or monitoring. MoodGYM is completed over six weekly sessions and focuses on cognitive restructuring, pleasant activities, assertiveness training, problem-solving, and relaxation strategies, with the sixth session reviewing all of this material. An initial test of the efficacy of MoodGYM was conducted by Christensen, Griffiths, and Jorm (2004), in which MoodGYM was compared to a psychoeducational website about depression (BluePages) and an attention control
condition. Participants assigned to the *BluePages* were instructed to look at one section of the website each week for five weeks, with the sixth week providing an overview of the material covered. The website provided information about the depression symptoms, diagnosis, interventions, and resources. Participants assigned to the attention placebo condition spoke with an interviewer on a weekly basis about lifestyle habits and environmental factors that might have a relationship to depression. A recruitment questionnaire was sent to 27,000 people, 525 of which had elevated symptoms of depression and were randomized to the *BluePages* condition (n=166), the *MoodGYM* condition (n=182), or attention placebo (n=178). Twenty-five participants assigned to *BluePages*, 46 participants assigned to *MoodGYM*, and 19 participants assigned to the attention placebo condition dropped out prior to completing their respective intervention. The difference in drop-out rates between the *MoodGYM* and *BluePages* conditions was statistically significant. Pre-post effect sizes using an intent-to-treat analysis were 0.4, 0.4, and 0.1 for *MoodGYM*, *BluePages*, and the attention placebo. When examining data from completers only, the effect sizes for *MoodGYM* and *BluePages* increased to 0.6 and 0.5, respectively, and when examining data from completers with clinical depression as indicated by a CES-D score of over 16, effect sizes were 0.9, 0.75, and 0.25 for *MoodGYM*, *BluePages*, and attention placebo, respectively. In addition to reducing symptoms of depression, *MoodGYM* reduced dysfunctional thinking and increased knowledge of effective psychological treatments. Similarly, *BluePages* increased knowledge of medical, psychological, and lifestyle treatments for depression. These data indicate
that psychoeducation and cognitive-behavioral therapy provided through the Internet are more effective at reducing symptoms of depression than placebo, with unique additional effects observed for each active condition. Mackinnon, Griffiths, and Christensen (2008) obtained six- and twelve-month follow-up data from participants involved in this study. Participants in all three conditions continued to show modest declines in symptoms of depression through twelve-month follow-up. At six-month follow-up, only individuals assigned to the MoodGYM maintained statistically significant improvements in symptoms of depression, relative to controls, however at twelve-months, both the MoodGYM condition and the BluePages condition demonstrated statistically significant advantages relative to the attention placebo.

A subsequent investigation of the MoodGYM program attempted to determine whether all modules of the program were necessary to achieve observed treatment effects (Christensen, Griffiths, Mackinnon, & Brittliffe, 2006). Two thousand seven hundred and ninety-four participants recruited through the MoodGYM website who had elevated scores on the Goldberg Depression Scale were randomly assigned to one of six versions of the MoodGYM website: Version 1 (one session of brief CBT), Version 2 (brief CBT plus problem-solving), Version 3 (brief CBT plus problem-solving and stress management techniques), Version 4 (extended CBT plus problem-solving), Version 5 (extended CBT plus problem-solving and behavioral techniques for managing depression), and Version 6 (the full MoodGYM program). Of note, only 20.4% of participants completed their assigned intervention. Data from these participants suggested that Version 1 and Version 2 were not successful at reducing
symptoms of depression and that Version 4 and Version 5 were most successful at decreasing symptoms of depression, with Version 4 yielding the largest overall effect size. These data suggest that the inclusion of the extended CBT component of the MoodGYM program is important to achieving optimal treatment effects. The authors also commented on the dropout rate of the study and hypothesized that continuous monitoring of participants, like the strategies applied in the Clarke, et al. (2005) study, may minimize dropout and should be considered in future investigations.

In addition to the four programs mentioned previously, other programs exist that utilize technology to address symptoms of depression, but do not fit the description of a largely standalone computerized CBT intervention. Good Days Ahead: The Multimedia Program for Cognitive Therapy retains the multimedia interactivity approach of the aforementioned computerized CBT programs, however in both studies investigating its efficacy, patients had access to therapist-administered psychotherapy services (Cavanagh & Shapiro, 2004; Wright, Wright, Albano, Basco, Goldsmith, Raffield, et al., 2005). As with Good Days Ahead, Cope allows users to receive therapist-administered psychotherapy services and uses a computerized phone system, rather than a computerized multimedia package (Gega, Marks, & Mataix-Cols, 2004). Finally, Andersson and colleagues (2005) created a self-help program that consisted of digitized versions of textual self-help materials, focusing on cognitive therapy and behavioral activation (e.g. Andersson, Bergstrom, Hollandare, Carlbring, Kaldo, & Ekselius, 2005). Although their program included quizzes to
check for comprehension, it lacked the interactivity necessary to consider it to be a truly computerized CBT intervention.

Two meta-analyses have examined the available literature on computerized CBT programs for depression. Cavanagh and Shapiro (2004) conducted a small meta-analysis using five available studies of computerized CBT programs and found a large pre-post effect size of 1.38, suggesting that computerized CBT programs perform superiorly in comparison to treatment-as-usual and waitlist controls. A subsequent meta-analysis conducted by Spek and colleagues (2007) examined the effects of internet-based CBT for depression and anxiety, rather than examining the efficacy of computerized CBT programs administered in clinical settings, as were summarized in the Cavanagh and Shapiro (2004) meta-analysis (Spek, Cuijpers, Nykicek, Riper, Keyzer, & Pop, 2007). Although Spek and colleagues (2007) examined twelve randomized controlled trials in their meta-analysis and found a moderate to large effect size favoring internet-based CBT over controls, only five of these randomized controlled trials were studies specifically targeting symptoms of depression. When examining these studies separately, internet-based CBT for depression yielded a small effect size between 0.27 and 0.32, depending on the statistical methodology used. The authors hypothesized that the small effect size for internet-based CBT for depression could be accounted for by lack of therapist support and monitoring, which is perhaps supported by the contrast between their findings and that of Cavanagh and Shapiro (2004).
Problem Statement. The present study seeks to build on the extant literature in two primary ways. The available body of research suggests that behavioral activation is an efficacious treatment for depression and computerized cognitive-behavioral interventions are efficacious treatments for depression, but no study has examined the efficacy of a computerized behavioral activation treatment for depression. The present study aims to provide preliminary data about the efficacy of such a program. Secondly, previous data regarding possible mechanisms of action of behavioral activation is incredibly limited and has reached contradictory conclusions. Computerized behavioral activation programs lend themselves nicely to examining mechanism of action, as interventions received by each participant are uniform in nature. The present study seeks to build on existing data about possible mechanisms of action of behavioral activation.
CHAPTER III

METHOD

Sample. Nine participants experiencing symptoms of depression were recruited from Kalamazoo, Portage, and surrounding areas in Southwestern Michigan through the use of recruitment flyers, printed newspaper advertisements, newspaper advertisements available through the Internet, contacts with support groups, and recruitment speeches made at local colleges and universities.

All participants had a score of eighteen or higher on the Beck Depression Inventory – II (BDI-II), in addition to either meeting criteria for a diagnosis of Major Depressive Disorder or Dysthymic Disorder based on the results of a Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I) or receiving a score of ten or higher on the Revised Hamilton Rating Scale for Depression (RHRSD). The SCID-I and the RHRSD were administered and scored by trained independent assessors.

Participants were excluded from further participation in the study if they were determined to meet criteria for bipolar disorder, psychotic disorder, active substance abuse, mental retardation and/or dementia during the pretreatment assessment phase of the study. Additionally, participants were excluded if they were receiving any type of psychotherapy services for their depression or if they had recently begun treatment with antidepressants and had been taking their antidepressants for less than eight weeks.
Setting. All assessment and treatment sessions were conducted in private laboratory rooms on the second floor of Wood Hall, located on the campus of Western Michigan University.

Treatment. The treatment utilized in this study was a server-based computer program, titled *Building a Meaningful Life Through Behavioral Activation*. The substantive content of the computer program was developed by psychologists at Western Michigan University and relies heavily upon recent iterations of behavioral activation. The foci of the initial six sessions include psychoeducation about depression and the treatment of depression through the use of behavioral activation, assignments that focus on tracking behaviors, information about how behaviors affect mood, assignments pertaining to changing behaviors to reflect personal values, and information about practicing behaviors such that they become routine. The remaining four sessions consist of a series of mini-lessons that teach participants how to increase adaptive activities, manage anger, apply for jobs, communicate more effectively with others, engage in relaxation techniques, set and achieve goals, break down large tasks, and achieve more routine and restful sleep patterns. For purposes of this study, all participants received all mini-lessons, regardless of the extent to which information covered in the mini-lessons applied to their specific problem. All sessions were monitored by a computerized treatment administrator, all of whom were graduate students in Clinical Psychology or Counselor Education and Counseling Psychology programs at Western Michigan University. At the beginning of each session, the computerized treatment administrator gave each participant a BDI-II, the Behavioral
Activation for Depression Scale (BADS), and the Automatic Thoughts Questionnaire (ATQ). After completing these measures, the computerized treatment administrator oriented the participant to the computer and asked if he or she had any questions prior to beginning the session. The computerized treatment administrator then answered any questions the participant had and allowed the participant to complete the session on his or her own. The average session length across participants and sessions was 52 minutes, with a range of 18 minutes to 100 minutes. At the end of the session, the computerized treatment administrator reviewed the session with the participant, reminded the participant to complete his or her homework, and allowed the participant to ask clarifying questions regarding the material contained in the program. The average amount of time the computerized treatment administrators spent with participants across sessions was eight minutes, with a range of two minutes to 30 minutes.

Measures. Symptoms of depression and related constructs were tracked throughout the present study through the use of a variety of measures. The Beck Depression Inventory – II (BDI-II; Beck, Steer, & Brown, 1996; Appendix A) is one of the most widely used self-report measures of depression. The BDI-II was administered to participants during both pretreatment assessments, prior to each treatment session, and at all post-treatment assessments. The BDI-II is a 21-item measure that assesses for symptoms of depression, comparable to the symptoms described in the DSM-IV-TR diagnostic criteria for Major Depressive Disorder. Each item of the BDI-II is rated on a four-point Likert-type scale, ranging from zero to
three. The items are then summed to yield a total score, with scores between zero and 13 suggesting minimal levels of depression, 14 to 19 suggesting mild levels of depression, 20 to 28 suggesting moderate levels of depression, and 29 to 63 suggesting severe levels of depression. The BDI-II has demonstrated acceptable reliability and validity and demonstrates moderately high correlations with the Revised Hamilton Psychiatric Rating Scale for Depression, the Beck Hopelessness Scale, and the SCL-90-R Depression subscale (Beck, Steer, & Brown, 1996; Steer, Ball, Ranieri, & Beck, 1997).

The Revised Hamilton Rating Scale for Depression (RHRSD; Warren, 1994; Appendix B) is a clinician-rated scale, intended to be completed after a clinical interview, that provides a quantitative measure of the clinician’s assessment of a patient’s level of symptoms of depression and the impact of these symptoms on the patient’s everyday functioning. The RHRSD was completed by the independent assessors involved in the present study after the second pretreatment assessment and after each post-treatment assessment. The RHRSD consists of 22 items, 17 of which may be scored. Nine of these items are rated on a five-point scale, from zero to four, and eight of these items are rated on a three-point scale, from zero to two. These scores are then summed to yield a total score. Scores below six suggest that the individual is in the nondepressed range, scores between seven and 17 suggest the individual is experiencing mild levels of depression, scores between 18 and 24 suggest the individual is experiencing moderate levels of depression, and scores above 25 suggest the individual is experiencing severe levels of depression. The
RHRSD displays adequate reliability and has a mean correlation of .67 with a wide variety of other measures of symptoms of depression, which demonstrates acceptable concurrent validity (Burnett, 1998).

The Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I; First, Gibbon, Spitzer, & Williams, 1996; Appendix C) is a semi-structured interview used to diagnose major DSM-IV disorders. The SCID-I was administered by the independent assessors involved in the present study during the second pretreatment assessment and during each post-treatment assessment. The SCID-I consists of six major modules, including Mood Episodes, Psychotic Symptoms, Psychotic Disorders, Mood Disorders, Substance Use Disorders, and Anxiety and Other Disorders. The reliability of the SCID has been adequately demonstrated (Segal, Hersen, & Van Hasselt, 1994), however little data exists on its validity.

