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Effectiveness of a smartphone app as an adjunct to therapy for depression

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EFFECTIVENESS OF A SMARTPHONE APP AS AN ADJUNCT TO THERAPY
FOR DEPRESSION

by

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Bachelor of Arts, Augsburg College, 2009
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A Dissertation

Submitted to the Graduate Faculty

of the

University of North Dakota

in partial fulfillment of the requirements

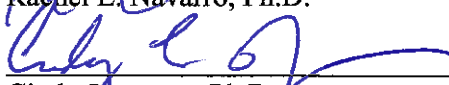for the degree of

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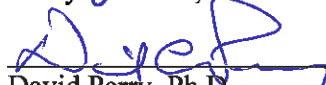
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May
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This dissertation, submitted by Caitlin Massop in partial fulfillment of the requirements for the Degree of Doctorate of Philosophy from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

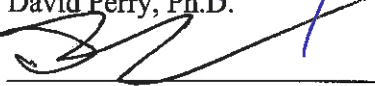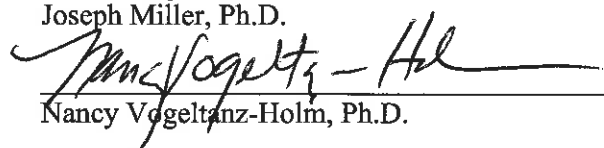Rachel L. Navarro, Ph.D.

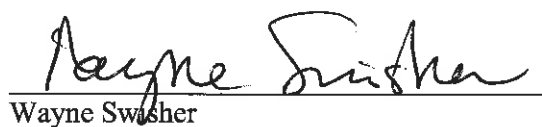Cindy Juntunen, Ph.D.

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This dissertation is being submitted by the appointed advisory committee as having met all of the requirements of the School of Graduate Studies at the University of North Dakota and is hereby approved.

Wayne Swisher
Dean of the School of Graduate Studies

April 15, 2016
Date

PERMISSION

Title: Effectiveness of a smartphone app as an adjunct to therapy for depression

Department: Counseling Psychology

Degree: Doctor of Philosophy

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Caitlin Massop

04/03/2016

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ABSTRACT

Over the years, depression and treatments for depression have been extensively

researched. However, as times have changed and technology has become an integrated

aspect into many indivdiual's lives, including those with depression, researched mental

health treatments have been slow to appreciate technological advances such as the

smartphone app. The purpose of this study was to examine the effectiveness of a

smartphone app in addition to CBT as compared to CBT with paper homework when

treating depression. Using a single-case design, as described by Kazdin (2011), with two

participants this study found that both participants experienced a decrease in depression

scores with the individual in the app condition scoring lower throughout the study;

however, the exact contribution that the app had in decreasing depression scores is

unclear. The client using the app enjoyed it and found it easy to use and helpful, while the

provider was uncertain about including the app in future clinical work. Despite investing

more time into her homework, the participant using the app scored lower on a measure of

outside engagement than the control participant. As predicted, the participant utilizing the

app experienced fewer barriers to homework completion. Due to a small sample size,

lack of psychometrically sound instruments and limitations of the design methodology,

the findings of this study are limited in scope and generalizability. The causality or

influence of the interventions examined on the outcome measures studied is unknown.

However, this study adds to the literature on using a depression app as an adjunctive tool

to CBT, client and provider attitudes toward the incorporation of an app into

psychotherapy, and differences in levels of outside engagement and barriers to homework

completion when comparing the mediums of pen and paper versus an app.

CHAPTER I

INTRODUCTION

Endorsing depressive symptoms and receiving a diagnosis of depression is by definition experiencing distress and/or impairment (American Psychiatric Association, 2013). Depression has an extensive history of leaving devastation (e.g., suicide, loss of employment, substance use) in its wake, both for individuals and society alike (USA.gov, 2011; Aguilera & Munoz, 2011; Kazdin & Blase, 2011; Burns et al., 2011; Whittaker et al., 2012). As a result, researchers across multiple disciplines have worked to identify effective treatments for those who suffer with depressive symptoms (White, Caine, Connelly, Selove, & Doub, 2014; Dimeff, Paves, Skutch, & Woodcock, 2010). Behavioral scientists, in particular, have examined specific methods of conducting psychotherapy with those struggling with depression. When the field of psychology decided to emphasize the importance of demonstrating empirical support for applied clinical skills and theoretical orientations, research on interventions for depression boomed (Dimeff et al., 2010; Kazdin & Blase, 2011; APA Presidential Task Force on Evidence-Based Practice, 2006). One such orientation that has been researched extensively to determine its efficacy and effectiveness in treating depression is cognitive behavioral therapy (CBT) (Boschen & Casey, 2008; Carroll et al., 2008).

CBT has been shown to effectively treat depressive symptoms in individuals across the lifespan (Aguilera & Munoz, 2011; Watts et al., 2013). Together, counseling

dyads work to address negative thoughts, behaviors, and emotions (Duckworth & Freedman, 2012). A core element of CBT is assigning homework, which has been linked to increased treatment outcomes (Boschen & Casey, 2008). Evidence that the use of CBT homework to increase treatment outcomes has been found in research on in-person therapy, web-based therapy, and mobile phone therapy (Aguilera & Munoz, 2011; Carroll et al., 2008, Watts et al., 2013).

Research is just beginning to catch on to technology trends such as mobile phone technology, which has exploded and continues to grow (Nielson, 2014). Individuals have become so attached to their mobile phones that the term "mobile mindset" has been used to define the relationship owners have with their phones (Lookout Inc., 2012). The use of mobile phones as a health intervention has been researched by behavioral health (Luxton, McCann, Bush, Mishkind, & Reger, 2011), medical science (Boschen, 2009b), and psychology (Burns et al., 2011). Features of the phone, such as text messaging, have been accepted by users and shown to be effective in assessment, treatment, and exchange of information (Boschen, 2009b; Torous, Friedman, & Keshvan, 2014). As a result of the increase in health-related applications (apps) (Boulos, Wheeler, Tavares, & Jones, 2011), researchers were interested to see if results from text messaging would be replicated in the use of apps (Ainsworth et al., 2013). Research has supported the addition of an app to therapy for certain psychological conditions, such as borderline personality disorder and substance use disorder (Morris et al., 2010; Rizvi, Dimeff, Skutch, Carroll, & Linehan, 2011). Despite these initial research efforts, more needs to be done to examine the use of specific smartphone apps to address the serious issue of depression in the general U.S. population.

Researchers have begun acknowledging and exploring the influx of technology in almost every aspect of American life and its impact including research focused on the attitudes clients and providers hold toward technology. Users seem to be open and satisfied with apps (White et al., 2014; Proudfoot et al., 2010). According to Proudfoot et al. (2010), those with mental health conditions have special interest in using apps to track their mental health because of the convenience, ease of access, importance of being able to monitor and reflect on mood changes, opportunity to enhance self-awareness, self-management and well-being, and potential for an app to help isolated individuals with mental health issues feel more connected. On the other hand, historically, providers have held negative attitudes toward implementing technology into their practices (McMinn, Bearse, Heyne, Smithberger, & Erb, 2011); however, this may be changing. In fact, White et al. (2014) found that mental health providers endorsed favorable attitudes toward using technology to treat depression.

The purpose of the current study is to advance research on both the treatment of depression and the use of smartphone technology in treatment. Specifically, the current study examined if using a smartphone app in addition to in-person therapy reduces depressive symptoms at a greater rate than in-person therapy alone. It was hypothesized that the individual in the therapy plus app condition would improve more than the individual in the therapy treatment condition. Additionally, the satisfaction of the