The Behavioral Activation for Depression Scale (BADS; Kanter, Mulick, Busch, Berlin, & Martell, 2006; Appendix D) is a self-report measure that examines changes in client behavior over the course of behavioral activation therapy. The BADS was administered to participants during the second pretreatment assessment, prior to each treatment session, and at all post-treatment assessments. The BADS is a 25-item measure that consists of four subscales (Activation, Avoidance/Rumination, Work/School Impairment, and Social Impairment), although for purposes of the present study, only the Activation and Avoidance/Rumination subscales were used. Each item of the BADS is rated on a seven-point Likert-type scale, ranging from zero to six. Subscale items are then summed, with higher scores indicating greater levels
of the construct measured. The BADS demonstrates acceptable test-retest reliability (Kanter, et al., 2006) and construct validity through expected significant correlations with the BDI, CBAS, and SSQ (Kanter, et al., 2006; Kanter, Rusch, Busch, & Sedivy, 2009).

The Automatic Thoughts Questionnaire (ATQ; Hollon & Kendall, 1980; Appendix E) is a self-report measure that assesses the frequency of common negative automatic thoughts over the course of the previous week. The ATQ was administered to participants as part of the second pretreatment assessment, prior to each treatment session, and as part of all post-treatment assessments. The ATQ consists of 30 items, for which participants are asked to use a five-point, Likert-type scale ranging from one to five to rate frequency of negative automatic thoughts. These items are then summed to yield a total score, with higher scores indicating more frequent occurrences of negative automatic thoughts. The ATQ demonstrates high internal reliability and a strong correlation with therapist ratings of depression and commonly utilized self-report measures of depression (e.g. BDI) (Dobson & Breiter, 1983; Harrell & Ryon, 1983). Furthermore, the ATQ demonstrates a strong negative correlation with the BADS (Kanter, et al., 2006).

The Quality of Life Scale (QOLS; Flanagan, 1978; Appendix F) is a self-report measure assessing six areas related to quality of life: Material and Physical Well-Being; Relationships with Other People; Social, Community, and Civic Activities; Personal Development and Fulfillment; Recreation; and Independence (Burckhardt & Anderson, 2003). The QOLS was administered to participants as part
of the second pretreatment assessment and during each post-treatment assessment. The QOLS consists of 16 items, each rated on a seven-point, Likert-type scale ranging from one to seven. These items are then summed to yield a total score, with higher total scores suggesting higher quality of life. Studies of the psychometric properties of the QOLS suggest that it demonstrates adequate reliability and validity (Burckhardt & Anderson, 2003).

In addition to the standardized outcome measures used in the present study, a number of idiographic measures were utilized to gather demographic information, measure treatment outcome, and assess consumer satisfaction. The Initial Assessment Information Form (Appendix G) was administered to participants during the first pretreatment assessment appointment. This form gathered basic demographic data (e.g. age, race, sex), information about previous and current treatments for depression, and self-report ratings of experience and comfort with computer use. The Additional Services Form (Appendix H) was administered to participants as part of each post-treatment assessment appointment. This form asked participants to report any mental health services they have received since the completion of the treatment phase of the study. In addition to these measures, the Valued Living Questionnaire, a measure of homework completion, and measures of consumer satisfaction were embedded within the Building a Meaningful Life Through Behavioral Activation program.

Procedure. Adult participants experiencing symptoms of depression were recruited for the present study through the use of posted flyers, newspaper
advertisements, contacts with support groups, and contacts with agencies providing mental health services. Prospective participants called the Anxiety Disorders Laboratory telephone and left messages requesting to be contacted with further information regarding the present study. A research assistant returned the telephone calls of prospective participants and utilized a phone script (Appendix I) to describe the research study to prospective participants. Prospective participants who indicated interest in participating in the present study were given the opportunity to schedule initial screening assessments, which were scheduled at the end of the initial aforementioned phone contacts.

Upon arrival for their initial screening appointments, prospective participants were greeted by a research assistant and led into a private laboratory room. Once in the laboratory room, a research assistant provided prospective participants with two copies of the informed consent document (Appendix J) and read this document aloud to the prospective participants. Prospective participants were asked if they had any questions, which were answered by the research assistant. Prospective participants were then asked to sign both copies of the consent forms, one of which was retained in the participant's file in the laboratory of the researcher and one of which was given to participants to keep in their own personal records. After signing the informed consent documents, participants were asked to complete an Initial Assessment Information Form and a BDI-II form. Participants were then asked to return one week later to complete a comprehensive second assessment.
At the comprehensive second assessment appointment, participants were greeted by an independent assessor and asked to complete a BDI-II form. Participants with a score of 18 or higher on the BDI-II then completed a SCID-I with the independent assessor, who then also completed a RHRSD after the interviews with participants. Participants who were eligible for inclusion in the study on the basis of these three measures were then asked to complete the BADS, the ATQ, and the QOLS. Ineligible participants were provided with referral information for local mental health providers.

Those participants who were eligible for inclusion on the basis of their comprehensive second assessment results were asked to return to the laboratory one week later to begin treatment. Participants attended ten weekly sessions of computerized behavioral activation therapy. At the beginning of each session, participants were greeted by a computerized treatment administrator. All the computerized treatment administrators were graduate students in either the Clinical Psychology or Counselor Education and Counseling Psychology programs at Western Michigan University. The computerized treatment administrator led participants to a private laboratory room, where the computer was located, and asked the participants to complete a BDI-II, BADS, and ATQ. The computerized treatment administrator monitored suicidality through the BDI-II and handled elevated suicide risk according to a predetermined protocol. After completing these measures, participants were asked if they had any questions about the program, previous material covered in the program, or homework assignments from the previous session. Questions were
answered by the computerized treatment administrators to the best of their ability. Participants were then left alone in the laboratory room to complete their session of computerized behavioral activation therapy. After completing their session, participants notified the computerized treatment administrator, who then reviewed the content of the session with them and provided them with a session summary sheet. Participants were asked if they had any questions regarding their session and these questions were answered by the computerized treatment administrator. Participants were then reminded to complete their homework and a session for the following week was scheduled.

After ten weeks of treatment, participants were asked to return to the clinic one week later to complete a post-treatment follow-up assessment. This appointment was similar to the comprehensive second assessment, as participants completed a BDI-II, the BADS, the ATQ, and the QOLS. Additionally, a SCID-I interview was conducted and the RHRSD was completed by an independent assessor after the interview. At this post-treatment assessment appointment, participants also completed a Consumer Satisfaction Survey and an Additional Services Form. Participants were then asked to attend a one-month follow-up assessment appointment, during which they completed all aforementioned measures, except for the Consumer Satisfaction Survey. Participants were also asked to attend follow-up appointments at three-months and six-months post-treatment.
CHAPTER IV

RESULTS

Analysis Plan. This investigation included a number of hypotheses regarding depressive symptoms and mechanisms of action. First, it was hypothesized that depressive symptoms would decrease from pretreatment to posttreatment and continue to remain decreased through six-month follow-up, as measured by the BDI-II and RHRSD. In order to test this hypothesis, a series of last observation carry-forward (LOCF) one-way repeated measures analysis of variance (ANOVA) were conducted.

Second, it was hypothesized that quality of life would increase from pretreatment to posttreatment and continue to remain improved through six-month follow-up, as measured by the QOLS. This hypothesis was also tested using a LOCF, one-way repeated measures ANOVA.

Third, it was hypothesized that values-consistent behavior would increase over the course of treatment, as measured by the VLQ. As with the prior two hypotheses, this hypothesis was tested using a LOCF, one-way repeated measures ANOVA.

Fourth, it was hypothesized that homework completion would be positively correlated with decreases in BDI-II scores. In order to test this hypothesis, a Pearson Product-Moment Correlation was conducted.
Finally, it was hypothesized that changes in the patterns and nature of overt behavior of participants would be the primary mechanism by which treatment effects would be observed. This hypothesis was tested in a variety of ways. First, a series of LOCF, one-way repeated measures ANOVAs were conducted using data obtained from the ATQ, BADS, and VLQ. Second, a series of Pearson Product-Moment Correlations were conducted between these data and the BDI-II. Finally, all data from these measures and the BDI-II were plotted on a graph for visual inspection.

Of note, participant number eight was identified as the only participant who became worse over the course of treatment, as measured by an increase in BDI-II scores from 29 at pretreatment to 44 at six-month follow-up. Thus, participant number eight was considered to be a distinct nonresponder to treatment and as such, two analyses were conducted for each outcome measure: one including the data of participant number eight and one excluding the data of participant number eight. These data are identified accordingly in the data analyses below.

In addition to conducting statistical analyses of aggregated data, visual inspection of individual participant graphs was also a component of the analysis plan. The decision to examine individual participant data was made on the based on two primary issues. First, given the low sample size, relying solely on statistical analysis in this instance may obfuscate significant changes on an individual participant level that occurred over the course of treatment. Second, conducting an idiographic analysis allowed for greater capacity to investigate the role of mediational variables in treatment.
Preliminary Analyses. Forty-three potential participants contacted the Anxiety Disorders Laboratory to learn more information about the present study. Of these individuals, fifteen potential participants attended at least one of the two pretreatment assessment appointments and nine individuals were enrolled in treatment. Of the six potential participants who were not enrolled in treatment, four potential participants did not qualify on the basis of BDI-II cutoff scores, one potential participant self-excluded on the basis of an exclusionary diagnosis, and one participant did not return to complete a second comprehensive assessment appointment. The nine individuals who participated in the study all completed the minimum five sessions of computerized behavioral activation therapy required to be considered treatment completers, although two individuals terminated treatment after session five, one individual terminated treatment after session six, and one individual terminated treatment after session eight. One of the individuals who terminated after session five did so due to frustration with program functionality and the other individual who terminated after session five did so due to difficulties with scheduling. The other two individuals who prematurely terminated did so due to returning home after the Spring semester for summer recess.

Demographic data for the nine treatment completers is displayed in Table 1. Of the nine participants who completed the study, two participants (22.2%) were male and seven participants (77.8%) were female. The mean age of participants was 34.9 years of age, with a range of 18 years of age to 60 years of age. Eight participants (88.9%) were Caucasian and one participant (11.1%) was Multiracial. In terms of
marital status, seven participants (77.8%) were single, one participant (11.1%) was separated, and one participant (11.1%) was divorced or annulled. Two participants (22.2%) were currently employed, six participants (66.7%) were unemployed, and one participant (11.1%) was a student. Seven participants (77.8%) had completed some college and two participants (22.2%) had graduated from a two-year college or technical school. The socioeconomic status of participants varied widely, with three participants (33.3%) making under $5,000 annually, one participant (11.1%) making $5,000 to $9,999 annually, one participant (11.1%) making $10,000 to $14,999 annually, two participants (22.2%) making $15,000 to $24,999 annually, and one participant (11.1%) making $25,000 to $34,999 annually. Furthermore, one participant (11.1%) failed to report socioeconomic data.

Information regarding previous and current treatments for depression was also gathered for all participants. Two participants (22.2%) reported no prior treatments for their symptoms of depression. Four participants (44.4%) reported receiving medications, five participants (55.6%) reported participating in individual therapy, one participant (11.1%) reported participating in a support group, one participant (11.1%) reported receiving pastoral care, one participant (11.1%) reported being hospitalized, and one participant (11.1%) reported receiving an unlisted treatment for depression. In terms of current treatments for depression, seven participants (77.8%) reported that they were not currently receiving any treatment for their symptoms of depression. One participant (11.1%) reported receiving an unlisted treatment for
depression and one participant (11.1%) failed to report current treatments for depression.

Finally, participants were asked to report information regarding their computer use habits. Participants reported an average of 13.4 years of experience with computers and reported using computers for an average of 15.2 hours a week. Using a Likert-type scale ranging from one to ten, with "one" representing "completely uncomfortable" and "ten" representing "completely comfortable," participants reported an average rating of 8.3, suggesting a high level of comfort with computers. Participants also asked to report their perceived amount of knowledge about computers. Using this same type of scale, with "one" representing "no knowledge" and "ten" representing "extensive knowledge," participants reported an average rating of 7.1, suggesting a relatively extensive knowledge of computers.

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic Variables for Full Sample, Non-Qualifiers, and Completers</td>
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<table>
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<tr>
<th>Variable</th>
<th>Full Sample (n=15)</th>
<th>Non-Qualifiers (n=6)</th>
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<tr>
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<td>Age (Range)</td>
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<td>19 – 57</td>
<td>18 – 60</td>
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<tr>
<td>Race</td>
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<td>Caucasian/White</td>
<td>11 (73.3%)</td>
<td>3 (50.0%)</td>
<td>8 (88.9%)</td>
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<td>African-American</td>
<td>2 (13.3%)</td>
<td>2 (33.3%)</td>
<td>0 (0.0%)</td>
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<td>Multiracial</td>
<td>2 (13.3%)</td>
<td>1 (16.7%)</td>
<td>1 (11.1%)</td>
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<tr>
<td>Sex</td>
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<tr>
<td>Male</td>
<td>7 (46.7%)</td>
<td>5 (83.3%)</td>
<td>2 (22.2%)</td>
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<tr>
<td>Female</td>
<td>8 (53.3%)</td>
<td>1 (16.7%)</td>
<td>7 (77.8%)</td>
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Table 1 (Continued)

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<th>Marital Status</th>
<th>1 (73.3%)</th>
<th>4 (66.7%)</th>
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<tr>
<td>Single</td>
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<td>0 (0.0%)</td>
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<td>Married</td>
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<td>Separated</td>
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<td>0 (0.0%)</td>
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<tr>
<td>Divorced or Annulled</td>
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<td>0 (0.0%)</td>
<td>1 (11.1%)</td>
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<table>
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<td>Currently Employed</td>
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<td>Unemployed</td>
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<td>On Disability</td>
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<td>1 (16.7%)</td>
<td>0 (0.0%)</td>
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<tr>
<td>Stay at Home Parent</td>
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<td>1 (16.7%)</td>
<td>0 (0.0%)</td>
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<tr>
<td>Student</td>
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<td>0 (0.0%)</td>
<td>1 (11.1%)</td>
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<th>Socioeconomic Status</th>
<th>4 (26.7%)</th>
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<th>3 (33.3%)</th>
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<tr>
<td>Under $5,000</td>
<td>2 (13.3%)</td>
<td>1 (16.7%)</td>
<td>1 (11.1%)</td>
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<tr>
<td>$5,000-$9,999</td>
<td>3 (20.0%)</td>
<td>2 (33.3%)</td>
<td>1 (11.1%)</td>
</tr>
<tr>
<td>$10,000-$14,999</td>
<td>2 (13.3%)</td>
<td>0 (0.0%)</td>
<td>2 (22.2%)</td>
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<tr>
<td>$15,000-$24,999</td>
<td>1 (6.7%)</td>
<td>0 (0.0%)</td>
<td>1 (11.1%)</td>
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<tr>
<td>$25,000-$34,999</td>
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<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
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<td>$35,000-$49,999</td>
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<td>$75,000-$99,999</td>
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<th>7 (77.8%)</th>
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<td>2 (33.3%)</td>
<td>2 (22.2%)</td>
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<tr>
<td>Graduated 2-Year College / Tech. School</td>
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<td>1 (16.7%)</td>
<td>0 (0.0%)</td>
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<tr>
<td>Graduated 4-Year College</td>
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<td>1 (16.7%)</td>
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<tr>
<td>Some Graduate School</td>
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<td>4 (44.4%)</td>
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<td>Medications</td>
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<td>Individual Therapy</td>
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<td>Group Therapy</td>
<td>2 (13.3%)</td>
<td>1 (16.7%)</td>
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<td>Support Group</td>
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<td>1 (16.7%)</td>
<td>0 (0.0%)</td>
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<td>Case Management</td>
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<td>0 (0.0%)</td>
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<td>Pastoral Care</td>
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<td>Hospital</td>
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<td>1 (11.1%)</td>
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<td>1 (11.1%)</td>
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<td>Full Sample (n=15)</td>
<td>Non-Qualifiers (n=6)</td>
<td>Completers (n=9)</td>
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<td>-----------------------------------------------</td>
<td>--------------------</td>
<td>----------------------</td>
<td>------------------</td>
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<td>7 (77.8%)</td>
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<td>SSRI</td>
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<td>MAOI</td>
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<td>0 (0.0%)</td>
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<td>SSNRI</td>
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<td>0 (0.0%)</td>
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<tr>
<td>Atypical</td>
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<td>1 (16.7%)</td>
<td>0 (0.0%)</td>
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<tr>
<td>Antipsychotic</td>
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<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
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<tr>
<td>Mood Stabilizer</td>
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<td>2 (33.3%)</td>
<td>0 (0.0%)</td>
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<tr>
<td>Anxiolytic</td>
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<td>0 (0.0%)</td>
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<td>211</td>
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<td>2 (33.3%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Group Therapy</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Support Group</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Case Management</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Pastoral Care</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Hospital</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (13.3%)</td>
<td>1 (16.7%)</td>
<td>1 (11.1%)</td>
</tr>
<tr>
<td>Unreported</td>
<td>1 (6.7%)</td>
<td>0 (0.0%)</td>
<td>1 (11.1%)</td>
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<tr>
<td>Number of Current Treatments (Range)</td>
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<td>0 – 1</td>
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<tr>
<td>Number of Current Treatments (Mean)</td>
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<td>0.1</td>
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<td>Years Experience With a Computer (Mean)</td>
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<td>10.8</td>
<td>13.4</td>
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<td>8.2/10</td>
<td>8.3/10</td>
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<td>Amount of Knowledge About Computers (Mean)</td>
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<td>6.8/10</td>
<td>7.1/10</td>
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<tr>
<td>Mean Number of Hours of Weekly Computer Use (Mean)</td>
<td>15.9</td>
<td>16.8</td>
<td>15.2</td>
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Hypothesis Number One. As stated previously, it was hypothesized that depressive symptoms would decrease from pretreatment to posttreatment and continue to remain decreased through six-month follow-up. The means and standard deviations for data obtained from the BDI-II are presented in Table 2. A LOCF, one-way repeated measures ANOVA was conducted to compare scores on the BDI-II at Time 1 (pretreatment), Time 2 (posttreatment), and Time 3 (six-month follow-up) for all treatment completers. There was a marginally significant effect for time, Wilks’ Lambda = .439, $F(2, 7) = 4.467, p = .056$, multivariate partial eta squared = .561. These data suggest a trend toward decreases in symptoms of depression over time. This statistical analysis was then repeated, excluding the data of participant number eight, who was considered to be a nonresponder. The removal of the data of participant number eight resulted in a significant effect for time, Wilks’ Lambda = .152, $F(2, 6) = 16.680, p = .004$, multivariate partial eta squared = .848. These data suggest a very large effect size for improvement on BDI-II scores over time. These statistical analyses were also conducted for percent change on the BDI-II. The results of a LOCF, one-way repeated measures ANOVA conducted utilizing the full sample suggested that there was not a significant effect for time, Wilks’ Lambda = .595, $F(2, 7) = 2.385, p = .162$, multivariate partial eta squared = .405. These data suggest that no significant effects were observed in terms of percent change on BDI-II scores. This analysis was then repeated after excluding the data from participant number eight. This analysis yielded a significant effect for time, Wilks’ Lambda = .086, $F(2,$
6) = 31.766, p = .001, multivariate partial eta squared = .914. These data suggest a very large effect size for percent change in BDI-II scores over time.

Examining the data available at an individual participant level supports the conclusion that substantial changes occurred in BDI-II scores between pretreatment, posttreatment and follow-up (please reference Appendix K for individual participant graphs). On the basis of BDI-II scores, four participants met criteria to be considered full responders, defined as individuals with BDI-II scores below 13. Furthermore, three participants met criteria to be considered partial responders, defined as individuals with BDI-II scores lower than the study inclusion criteria of 18, but higher than the remission criteria of 13. The remaining two participants were considered to be nonresponders. These response rates are comparable to those found in other studies of the efficacy of behavioral activation, suggesting that the *Building a Meaningful Life Through Behavioral Activation* program performs as well as expected in terms of treatment responder rates.

**Table 2**

Pretreatment, Posttreatment, and Six-Month Follow-Up Means and Standard Deviations for BDI-II Scores and Percent Change

<table>
<thead>
<tr>
<th>Time Period</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1 (Pretreatment Score) (Including Nonresponder)</td>
<td>9</td>
<td>30.11</td>
<td>5.35</td>
</tr>
<tr>
<td>Time 2 (Posttreatment Score) (Including Nonresponder)</td>
<td>9</td>
<td>16.22</td>
<td>13.22</td>
</tr>
<tr>
<td>Time 3 (Six-Month Follow-Up Score) (Including Nonresponder)</td>
<td>9</td>
<td>15.11</td>
<td>12.83</td>
</tr>
</tbody>
</table>
Table 2 (Continued)

| Time 1 (Pretreatment Score) (Excluding Nonresponder) | 8 | 30.25 | 5.70 |
| Time 2 (Posttreatment Score) (Excluding Nonresponder) | 8 | 13.5 | 11.11 |
| Time 3 (Six-Month Follow-Up Score) (Excluding Nonresponder) | 8 | 11.5 | 7.35 |
| Time 1 (Pretreatment Percent Change) (Including Nonresponder) | 9 | 0 | 0 |
| Time 2 (Posttreatment Percent Change) (Including Nonresponder) | 9 | -40.41% | 52.86 |
| Time 3 (Six-Month Follow-Up Percent Change) (Including Nonresponder) | 9 | -43.10% | 57.11 |
| Time 1 (Pretreatment Percent Change) (Excluding Nonresponder) | 8 | 0 | 0 |
| Time 2 (Posttreatment Percent Change) (Excluding Nonresponder) | 8 | -54.55 | 33.71 |
| Time 3 (Six-Month Follow-Up Percent Change) (Excluding Nonresponder) | 8 | -60.99 | 20.88 |

Comparable analyses to those used with the BDI-II were then conducted with the RHRSD. The means and standard deviations for data obtained from the RHRSD are presented in Table 3. A LOCF, one-way repeated measures ANOVA was conducted to compare scores on the RHRSD at Time 1 (pretreatment), Time 2 (posttreatment), and Time 3 (six-month follow-up) for all treatment completers. The effect for time was not significant, Wilks’ Lambda = .568, F (2, 7) = 2.659, p = .138, multivariate partial eta squared = .432. These data suggest that RHRSD scores did not improve significantly over time. This statistical analysis was then repeated, excluding the data of participant number eight. This analysis yielded a marginally significant effect for time, Wilks’ Lambda = .395, F (2, 6) = 4.600, p = .061,
multivariate partial eta squared = .605. These data suggest a non-significant trend toward improvement of symptoms of depression, as measured by the RHRSD, over time.

When examining the data of individual participants, numerous participants met full responder or partial responder criteria. Of those individuals who met full responder criteria on the basis of BDI-II scores, all but one participant also met full responder criteria (a score of seven or below) on the basis of RHRSD scores. Furthermore, the participant who did not meet full responder criteria also did not have available follow-up data, so RHRSD scores had been carried forward from pretreatment. Additionally, of the three individuals who were deemed to be partial responders on the basis of BDI-II scores, one individual met criteria to be considered a full responder on the basis of RHRSD scores. Furthermore, the other two participants who were partial responders did not have available follow-up data, so their pretreatment RHRSD scores were carried forward as well.

Table 3

Pretreatment, Posttreatment, and Six-Month Follow-Up Means and Standard Deviations for RHRSD Scores

<table>
<thead>
<tr>
<th>Time Period</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
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<tr>
<td>Time 1 (Pretreatment Score) (Including Nonresponder)</td>
<td>9</td>
<td>13.56</td>
<td>3.57</td>
</tr>
<tr>
<td>Time 2 (Posttreatment Score) (Including Nonresponder)</td>
<td>9</td>
<td>8.44</td>
<td>5.15</td>
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<td>Time 3 (Six-Month Follow-Up Score) (Including Nonresponder)</td>
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<td>7.67</td>
<td>5.76</td>
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Table 3 (Continued)

<table>
<thead>
<tr>
<th>Time 1 (Pretreatment Score) (Excluding Nonresponder)</th>
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<th>13.75</th>
<th>3.77</th>
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<tr>
<td>Time 2 (Posttreatment Score) (Excluding Nonresponder)</td>
<td>8</td>
<td>7.88</td>
<td>5.19</td>
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<tr>
<td>Time 3 (Six-Month Follow-Up Score) (Excluding Nonresponder)</td>
<td>8</td>
<td>6.38</td>
<td>4.57</td>
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</tbody>
</table>

_Hypothesis Number Two._ The second hypothesis tested in the present investigation was that perceived quality of life would increase from pretreatment to posttreatment and remain at an increased level through six-month follow-up. The means and standard deviations for data obtained from the QOLS are presented in Table 4. A LOCF, one-way repeated measures ANOVA was conducted to compare scores on the QOLS at Time 1 (pretreatment), Time 2 (posttreatment), and Time 3 (six-month follow-up) for all treatment completers. The effect for time was not significant, Wilks’ Lambda = .730, \(F(2, 7) = 1.292, p = .333\), multivariate partial eta squared = .270. These data suggest that QOLS scores did not increase significantly over time. This statistical analysis was then repeated without the data of participant number eight included. The results remained non-significant, Wilks’ Lambda = .726, \(F(2, 6) = 1.135, p = .382\), multivariate partial eta squared = .274, suggesting that quality of life did not improve over the course of treatment and follow-up. These findings were corroborated by examining individual participant graphs, as only full responder #1 and full responder #3 appeared to have sustained increases in overall quality of life (please reference Appendix L for individual participant graphs).
Table 4

Pretreatment, Posttreatment, and Six-Month Follow-Up Means and Standard Deviations for QOLS Scores

<table>
<thead>
<tr>
<th>Time Period</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1 (Pretreatment Total Score) (Including Nonresponder)</td>
<td>9</td>
<td>55.78</td>
<td>10.87</td>
</tr>
<tr>
<td>Time 2 (Posttreatment Total Score) (Including Nonresponder)</td>
<td>9</td>
<td>62.78</td>
<td>20.49</td>
</tr>
<tr>
<td>Time 3 (Six-Month Follow-Up Total Score) (Including Nonresponder)</td>
<td>9</td>
<td>59.33</td>
<td>17.36</td>
</tr>
<tr>
<td>Time 1 (Pretreatment Total Score) (Excluding Nonresponder)</td>
<td>8</td>
<td>57.75</td>
<td>9.75</td>
</tr>
<tr>
<td>Time 2 (Posttreatment Total Score) (Excluding Nonresponder)</td>
<td>8</td>
<td>64.75</td>
<td>20.97</td>
</tr>
<tr>
<td>Time 3 (Six-Month Follow-Up Total Score) (Excluding Nonresponder)</td>
<td>8</td>
<td>60.88</td>
<td>17.88</td>
</tr>
<tr>
<td>Time 1 (Pretreatment Relationships and Material Well-Being Score) (Including Nonresponder)</td>
<td>9</td>
<td>21.89</td>
<td>4.31</td>
</tr>
<tr>
<td>Time 2 (Posttreatment Relationships and Material Well-Being Score) (Including Nonresponder)</td>
<td>9</td>
<td>26.00</td>
<td>8.26</td>
</tr>
<tr>
<td>Time 3 (Six-Month Follow-Up Relationships and Material Well-Being Score) (Including Nonresponder)</td>
<td>9</td>
<td>24.89</td>
<td>6.72</td>
</tr>
<tr>
<td>Time 1 (Pretreatment Relationships and Material Well-Being Score) (Excluding Nonresponder)</td>
<td>8</td>
<td>22.63</td>
<td>3.96</td>
</tr>
<tr>
<td>Time 2 (Posttreatment Relationships and Material Well-Being Score) (Excluding Nonresponder)</td>
<td>8</td>
<td>26.75</td>
<td>8.50</td>
</tr>
</tbody>
</table>
Table 4 (Continued)

| Time 3 (Six-Month Follow-Up Relationships and Material Well-Being Score) (Excluding Nonresponder) | 8 | 25.38 | 7.01 |
| Time 1 (Pretreatment Health and Functioning Score) (Including Nonresponder) | 9 | 14.33 | 3.12 |
| Time 2 (Posttreatment Health and Functioning Score) (Including Nonresponder) | 9 | 15.11 | 5.01 |
| Time 3 (Six-Month Follow-Up Health and Functioning Score) (Including Nonresponder) | 9 | 16.67 | 5.68 |

| Time 1 (Pretreatment Health and Functioning Score) (Excluding Nonresponder) | 8 | 14.38 | 3.34 |
| Time 2 (Posttreatment Health and Functioning Score) (Excluding Nonresponder) | 8 | 15.50 | 5.21 |
| Time 3 (Six-Month Follow-Up Health and Functioning Score) (Excluding Nonresponder) | 8 | 17.00 | 5.98 |

| Time 1 (Pretreatment Personal, Social, and Community Commitment Score) (Including Nonresponder) | 9 | 20.00 | 7.02 |
| Time 2 (Posttreatment Personal, Social, and Community Commitment Score) (Including Nonresponder) | 9 | 22.78 | 8.17 |
| Time 3 (Six-Month Follow-Up Personal, Social, and Community Commitment Score) (Including Nonresponder) | 9 | 21.11 | 7.54 |

| Time 1 (Pretreatment Personal, Social, and Community Commitment Score) (Excluding Nonresponder) | 8 | 21.25 | 6.34 |
| Time 2 (Posttreatment Personal, Social, and Community Commitment Score) (Excluding Nonresponder) | 8 | 23.75 | 8.15 |
| Time 3 (Six-Month Follow-Up Personal, Social, and Community Commitment Score) (Excluding Nonresponder) | 8 | 22.25 | 7.19 |

As expected based on the data presented here, the results of LOCF, one-way repeated measures ANOVAs conducted with the three subscales of the QOLS
(Relationships and Material Well-Being; Health and Functioning; Personal, Social, and Community Commitment) were also non-significant. The means and standard deviations for these data are also presented in Table 4.

**Hypothesis Number Three.** As stated previously, it was hypothesized that values-consistent behavior would increase over the course of treatment. The means and standard deviations for data obtained from the VLQ are presented in Table 5. A LOCF, one-way repeated measures ANOVA was conducted to compare scores on the VLQ at Time 1 (session three of treatment), Time 2 (session six of treatment), and Time 3 (session ten of treatment) for all treatment completers. The effect for time was non-significant, Wilks’ Lambda = .585, \( F (2, 7) = 2.485, p = .153 \), multivariate partial eta squared = .415. These data suggest that values-consistent behaviors did not increase significantly over the course of treatment. This statistical analysis was then repeated, excluding the data from participant number eight. The removal of this data resulted in a significant effect for time, Wilks’ Lambda = .343, \( F (2, 6) = 5.740, p = .040 \), multivariate partial eta squared = .657. These data suggest a very large effect size for increases in values-consistent behavior over the course of treatment. These data appear to be supported by a visual inspection of individual participant graphs, as full responders #1, #2, and #3, and partial responder #2 all demonstrated fairly sizeable increases in VLQ scores (please reference Appendix M for individual participant graphs).
Table 4 (Continued)

Session Three, Session Six, and Session Ten Means and Standard Deviations for VLQ Scores

<table>
<thead>
<tr>
<th>Time Period</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1 (Session Three Score) (Including Nonresponder)</td>
<td>9</td>
<td>4.63</td>
<td>1.07</td>
</tr>
<tr>
<td>Time 2 (Session Six Score) (Including Nonresponder)</td>
<td>9</td>
<td>5.82</td>
<td>2.01</td>
</tr>
<tr>
<td>Time 3 (Session Ten Score) (Including Nonresponder)</td>
<td>9</td>
<td>5.82</td>
<td>2.16</td>
</tr>
<tr>
<td>Time 1 (Session Three Score) (Excluding Nonresponder)</td>
<td>8</td>
<td>4.61</td>
<td>1.14</td>
</tr>
<tr>
<td>Time 2 (Session Six Score) (Excluding Nonresponder)</td>
<td>8</td>
<td>6.16</td>
<td>1.85</td>
</tr>
<tr>
<td>Time 3 (Session Ten Score) (Excluding Nonresponder)</td>
<td>8</td>
<td>6.10</td>
<td>2.12</td>
</tr>
</tbody>
</table>

_Hypothesis Number Four._ The fourth hypothesis tested in the present study was that homework completion would be positively correlated with decreases in BDI-II scores. Average homework completion scores were computed by first assigning a value to each of the responses. “None” was assigned a value of “1,” “Some” was assigned a value of “2,” and “All” was assigned a value of “3.” The scores for each participant were then summed and divided by the number of sessions for which homework completion scores were available. A Pearson Product-Moment Correlation was then conducted to examine the relationship between homework completion and change in BDI-II scores from pretreatment to posttreatment. A non-significant, negative correlation between the two variables was observed, $r = -.391$, $n = 9$, $p = .298$. These data suggest that there is no relationship between homework completion and changes in symptoms of depression. However, visual inspection of a
scatterplot of change in BDI-II scores from pretreatment to posttreatment and average homework completion scores revealed that those individuals who had the greatest decreases in BDI-II scores also tended to have the highest average homework completion scores. As such, it is possible that the statistical analysis of aggregated data does not accurately represent the relationship between homework completion and treatment outcome.

![Scatterplot of Change in BDI-II Scores From Pretreatment to Posttreatment and Average Homework Completion Scores](image)

Figure 1. Scatterplot of Change in BDI-II Scores From Pretreatment to Posttreatment and Average Homework Completion Scores

*Hypothesis Number Five.* Finally, it was hypothesized that changes in the patterns and nature of overt behavior of participants would be the primary mechanism by which treatment effects would be observed. This hypothesis was first tested through conducting a series of LOCF, one-way repeated measures ANOVAs were conducted using data obtained from the ATQ, BADS, and VLQ (results reported in
hypothesis number three section). The means and standard deviations from data obtained from the ATQ are presented in Table 6. A LOCF, one-way repeated measures ANOVA was conducted to compare scores on the ATQ at Time 1 (pretreatment), Time 2 (posttreatment), and Time 3 (six-month follow-up) for all treatment completers. There was a marginally significant effect for time, Wilks’ Lambda = .445, $F(2, 7) = 4.371$, $p = .059$, multivariate partial eta squared = .555. These data suggest a trend toward decreases in negative automatic thoughts over time. This statistical analysis was then repeated, excluding the data of participant number eight. The means and standard deviations, excluding participant number eight, are presented in Table 6. There was a significant effect for time, Wilks’ Lambda = .152, $F(2, 6) = 16.780$, $p = .003$, multivariate partial eta squared = .848. These data suggest a very large effect size for decreases in ATQ scores over time. As with the BDI-II, a LOCF, one-way repeated measures ANOVA was conducted to examine percent change on the ATQ. The results of this analysis suggested that there was a significant effect for time Wilks’ Lambda = .393, $F(2, 7) = 5.401$, $p = .038$, multivariate partial eta squared = .607. These data suggest a very large effect size for percent change in ATQ scores over time. This analysis was then repeated excluding the data from participant number eight. As expected, there continued to be a significant effect for time with a very large effect size, Wilks’ Lambda = .086, $F(2, 6) = 31.861$, $p = .001$, multivariate partial eta squared = .914.
Table 6

Pretreatment, Posttreatment, and Six-Month Follow-Up Means and Standard Deviations for ATQ Scores and Percent Change

<table>
<thead>
<tr>
<th>Time Period</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1 (Pretreatment Score) (Including Nonresponder)</td>
<td>9</td>
<td>79.44</td>
<td>20.03</td>
</tr>
<tr>
<td>Time 2 (Posttreatment Score) (Including Nonresponder)</td>
<td>9</td>
<td>54.00</td>
<td>25.62</td>
</tr>
<tr>
<td>Time 3 (Six-Month Follow-Up Score) (Including Nonresponder)</td>
<td>9</td>
<td>52.44</td>
<td>28.54</td>
</tr>
<tr>
<td>Time 1 (Pretreatment Score) (Excluding Nonresponder)</td>
<td>8</td>
<td>79.50</td>
<td>21.41</td>
</tr>
<tr>
<td>Time 2 (Posttreatment Score) (Excluding Nonresponder)</td>
<td>8</td>
<td>48.00</td>
<td>19.49</td>
</tr>
<tr>
<td>Time 3 (Six-Month Follow-Up Score) (Excluding Nonresponder)</td>
<td>8</td>
<td>45.25</td>
<td>19.97</td>
</tr>
<tr>
<td>Time 1 (Pretreatment Percent Change) (Including Nonresponder)</td>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Time 2 (Posttreatment Percent Change) (Including Nonresponder)</td>
<td>9</td>
<td>-31.64</td>
<td>27.02</td>
</tr>
<tr>
<td>Time 3 (Six-Month Follow-Up Percent Change) (Including Nonresponder)</td>
<td>9</td>
<td>-34.01</td>
<td>30.48</td>
</tr>
<tr>
<td>Time 1 (Pretreatment Percent Change) (Excluding Nonresponder)</td>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Time 2 (Posttreatment Percent Change) (Excluding Nonresponder)</td>
<td>8</td>
<td>-39.24</td>
<td>15.54</td>
</tr>
<tr>
<td>Time 3 (Six-Month Follow-Up Percent Change) (Excluding Nonresponder)</td>
<td>8</td>
<td>-43.16</td>
<td>14.16</td>
</tr>
</tbody>
</table>

These same analyses were then conducted with the BADS Activation subscale for all treatment completers. The means and standard deviations are presented in Table 7. The effect for time was not significant, Wilks’ Lambda = .626, $F(2, 7) = 2.089, p = .194$, multivariate partial eta squared = .374. This statistical analysis was
then repeated, excluding the data of participant number eight. The means and standard deviations, excluding participant number eight, are presented in Table 7.

The effect for time remained non-significant, Wilks’ Lambda = .603, $F (2, 6) = 1.977$, $p = .219$, multivariate partial eta squared = .397. These data suggest that behavioral activation did not increase over the course of time. These statistical analyses were then repeated for percent change on the BADS Activation subscale. The results of a LOCF, one-way repeated measures ANOVA suggested that there was not a significant effect for time, Wilks’ Lambda = .670, $F (2, 7) = 1.725$, $p = .246$, multivariate partial eta squared = .330. This analysis was then repeated after excluding the data from participant number eight. The results continued to remain non-significant for time, Wilks’ Lambda = .649, $F (2, 6) = 1.623$, $p = .273$, multivariate partial eta squared = .351. These analyses suggest that the percentage change in BADS Activation subscale scores was not significant over time.

Table 7

<table>
<thead>
<tr>
<th>Time Period</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1 (Pretreatment Score) (Including Nonresponder)</td>
<td>9</td>
<td>17.11</td>
<td>7.49</td>
</tr>
<tr>
<td>Time 2 (Posttreatment Score) (Including Nonresponder)</td>
<td>9</td>
<td>21.56</td>
<td>10.37</td>
</tr>
<tr>
<td>Time 3 (Six-Month Follow-Up Score) (Including Nonresponder)</td>
<td>9</td>
<td>24.33</td>
<td>11.76</td>
</tr>
</tbody>
</table>
Analyses were then conducted with the BADS Avoidance/Rumination subscale. A LOCF, one-way repeated measures ANOVA was conducted to compare scores on this subscale at Time 1 (pretreatment), Time 2 (posttreatment), and Time 3 (six-month follow-up) for all treatment completers. The means and standard deviations are presented in Table 8. The effect for time was not significant, Wilks’ Lambda = .594, $F (2, 7) = 2.394$, $p = .161$, multivariate partial eta squared = .406. These data suggest that there were no significant decreases in avoidant or ruminative behavior over time. This statistical analysis was then repeated, excluding the data of participant number eight. The means and standard deviations, excluding participant number eight, are presented in Table 8. There was a significant effect for time,
Wilks’ Lambda = .328, $F(2, 6) = 6.139, p = .035$, multivariate partial eta squared = .672. These data contradict the results of the previous analysis conducted, which included data from participant number eight, and suggest that there were in fact significant decreases in avoidant and ruminative behavior over time. These statistical analyses were then conducted for percent change on the BADS Avoidance/Rumination subscale. The results of a LOCF, one-way repeated measures ANOVA suggested that there was not a significant effect for time, Wilks’ Lambda = .558, $F(2, 7) = 2.777, p = .129$, multivariate partial eta squared = .442. This analysis was then repeated after excluding the data from participant number eight. This analysis resulted in a significant effect for time, Wilks’ Lambda = .305, $F(2, 6) = 6.827, p = .028$, multivariate partial eta squared = .695. These results suggest that there was a very significant effect size for percent change in BADS Avoidance/Rumination subscale scores over time.

Table 8

<table>
<thead>
<tr>
<th>Time Period</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1 (Pretreatment Score) (Including Nonresponder)</td>
<td>9</td>
<td>24.11</td>
<td>3.55</td>
</tr>
<tr>
<td>Time 2 (Posttreatment Score) (Including Nonresponder)</td>
<td>9</td>
<td>15.56</td>
<td>11.94</td>
</tr>
<tr>
<td>Time 3 (Six-Month Follow-Up Score) (Including Nonresponder)</td>
<td>9</td>
<td>15.67</td>
<td>12.55</td>
</tr>
</tbody>
</table>
After all LOCF, one-way repeated measures ANOVAs were conducted with data from the ATQ and BADS, a series of Pearson Product-Moment Correlations were conducted between the BDI-II and the ATQ, BADS, and VLQ. The results of these correlations are combined with graphs of the results of the ATQ, BADS, VLQ and BDI-II, which are presented below for analysis using visual inspection to examine session-by-session changes in scores.

When including the data from participant number eight, the BDI-II and ATQ correlated strongly with each other across treatment and follow-up (see Table 9 and Figure 2), suggesting changes in cognition as being a plausible mechanism of action.
Table 9
Correlations Between BDI-II and ATQ Scores (Including Participant #8)
(Significant Correlations in Bold Italics)

<table>
<thead>
<tr>
<th>Time</th>
<th>Pre Tx</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
<th>S5</th>
<th>S6</th>
<th>S7</th>
<th>S8</th>
<th>S9</th>
<th>S10</th>
<th>Post Tx</th>
<th>1-Mo FU</th>
<th>3-Mo FU</th>
<th>6-Mo FU</th>
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</thead>
<tbody>
<tr>
<td>r</td>
<td>.737</td>
<td>.669</td>
<td>.553</td>
<td>.673</td>
<td>.707</td>
<td>.757</td>
<td>.809</td>
<td>.705</td>
<td>.738</td>
<td>.851</td>
<td>.861</td>
<td>.830</td>
<td>.850</td>
<td>.858</td>
<td>.945</td>
</tr>
<tr>
<td>p</td>
<td>.023</td>
<td>.049</td>
<td>.123</td>
<td>.047</td>
<td>.033</td>
<td>.018</td>
<td>.008</td>
<td>.034</td>
<td>.023</td>
<td>.004</td>
<td>.003</td>
<td>.006</td>
<td>.004</td>
<td>.003</td>
<td>.000</td>
</tr>
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</table>

Figure 2. BDI-II and ATQ Scores (Including Participant #8)

However, when the data from participant number eight was excluded, the correlations between the BDI-II and ATQ only emerged later in the course of treatment, calling in to question the likelihood that changes in cognition are responsible for changes in symptoms of depression (see Table 10 and Figure 3).
Table 10

Correlations Between BDI-II and ATQ Scores (Excluding Participant #8)  
(Significant Correlations in Bold Italics)

<table>
<thead>
<tr>
<th></th>
<th>Pre Tx</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
<th>S5</th>
<th>S6</th>
<th>S7</th>
<th>S8</th>
<th>S9</th>
<th>S10</th>
<th>Post Tx</th>
<th>1-Mo FU</th>
<th>3-Mo FU</th>
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<tbody>
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<td>r</td>
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<td>.669</td>
<td>.565</td>
<td>.643</td>
<td>.647</td>
<td>.491</td>
<td>.642</td>
<td>.429</td>
<td>.560</td>
<td>.775</td>
<td>.745</td>
<td>.708</td>
<td>.710</td>
<td>.700</td>
<td>.873</td>
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<tr>
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<td>.069</td>
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<td>.086</td>
<td>.083</td>
<td>.217</td>
<td>.086</td>
<td>.289</td>
<td>.149</td>
<td>.024</td>
<td>.034</td>
<td>.050</td>
<td>.049</td>
<td>.053</td>
<td>.005</td>
</tr>
</tbody>
</table>

Figure 3. BDI-II and ATQ Scores (Excluding Participant #8)

The same analysis was then conducted to examine the relationship between BDI-II scores and BADS Activation subscale scores. Both when including and excluding data from participant number eight, no consistent correlation appeared to emerge between changes in symptoms of depression and changes in behavioral
activation until later in treatment, suggesting that change in overt behavior is not the mechanism through which changes in symptoms of depression are observed (see Tables 11 and 12 and Figures 4 and 5).

Table 11

Correlations Between BDI-II and BADSAC Scores (Including Participant #8)
(Significant Correlations in Bold Italics)

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Tx</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
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<th>Post</th>
<th>1-Mo</th>
<th>3-Mo</th>
<th>6-Mo</th>
</tr>
</thead>
<tbody>
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<td>.077</td>
<td>.108</td>
<td>.602</td>
<td>.739</td>
<td>.569</td>
<td>.409</td>
<td>.667</td>
<td>.483</td>
<td>.598</td>
<td>.739</td>
<td>.690</td>
<td>.686</td>
<td>.732</td>
<td>.741</td>
<td>.681</td>
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<tr>
<td>p</td>
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<td>.110</td>
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<td>.050</td>
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<td>.040</td>
<td>.041</td>
<td>.023</td>
<td>.022</td>
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</tbody>
</table>

Figure 4. BDI-II and BADSAC Scores (Including Participant #8)
Table 12

Correlations Between BDI-II and BADSAC Scores (Excluding Participant #8)
(Significant Correlations in Bold Italics)

<table>
<thead>
<tr>
<th>Time</th>
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<th>S2</th>
<th>S3</th>
<th>S4</th>
<th>S5</th>
<th>S6</th>
<th>S7</th>
<th>S8</th>
<th>S9</th>
<th>S10</th>
<th>Post Tx</th>
<th>1-Mo FU</th>
<th>3-Mo FU</th>
<th>6-Mo FU</th>
</tr>
</thead>
<tbody>
<tr>
<td>r</td>
<td>.204</td>
<td>.602</td>
<td>.728</td>
<td>.514</td>
<td>.411</td>
<td>.668</td>
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<td>.707</td>
<td>-</td>
<td>-.706</td>
<td>-.731</td>
<td>.760</td>
<td>.841</td>
</tr>
<tr>
<td>p</td>
<td>.628</td>
<td>.795</td>
<td>.114</td>
<td>.040</td>
<td>.193</td>
<td>.311</td>
<td>.070</td>
<td>.270</td>
<td>.112</td>
<td>.044</td>
<td>.050</td>
<td>.050</td>
<td>.040</td>
<td>.029</td>
<td>.009</td>
</tr>
</tbody>
</table>

The correlation between the BDI-II and the BADS Avoidance/Rumination subscale scores was also investigated. When this correlation was examined while including the data from participant number eight, a consistent correlation emerged early in treatment between changes in symptoms of depression and changes in symptoms of avoidance/rumination.
avoidance and rumination, suggesting that decreased avoidance and rumination is a probable mechanism through which the effects of behavioral activation are observed (see Table 13 and Figure 6).

Table 13

Correlations Between BDI-II and BADSAR Scores (Including Participant #8)
(Significant Correlations in Bold Italics)

<table>
<thead>
<tr>
<th></th>
<th>Pre Tx</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
<th>S5</th>
<th>S6</th>
<th>S7</th>
<th>S8</th>
<th>S9</th>
<th>S10</th>
<th>Post Tx</th>
<th>1-Mo FU</th>
<th>3-Mo FU</th>
<th>6-Mo FU</th>
</tr>
</thead>
<tbody>
<tr>
<td>( r )</td>
<td>.397</td>
<td>.571</td>
<td>.511</td>
<td>.656</td>
<td>.602</td>
<td>.808</td>
<td>.798</td>
<td>.742</td>
<td>.670</td>
<td>.797</td>
<td>.746</td>
<td>.775</td>
<td>.795</td>
<td>.797</td>
<td>.847</td>
</tr>
<tr>
<td>( p )</td>
<td>.290</td>
<td>.108</td>
<td>.160</td>
<td>.055</td>
<td>.086</td>
<td>.008</td>
<td>.010</td>
<td>.022</td>
<td>.048</td>
<td>.010</td>
<td>.021</td>
<td>.014</td>
<td>.010</td>
<td>.010</td>
<td>.004</td>
</tr>
</tbody>
</table>

Figure 6. BDI-II and BADSAR Scores (Including Participant #8)
Interestingly, when this analysis was repeated without including the data of participant number eight, no correlations were observed between the BDI-II and the BADS Avoidance/Rumination subscale, calling into question the conclusion that decreases in avoidance and rumination are responsible for decreases in symptoms of depression (see Table 14 and Figure 7).

Table 14

Correlations Between BDI-II and BADSAR Scores (Excluding Participant #8)
(Significant Correlations in Bold Italics)

<table>
<thead>
<tr>
<th></th>
<th>PreTx</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
<th>S5</th>
<th>S6</th>
<th>S7</th>
<th>S8</th>
<th>S9</th>
<th>S10</th>
<th>PostTx</th>
<th>1-MoFU</th>
<th>3-MoFU</th>
<th>6-MoFU</th>
</tr>
</thead>
<tbody>
<tr>
<td>r</td>
<td>.597</td>
<td>.631</td>
<td>.628</td>
<td>.625</td>
<td>.508</td>
<td>.574</td>
<td>.691</td>
<td>.539</td>
<td>.350</td>
<td>.686</td>
<td>.496</td>
<td>.601</td>
<td>.592</td>
<td>.599</td>
<td>.594</td>
</tr>
<tr>
<td>p</td>
<td>.118</td>
<td>.093</td>
<td>.179</td>
<td>.097</td>
<td>.199</td>
<td>.137</td>
<td>.058</td>
<td>.168</td>
<td>.395</td>
<td>.060</td>
<td>.211</td>
<td>.115</td>
<td>.122</td>
<td>.117</td>
<td>.120</td>
</tr>
</tbody>
</table>

Figure 7. BDI-II and BADSAR Scores (Excluding Participant #8)
Finally, the correlation between the BDI-II and the VLQ was examined. When including the data from participant number eight, a semi-consistent correlation between decreases in symptoms of depression and increases in values-consistent behaviors emerged in mid- to late-treatment, suggesting that changes in values-consistent behavior may be responsible for changes in symptoms of depression (see Table 15 and Figure 7).

Table 15

Correlations Between BDI-II and VLQ Scores (Including Participant #8)  
(Significant Correlations in Bold Italics)

<table>
<thead>
<tr>
<th></th>
<th>S3</th>
<th>S4</th>
<th>S5</th>
<th>S6</th>
<th>S7</th>
<th>S8</th>
<th>S9</th>
<th>S10</th>
</tr>
</thead>
<tbody>
<tr>
<td>r</td>
<td>-.208</td>
<td>-.338</td>
<td>-.541</td>
<td>-.712</td>
<td>-.622</td>
<td>-.702</td>
<td>-.744</td>
<td>-.748</td>
</tr>
<tr>
<td>p</td>
<td>.591</td>
<td>.374</td>
<td>.133</td>
<td>.032</td>
<td>.074</td>
<td>.035</td>
<td>.022</td>
<td>.020</td>
</tr>
</tbody>
</table>

Figure 8. BDI-II and VLQ Scores (Including Participant #8)
However, when this same analysis was repeated without including the data of participant number eight, only one statistically significant correlation between BDI-II scores and VLQ scores emerged, prior to session ten of treatment (see Table 16 and Figure 9). This finding suggests that changes in values-consistent behavior may not actually be responsible for changes in symptoms of depression.

Table 16

Correlations Between BDI-II and VLQ Scores (Excluding Participant #8)
(Significant Correlations in Bold Italics)

<table>
<thead>
<tr>
<th>S3</th>
<th>S4</th>
<th>S5</th>
<th>S6</th>
<th>S7</th>
<th>S8</th>
<th>S9</th>
<th>S10</th>
</tr>
</thead>
<tbody>
<tr>
<td>r</td>
<td>-.235</td>
<td>-.211</td>
<td>-.287</td>
<td>-.583</td>
<td>-.546</td>
<td>-.661</td>
<td>-.687</td>
</tr>
<tr>
<td>p</td>
<td>.575</td>
<td>.615</td>
<td>.491</td>
<td>.129</td>
<td>.161</td>
<td>.074</td>
<td>.060</td>
</tr>
</tbody>
</table>

Inspection of individual participant data was then conducted (please refer to Appendices M, N, and O for individual participant graphs). The data from individual participants is summarized in the table below. Items that are in bold, italic, and underlined text represent that changes in a specific scale occurred the between sessions prior to the largest decrease in BDI-II scores. Items that are in bold text alone represent that changes in a specific scale occurred corresponding with the largest decrease in BDI-II scores.
Figure 9. BDI-II and VLQ Scores (Excluding Participant #8)

Table 17

Largest Changes in BDI-II, BADSAC, VLQ, BADSAR, and ATQ Scores Among Full Responders and Partial Responders

<table>
<thead>
<tr>
<th>Participant</th>
<th>BDI-II</th>
<th>BADSAC</th>
<th>VLQ</th>
<th>BADSAR</th>
<th>ATQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Responder #1</td>
<td>S1-S2</td>
<td>S5-S6</td>
<td>S6-S7</td>
<td>S2-S3</td>
<td>S2-S3</td>
</tr>
<tr>
<td>Full Responder #2</td>
<td>S3-S4</td>
<td>S3-S4</td>
<td>S5-S6</td>
<td>S3-S4</td>
<td>S3-S4</td>
</tr>
<tr>
<td>Full Responder #3</td>
<td>S1-S2</td>
<td>S2-S3</td>
<td>S3-S4</td>
<td>S8-S9</td>
<td>S1-S2</td>
</tr>
<tr>
<td>Full Responder #4</td>
<td>S1-S2</td>
<td>S1-S2</td>
<td>S4-S5</td>
<td>S3-S4</td>
<td>S1-S2</td>
</tr>
<tr>
<td>Partial Responder #1</td>
<td>S3-S4</td>
<td>S3-S4</td>
<td>S4-S5</td>
<td>S4-S5</td>
<td>S3-S4</td>
</tr>
<tr>
<td>Partial Responder #2</td>
<td>S5-S6</td>
<td>S6-S7</td>
<td>S3-S4</td>
<td>S3-S4</td>
<td>S1-S2</td>
</tr>
<tr>
<td>Partial Responder #3</td>
<td>S1-S2</td>
<td>S3-S4</td>
<td>S3-S4</td>
<td>S1-S2</td>
<td>S1-S2</td>
</tr>
</tbody>
</table>

Examining the individual data from full responders and partial responders, only one participant had changes in outcome measures that preceded changes in BDI-II scores. Partial Responder #2 had a decrease in ATQ scores, followed by an
increase in VLQ scores and a decrease in BADSAR scores, all of which preceded the largest decrease in BDI-II scores for this participant. These data suggest that for this participant, changes in negative automatic thoughts may have been most relevant to changes in symptoms of depression, although change in values-based behavior is also a plausible mediator.

All full and partial responders, with the exception of Full Responder #1, experienced a large change in at least one of their outcome measures that corresponded with the largest change in BDI-II scores for these participants. Three participants had large changes in both BADSAC and ATQ scores that simultaneously changed at the same time as their BDI-II scores. Additionally, one participant experienced a change in her ATQ score alone, which occurred at the same time as her BDI-II score changed, and another participant experienced changes in both her ATQ and BADSAR scores, which occurred at the same time as her BDI-II scores.

Data from individual participant graphs add a small amount of additional support that changes in negative automatic thoughts may mediate changes in symptoms of depression when utilizing behavioral activation as a treatment for depression. However, given that many participants exhibited changes in outcome measures that occurred at the same time as changes in BDI-II scores, rather than preceding these changes, it is difficult to make conclusions about causality.

*Consumer Satisfaction and Services Sought Post-Treatment.* Finally, data on consumer satisfaction and services sought since treatment was gathered. Three questions regarding consumer satisfaction were embedded within each session of the
Building a Meaningful Life Through Behavioral Activation Program. Participants were first asked, “How interesting was today’s session?” Response options included “not interesting,” “somewhat interesting,” and “very interesting,” which were subsequently coded as “1,” “2,” and “3,” respectively. The average consumer satisfaction rating on this question was 2.38, suggesting that participants had at least moderate interest in the sessions they completed, on average. Participants were then asked, “How helpful was today’s session?” As with the previous question, response options were “not helpful,” “somewhat helpful,” and “very helpful,” which were coded in a similar fashion to the previous question. The average consumer satisfaction rating on this question was 2.28, suggesting that participants perceived the sessions they completed to be at least somewhat helpful, on average. Finally, participants were asked, “How encouraging was today’s session?” Response options included “not encouraging,” “somewhat encouraging,” and “very encouraging.” The average consumer satisfaction rating on this question was 2.25, suggesting that participants found the sessions they completed to be at least somewhat encouraging, on average. In addition to these three questions, participants were also asked to complete a fifteen-item Consumer Satisfaction Survey, with response options ranging from “1” (Strongly Disagree) to “5” (Strongly Agree), with higher scores representing greater degrees of consumer satisfaction. The average rating on this measure was 3.92, suggesting a relatively high level of satisfaction with the Building a Meaningful Life Through Behavioral Activation program.
Finally, data was obtained about services being sought at posttreatment and follow-up. At posttreatment, of the participants who responded, three participants were not currently receiving any services for symptoms of depression and one participant was receiving medication/psychiatric services in the community. At one-month follow-up, one participant continued to receive no services for symptoms of depression, one participant was receiving combined psychotherapy and medication services, and one participant was attending group meetings. At three-month follow-up, one participant continued to receive no services for symptoms of depression, two participants were receiving psychotherapy in the community, and one participant was continuing to use skills from the *Building a Meaningful Life Through Behavioral Activation Program*. At six-month follow-up, one participant continued to receive no services for symptoms of depression, one participant was engaging in self-care, one participant was receiving therapy in the community, one participant was receiving combined therapy and medication services in the community, and one participant reported receiving other, unspecified services.
CHAPTER V
DISCUSSION

The purposes of the present study were to test the efficacy of a computerized behavioral activation treatment for depression and examine possible mechanisms of action. This study intended to expand on existing treatment outcome literature suggesting that behavioral activation is an effective intervention by testing the efficacy of the intervention through novel treatment modality. Furthermore, this study aimed to provide some clarity around proposed mechanisms of action of behavioral activation treatments for depression. It was hypothesized that computerized behavioral activation treatment would lead to significant decreases in symptoms of depression and increases in quality of life and values-consistent behaviors. Furthermore, it was hypothesized that homework completion would be associated with greater reductions in symptoms of depression and that changes in overt behaviors would be the primary mechanism by which treatment effects are observed.

Outcomes of the Present Study. The results of this study provide preliminary evidence for the efficacy of the Building a Meaningful Life Through Behavioral Activation computerized treatment for depression. Observed effects on the BDI-II trended toward statistical significance when analyzing data from the entire sample of treatment completers and these effects became statistically significant with a large effect size upon removal of the data from the nonresponder in the study.
Additionally, the overall response rate obtained in this study, when using the BDI-II as a measure of response rate, the present study achieved comparable response rates to other studies examining the efficacy of behavioral activation. A similar pattern to that observed with the BDI-II was observed with scores from other measures that have demonstrated correlations with the BDI-II, including the ATQ and the BADS Avoidance/Rumination subscale. Of note, these changes were not only observed at posttreatment, but were maintained through six-month follow-up. These data provide a tentative but promising basis for continued study of the efficacy of this specific computerized treatment for depression. Furthermore, these data are consistent with prior findings demonstrating the efficacy of behavioral activation (e.g. Dimidjian, et al., 2006) and the efficacy of computerized interventions (e.g. Proudfoot, et al., 2004) in the treatment of depression.

While the observed decrease in symptoms of depression was consistent with the primary hypothesis of this study, the data used to examine hypothesized mechanisms of action did not provide unequivocal support for the hypothesis that overt changes in behavior are responsible for the observed treatment effects. Quantitative data available from the ATQ, BADS, and VLQ, when examined both statistically, visually, and at an individual participant level, at best suggest a tentative conclusion that changes in negative automatic thoughts may account for observed treatment effects. When examining data from the whole sample of treatment completers, as well as the majority of treatment responders, changes in scores on the ATQ and BADS Avoidance/Rumination subscales emerged as measures of plausible
mechanisms of action, given their correlations with the BDI-II beginning in early treatment sessions and continuing throughout treatment and the overall decreases in each measure observed over the course of treatment and through the follow-up assessment phase. However, when examining this same set of data without including the data from the nonresponder in the study, these correlations were no longer found and the correlations that were observed all were found in treatment sessions that were subsequent to the two most precipitous decreases in BDI-II scores, observed between sessions two and three and sessions four and five. However, individual correlations remained when examining the individual participant data of full and partial responders. Nonetheless, the notable changes on the ATQ over the course of treatment and follow-up warrant some consideration of changes in negative automatic thoughts as a possible mediator of observed treatment effects. The effects observed on the BADS Avoidance/Rumination subscale are arguably consistent with this finding, as the BADS Avoidance/Rumination subscale includes a number of thought-oriented items (e.g. “I tried not to think about certain things,” “I spent a long time thinking over and over about my problems”). Adding a level of complexity to this analysis, significant changes were also observed on the VLQ over the course of treatment, suggesting changes in values-consistent behavior may warrant additional consideration as a possible mediator of treatment effects of behavioral activation. Additionally, one participant experienced changes in VLQ scores that preceded changes in BDI-II scores, which lends some support to the possibility that changes in values-consistent behavior may mediate treatment effects. However, this participant
also experienced changes in the ATQ and BADSAR prior to changes in the BDI-II as well, which complicates interpretations of what may have mediated treatment effects for this participant. When considering the method of analysis used at an aggregated data level, it is important to note that a session-by-session correlational analysis interferes with the ability to make conclusions about direction of effect. Furthermore, this method of analysis does not take into account expectations regarding temporal precedence. In other words, we might expect, for example, for changes on the BADS to occur prior to changes on the BDI-II, rather than these changes occurring simultaneously. Unfortunately, the data obtained from this study regarding plausible mediators of treatment effects appear to only add additional complexity to the existing literature regarding the mechanism of action of behavioral activation.

Another interesting finding of the present study was that self-reported quality of life did not improve over the course of treatment, despite decreases in symptoms of depression and increases in values-consistent behavior at both an aggregate and individual level. It is curious that values-consistent behavior would increase without seeing increases in quality of life over time. It is possible that because the QOLS and VLQ measure two separate constructs (e.g. satisfaction with a variety of aspects of one’s life versus the extent to which one is living consistently with one’s values), it might be expected that they wouldn’t necessarily correlate with each other. It is entirely possible to be living fairly consistently with one’s values, while not being satisfied with the current circumstances of one’s life. Another possible explanation for the disconnect between the findings regarding the QOLS and the VLQ is that
changes on the VLQ could be accounted for by smaller, more easily accomplished behaviors (e.g. calling one’s mother more frequently to live more consistently with values pertaining to familial relationships), whereas changes on the QOLS may take more time and effort to accomplish (e.g. finding a romantic partner, increasing financial security). Finally, it is possible that changes that participants made in their lives that might account for changes in symptoms of depression are not changes that are measured by the QOLS, but are changes that are captured by the VLQ, which more closely relates to the content of the program. In fact, it is possible that many of the areas assessed by the QOLS are not necessarily areas that comport with values-based behavior for participants.

Finally, it was an unexpected finding that homework completion was not correlated with changes in BDI-II scores when analyzing aggregated data. It was hypothesized that the more participants engaged in the treatment process outside of session, the more than they would benefit in terms of improvements in symptoms of depression. A number of scenarios may account for this interesting finding. First, it is possible that the small sample size of the study obscured the relationship between homework completion and changes in symptoms of depression, a hypothesis that is supported by the distribution of participants on the corresponding scatterplot. Second, it is possible that nonspecific aspects of the program (e.g. support) may account for the observed changes, rather than overt changes in behavior outside of session, measured by homework completion. In fact, this hypothesized scenario may also account for the fact that no changes were observed on the BADS Activation
subscale. Third, it is possible that participants were altering their behavior outside of session, but not completing the actual homework assignments. In other words, participants were engaging with the treatment process, but not in a way that was being measured by homework completion. Finally, it is possible that the homework completion measure was not sensitive enough to capture this hypothesized correlation. The homework completion measure was an “all, some, or none” choice, which may not encompass more nuanced levels of completion.

Limitations of the Present Study. There are a number of limitations of the present study that merit comment. First, the small sample size of the present study should limit the extent to which firm conclusions are drawn from the data presented. Given that the intervention being utilized in the present study had not previously been tested, the it was the intention to keep the sample size relatively small, so that any difficulties discovered during pilot testing could be addressed accordingly prior to providing treatment to larger groups of individuals. This decision was ultimately an advantageous one, as many unexpected challenges were encountered in testing the first iteration of the computerized treatment program utilized in this study.

Second, only five of the nine individuals who began treatment completed all ten sessions of treatment. Many of the reasons for discontinuation could be addressed in future studies. Given that one participant terminated due to problems with program functionality, future tests of newly designed computer treatment programs should be extensively tested for functionality prior to beginning pilot testing. Future researchers could begin by having graduate students, research assistants, and other non-clinical
populations test the program for functionality, after which it could be pilot tested with a clinical population. The most common reason for termination, however, was the end of the school semester. Future researchers should consider time frames for recruitment to accommodate for the possibility that changes in schedules may lead to premature termination. As such, it would be recommended to commence recruitment at the beginning of semesters, when possible.

Third, the present study experienced some data loss, due to a period during which the program server was offline, without the knowledge of the research team. The computer was the sole source for a few pieces of data, including the VLQ, information regarding homework completion, and information regarding the extent to which the program was interesting, helpful, and encouraging. Future studies should consider having all measures be completed using pen and paper to prevent data loss. One concern with this approach is that participants may have the undue burden of completing the same measure twice, if the measure is also embedded in the computer program itself. This could be addressed through having a research assistant sit with the participant while he or she completes the measure and write down his or her responses. Alternatively, other measures could be taken to ensure that participant responses are being recorded by the computer, including programming a back-up system that increases the likelihood that participant responses will be recorded in at least one database or location on the computer.

Fourth, some aspects of the measures utilized in the present study may limit the ability to obtain information about treatment effects and consumer satisfaction.
The VLQ was only administered during sessions three through ten of treatment, which limits the conclusions that can be made about values-based behaviors prior to and early in treatment, as well as changes in values-based behaviors after treatment. Given the importance of continuing to gather data regarding plausible mechanisms of action of behavioral activation, the lack of data available from the VLQ is unfortunate, especially given that many participants experienced changes in symptoms of depression within the first two sessions of treatment, before the VLQ was administered. Additionally, many of the measures administered by the computer only had three response options, which may not capture more nuanced responses regarding homework completion and consumer satisfaction.

Future Investigation and Conclusion. The most obvious future direction for additional research on the Building a Meaningful Life Through Behavioral Activation computerized treatment for depression is to continue to test the program’s efficacy with a larger sample size. Clearly, the small sample size limits the conclusions that can be made regarding the efficacy of the program being tested and the generalizability of the preliminary findings of this study to different populations and settings. As many of the difficulties with program functionality have been addressed throughout the present study and in the time since the completion of data collection, further testing with clinical populations seems warranted at this time. In addition to allowing for more definitive conclusions to be made about the efficacy of the Building a Meaningful Life Through Behavioral Activation treatment, studies with an increased sample size may also be able to provide additional clarity with regard to
some of the other hypotheses tested in this study (e.g. hypotheses regarding mechanism of action), as well as test additional new hypotheses. For example, given the novelty of computerized interventions for depression, it may be interesting to test hypotheses examining populations for which computerized interventions are more and less effective.

Second, future researchers may want to examine the efficacy of the Building a Meaningful Life Through Behavioral Activation program in settings other than a university campus. Given the limited access to therapy services in many settings, including community mental health clinics, short-term inpatient psychiatric units, and primary care health settings, testing computerized interventions in these locations may provide evidence for cost-effective enhancements to the current level of care being provided. While it may not be plausible for these settings to employ mental health professionals capable of providing therapy on a full-time basis, it is more likely that these settings may be able to accommodate the cost of a computerized treatment program for depression, should this type of approach demonstrate efficacy with the populations served in these settings.

Third, if the Building a Meaningful Life Through Behavioral Activation program continues to demonstrate efficacy, studies comparing the program to other active treatments is warranted. Previous research has suggested that the effects of computerized treatment programs are comparable to the effects of therapist-administered treatments. Future researchers should examine whether this outcome is
found when comparing computerized behavioral activation programs to other active treatments.

Fourth, should additional studies demonstrate efficacy of computerized behavioral activation treatments for depression, future researchers may want to consider creating optional modules to include as part of the computerized treatment program, targeted at addressing disorders that are commonly comorbid with depression. Given the substantial comorbidity between mood and anxiety disorders, modules addressing some of the most common anxiety disorders may be a logical first step for expansion of computerized behavioral activation treatments.

Finally, future researchers may wish to consider ways to enhance the measurement of both proposed mechanisms of action, homework completion, and consumer satisfaction, with regard to computerized behavioral activation treatments. As mentioned previously, the VLQ was only administered throughout a limited portion of treatment. Given the potential relevance of this measure to examining mechanisms of action of behavioral activation, it is recommended that the VLQ be administered from pretreatment through follow-up assessment phases. Additionally, given the importance of assessment of homework completion, more nuanced approaches to the measurement of homework completion, perhaps including very detailed assessments of values-based behaviors from week-to-week is warranted. Finally, future researchers may consider more detailed measurements of consumer satisfaction, for purposes of additional program improvements.
In conclusion, the results of this study provide very preliminary evidence for
the efficacy computerized behavioral activation treatments for depressive disorders.
Future research this area should allow for continued refinements of this treatment
approach, which may provide some avenues for reducing lack of access to mental
health services, should further findings continue to demonstrate efficacy of this
specific treatment.
Appendix A

Beck Depression Inventory – II (BDI-II)
The Beck Depression Inventory – II is copyright by Aaron T. Beck, 1996. Individuals interested in obtaining information regarding the Beck Depression Inventory – II should contact Pearson, Attn: Customer Service, 19500 Bulverde Road, San Antonio, TX 78259-3701.
Appendix B
Revised Hamilton Rating Scale for Depression (RHRSD)
The Revised Hamilton Rating Scale for Depression is copyrighted by W. L. Warren, 1994. Individuals interested in obtaining information regarding the Revised Hamilton Rating Scale for Depression should contact Western Psychological Services, 12031 Wilshire Boulevard, Los Angeles, CA 90025-1251.
Appendix C

The Structured Clinical Interview for DSM-IV Axis I Disorders
Appendix D

The Behavioral Activation for Depression Scale
Individuals interested in obtaining information regarding the Behavioral Activation for Depression Scale should contact J. W. Kanter, Department of Psychology, University of Wisconsin-Milwaukee, PO Box 413, Milwaukee, WI 53201.
Appendix E

Automatic Thoughts Questionnaire (ATQ)
Individuals interested in obtaining information regarding the Automatic Thoughts Questionnaire should contact S. D. Hollon or P. C. Kendall, Cognitive Assessment Project, Department of Psychology, University of Minnesota, 75 East River Road, Minneapolis, MN 55455.
Appendix F

Quality of Life Scale (QOLS)
Individuals interested in obtaining information regarding the Quality of Life Scale should contact C. S. Burckhardt, Oregon Health Sciences University, 3181 S.W. Sam Jackson Park Road, Portland, OR 97201.
Appendix G

Initial Assessment Information Form
Initial Assessment Information Form for Participant Number _____

Date of Birth: ____________________ Age: ____________________

Race/Ethnicity:
1 = Caucasian/White  2 = African-American  3 = Hispanic/Latino
4 = Asian-American  5 = Native American  6 = Arab-American
7 = Alaskan American  8 = Multiracial ____________________________
9 = International / Non-US Resident ____________________________
10 = Other ____________________________

Sex:
1 = Male  2 = Female

Marital Status:
1 = Single  2 = Married  3 = Domestic Partnership
4 = Engaged  5 = Separated  6 = Divorced or Annulled
7 = Widowed  8 = Other ____________________________

Occupational Status:
1 = Currently Employed  2 = Unemployed  3 = On Disability
4 = Stay at Home Parent  5 = Retired  6 = Other ____________

Household Income:
1 = Under $5,000  2 = $5,000 - $9,999  3 = $10,000 - $14,999
4 = $15,000 - $24,999  5 = $25,000 - $34,999  6 = $35,000 - $49,999
7 = $50,000 - $74,999  8 = $75,000 - $99,999  9 = $100,000 and over
Education Level:

1 = Less than 7th Grade  
2 = 7th – 12th Grade (Did Not Graduate)  
3 = Graduated High School  
4 = GED  
5 = Some College  
6 = Graduated 2-Year College or Technical School  
7 = Graduated 4-Year College  
8 = Some Graduate School  
9 = Graduate Degree (e.g. Ph.D., M.A., M.D.)

PREVIOUS Treatment(s) for Depression (Circle All That Apply):

1 = None  
2 = Medications  
3 = Individual Therapy  
4 = Group Therapy  
5 = Support Group  
6 = Case Management  
7 = Pastoral Care  
8 = Hospital (Inpatient or Partial Hospitalization)  
9 = Other

CURRENT Treatment(s) for Depression (Circle All That Apply):

1 = None  
2 = Medications  
3 = Individual Therapy  
4 = Group Therapy  
5 = Support Group  
6 = Case Management  
7 = Pastoral Care  
8 = Hospital (Inpatient or Partial Hospitalization)  
9 = Other

Current Psychotropic Medications:

Selective Serotonin Reuptake Inhibitors (SSRIs)

_____ Citalopram (Celexa)  
_____ Escitalopram (Lexapro)  
_____ Fluoxetine (Prozac, Sarafem)  
_____ Fluvoxamine (Luvox, Faverin, Dumyrox)  
_____ Paroxetine (Paxil, Pexeva)  
_____ Sertraline (Zoloft)
**Tricyclic Antidepressants (TCAs)**

- Amitriptyline
- Clomipramine (Anafranil)
- Doxepin
- Nortriptyline (Pamelor)
- Trimipramine (Surmontil)
- Amoxapine
- Desipramine (Norpramin)
- Imipramine (Tofranil)
- Protriptyline (Vivactil)

**Monoamine Oxidase Inhibitors (MAOIs)**

- Isocarboxazid (Marplan)
- Rasagiline (Azilect)
- Tranylcypromine (Parnate)
- Phenelzine (Nardil)
- Selegiline (Eldepryl, Zelapar)

**SSNRI (Selective Serotonin and Norepinephrine Reuptake Inhibitors)**

- Duloxetine (Cymbalta)
- Venlafaxine (Effexor)

**Atypical Antidepressants**

- Bupropion (Wellbutrin, Zyban)

**Antipsychotics**

- Aripiprazole (Abilify)
- Clozapine (Clozaril, FazaClo)
- Haloperidol (Haldol)
- Olanzapine (Zydis, Zyprexa)
- Risperidone (Risperdal)
- Thiothixene (Navane)
- Ziprasidone (Geodon)
- Chlorpromazine (Thorazine)
- Fluphenazine (Prolixin)
- Loxapine (Loxitane)
- Quetiapine (Seroquel)
- Thioridazine (Mellaril)
- Trifluoperazine (Stelazine)

**Mood Stabilizers/Anticonvulsants**

- Gabapentin (Neurontin)
- Lithium (Eskalith, Lithobid)
- Tiagabine (Gabitril)
- Valproic Acid (Depakote)
- Lamotrigine (Lamictal)
- Oxcarbazepine (Trileptal)
- Topiramate (Topamax)

**Anxiolytics/Benzodiazepines**

- Alprazolam (Xanax)
- Chlordiazepoxide (Librium)
- Lorazepam (Ativan)
- Buspiron (BuSpar)
- Clonazepam (Klonopin)
- Oxazepam (Serax)
Number of Weeks You Have Been Taking Antidepressant Medications: 
___________ weeks

How Many Years of Experience Do You Have With Computers? 
___________ year(s)

How Comfortable Are You With a Computer?

1 2 3 4 5 6 7 8 9 10

Completely Uncomfortable

Completely Comfortable

How Much Knowledge Do You Have About Computers?

1 2 3 4 5 6 7 8 9 10

No Knowledge

Extensive Knowledge

On Average, How Many Hours Do You Use a Computer Each Week?

___________ hour(s)
Appendix H

Additional Services Form
Additional Services Form for Participant Number [Participant Number]

Please indicate what services you have received since completing your final session of the computerized treatment for depression.

1 = None

2 = Therapy in the Community

3 = Medication/Psychiatric Services in the Community

4 = Combined Therapy and Medication Services in the Community

5 = Investigating Treatment Options

6 = Self-Care

7 = Group Meetings

8 = Continuing to Use Skills From the Computerized Treatment for Depression

9 = Other (Please Describe) ___________________________
Appendix I

Phone Script
Phone Script

(Research Assistant): Hello. My name is __________. May I speak with __________?

YES: (wait for phone to be given to potential participant and/or begin script below)
NO: Do you know a time during which I may be able to reach him/her?

YES: (MAKE NOTE OF TIME). Thank you for your assistance.
NO: Thank you for your time, I will call back later.

(Research Assistant): Hello. My name is __________ and I am a research assistant at Western Michigan University. I am calling because you left a message on our laboratory phone regarding a depression study we are conducting. Are you interested in learning more about the study?

NO: Okay, thank you for your time.
YES: If you decide to participate and qualify for the study, you would receive a computerized behavioral activation treatment for depression called "Building a Meaningful Life Through Behavioral Activation". The treatment involves learning new strategies to alleviate your symptoms of depression and has been previously shown to be effective for many people who are experiencing symptoms of depression. Treatment would take place over the course of approximately two-and-a-half months and would involve ten weekly sessions of behavioral activation therapy, administered by a computer with the aid of a research assistant. These sessions will be approximately forty-five minutes to one-and-one-half hours in length. In addition to attending these weekly sessions, it is also expected that you will practice the strategies learned in therapy over the course of your week. You would also be asked to attend two initial assessment appointments and four follow-up assessment appointments to thoroughly evaluate your symptoms of depression, the last of which would occur six months after the completion of treatment. Do you have any questions about participating in this research project?

YES: (ANSWER ANY QUESTIONS). If you are still interested in learning more about the study, the next step would be to schedule an initial assessment appointment. This appointment should take approximately one half-hour to complete. During this assessment appointment, you will be asked to read and sign an informed consent document and complete two self-report measures. Would you be interested in scheduling an initial assessment appointment?

NO: If you are still interested in learning more about the study, the next step would be to schedule an initial assessment appointment. This appointment should take approximately one half-hour to complete. During this assessment appointment, you will be asked to read and sign an informed consent document and
complete two self-report measures. Would you be interested in scheduling an initial assessment appointment?

**NO:** Okay. Thank you for your time. Goodbye.

**YES:** Okay, at this time I would like to set up your initial screening appointment. (SET UP A DATE AND TIME). Would you like to receive a reminder phone call? (IF YES, MAKE REMINDER PHONE CALL ARRANGEMENT). Thank you for your time.
Appendix J

Informed Consent Document
Purpose

You have been invited to participate in research project entitled “Testing the Efficacy of a Computerized Behavioral Activation Protocol in the Treatment of Depressive Disorders.” This research is intended to test the effectiveness of a psychological therapy administered by a computer to treat symptoms of depression. This psychological therapy has been shown to be effective with many people when administered by a therapist. We are doing this study because we would like to know how effective this psychological therapy is when administered by a computer. This project will serve as Alyssa Kalata’s dissertation study.

Participation

If you agree to participate in this study, you will be asked to complete a brief initial assessment appointment at today’s appointment, during which you will complete a personal information form and one measure of your symptoms of depression. This brief initial assessment will take approximately one half-hour to complete. You will then be asked to complete a comprehensive second assessment approximately one week from today, during which you will complete three measures of your examining your symptoms of depression and methods of coping, one measure examining your quality of life and adaptive functioning, and a psychological interview. This comprehensive second assessment appointment will take approximately two hours to complete. Based on the results of this comprehensive second assessment appointment, it will be determined if you qualify to participate in the study. Those individuals who meet criteria for a depressive disorder, as determined by two of the primary assessment measures for the study, will be eligible to participate. A diagnosis of bipolar disorder, psychotic disorder, active substance abuse, mental retardation and/or dementia will exclude you from the study. You will also be excluded from the study if you are currently receiving therapy services for your symptoms of depression or if you are taking antidepressant medications and have been taking these medications for less than eight weeks. Regardless of whether you qualify for participation in the study, you will be provided with a list of local mental
health service providers, including some locations that offer reduced-fee services. These may be an alternative to participation in the present study.

Procedures

If you qualify for participation in the study, you will be asked to begin treatment approximately one week after your comprehensive second assessment appointment. You will receive a computerized behavioral activation treatment for depression, which involves ten weekly treatment sessions, lasting approximately forty-five minutes to one-hour each. In this behavioral activation therapy, you will be guided to look at how your behavior impacts your mood and your symptoms of depression, and you will be assisted in altering your behavior such that it has more positive effects in reducing or eliminating your symptoms of depression. This treatment will be administered with the aid of the researcher or a research assistant. Each week, you will be asked to complete the three measures of your symptoms of depression and methods of coping. If you are found to be symptomatic at the end of the ten weeks of treatment, or should you decide during the course of treatment that you no longer wish to participate in treatment, appropriate referrals to mental health practitioners in the area will be provided. You will be responsible for the cost of any treatment sought outside of this study.

One week after the completion of the ten weeks of treatment, you will be asked to come in and complete the three measures examining your symptoms of depression and methods coping, the one measure examining your quality of life and adaptive functioning, the psychological interview completed prior to treatment, a form asking about any current mental health treatments you are receiving, and a consumer satisfaction survey. One, three, and six months after treatment, you will be asked to complete this same battery of measures, with the exception of the consumer satisfaction survey.

Risks

As in all research, there may be unforeseen risks to you as a participant. One potential risk of your participation in this study is that you may experience unpleasant emotions, including anger, frustration, anxiety, depression, and disappointment, as you recall your problems and experiences and actively engage in behaviors in order to reduce your depression. Should emergency care become necessary, the research team is prepared to provide you with appropriate referrals, however you will be responsible for the cost of any emergency care that you may choose to seek.

Benefits

The primary potential benefit of participation in this study is the alleviation or elimination of symptoms of depression. This may occur through the using different
techniques and strategies that you will learn during your weekly sessions of behavioral activation therapy. Furthermore, knowledge gained from this study may lead to the development of more effective, accessible, and affordable treatments for depression, which may in turn help other individuals experiencing symptoms of depression.

Confidentiality

All information obtained from you is confidential. All paperwork that you complete for purposes of this study will include your participant number instead of your name and will be stored in a locked cabinet in the laboratory of the researcher. The researcher will maintain a list with your named matched to your corresponding participant number in a different locked cabinet located within the laboratory. This list will be retained for the duration of the study and will be destroyed after all of the data from the study is analyzed. A signed consent document and all paperwork that you complete for purposes of the study will be retained for at least three years in a locked cabinet in the laboratory of the researcher. You will be given a signed copy of this consent form for your records.

Problems or Questions

You may refuse to participate or quit at any time during the study without prejudice or penalty. If you have any questions or concerns about this study, you may contact either Dr. C. Richard Spates at (269) 387-4329 or Alyssa Kalata at (269) 387-4332. You may also contact the Chair of the Human Subjects Institutional Review Board at (269) 387-8293 or the Vice President of Research at (269) 387-8298 if questions or problems arise during the course of the study. This consent document has been approved for use for one year by the Human Subjects Institutional Review Board (HSIRB) as indicated by the stamped date and signature of the board chair in the upper right corner. Do not participate in this study if the stamped date is more than one year old.

Your signature below indicates that you have read and/or had explained to you the purpose and requirements of the study and that you agree to participate.

__________________________________________  __________________________
Signature                                      Date

Consent obtained by:  __________________________
Signature of researcher                          Date
Appendix K

Individual Participant BDI-II and RHRSD Graphs
Responder #1 BDI-II (Primary Axis) and RHRSD (Secondary Axis) Scores

Responder #2 BDI-II (Primary Axis) and RHRSD (Secondary Axis) Scores
Responder #3 BDI-II (Primary Axis) and RHRSD (Secondary Axis) Scores

Responder #4 BDI-II (Primary Axis) and RHRSD (Secondary Axis) Scores
Partial Responder #1 BDI-II (Primary Axis) and RHRSD (Secondary Axis) Scores

Partial Responder #2 BDI-II (Primary Axis) and RHRSD (Secondary Axis) Scores
Partial Responder #3 BDI-II (Primary Axis) and RHRSD (Secondary Axis) Scores

Nonresponder #1 BDI-II (Primary Axis) and RHRSD (Secondary Axis) Scores
Nonresponder #2 BDI-II (Primary Axis) and RHRSD (Secondary Axis) Scores

Score

Time

PreTx1 PreTx2 S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 PostTx 1-Mo FU 3-Mo FU 6-Mo FU

BDI-II RHRSD
Appendix L

Individual Participant QOLS and BDI-II Graphs
Responder #1 QOLS (Primary Axis) and BDI-II (Secondary Axis) Scores

Responder #2 QOLS (Primary Axis) and BDI-II (Secondary Axis) Scores
Responder #3 QOLS (Primary Axis) and BDI-II (Secondary Axis)

Responder #4 QOLS (Primary Axis) and BDI-II (Secondary Axis) Scores
Partial Responder #1 QOLS (Primary Axis) and BDI-II (Secondary Axis) Scores

Partial Responder #2 QOLS (Primary Axis) and BDI-II (Secondary Axis) Scores
Partial Responder #3 QOLS (Primary Axis) and BDI-II (Secondary Axis) Scores

Nonresponder #1 QOLS (Primary Axis) and BDI-II (Secondary Axis) Scores
Appendix M

Individual Participant VLQ and BDI-II Graphs
Responder #3 VLQ (Primary Axis) and BDI-II (Secondary Axis) Scores

Responder #4 VLQ (Primary Axis) and BDI-II (Secondary Axis) Scores
Partial Responder #1 VLQ (Primary Axis) and BDI-II (Secondary Axis) Scores

Partial Responder #2 VLQ (Primary Axis) and BDI-II (Secondary Axis) Scores
Partial Responder #3 VLQ (Primary Axis) and BDI-II (Secondary Axis) Scores

Nonresponder #1 VLQ (Primary Axis) and BDI-II (Secondary Axis) Scores
Nonresponder #2 VLQ (Primary Axis) and BDI-II Scores

Score

Time

VLQ  BDI-II
Appendix N

Individual Participant ATQ Graphs
Responder #1 ATQ (Primary Axis) and BDI-II (Secondary Axis) Scores

Responder #2 ATQ (Primary Axis) and BDI-II (Secondary Axis) Scores
Partial Responder #1 ATQ (Primary Axis) and BDI-II Scores

Partial Responder #2 ATQ (Primary Axis) and BDI-II (Secondary Axis) Scores
Partial Responder #3 ATQ (Primary Axis) and BDI-II (Secondary Axis) Scores

Nonresponder #1 ATQ (Primary Axis) and BDI-II (Secondary Axis) Scores
Nonresponder #2 ATQ (Primary Axis) and BDI-II (Secondary Axis) Scores
Appendix O

Individual Participant BADS Graphs
Responder #3 BADS and BDI-II Scores

Responder #4 BADS and BDI-II Scores
Partial Responder #3 BADS and BDI-II Scores

Time —•— BDI-II —•— BADSAR —*— BADSAC

Nonresponder #1 BADS and BDI-II Scores

Time —•— BDI-II —•— BADSAR —*— BADSAC
Nonresponder #2 BADS and BDI-II Scores

![Graph showing BADS and BDI-II scores over time](image)
Appendix P

HSIRB Approval Letter
Date: September 26, 2008

To: C. Richard Spates, Principal Investigator
   Alyssa Kalata, Student Investigator for dissertation
   Kellie Edmonds, Student Investigator for thesis

From: Christopher Cheatham, Ph.D., Chair

Re: HSIRB Project Number: 08-09-06

This letter will serve as confirmation that your research project entitled “Comparing the Efficacy of a Computerized Behavioral Activation Protocol and a Computerized Cognitive-Behavioral Therapy Protocol in the Treatment of Unipolar Mood Disorders” has been approved under the full category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: September 17, 2009

Walwood Hall, Kalamazoo, MI 49008-5456
PHONE: (269) 387-8293 FAX: (269) 387-8276


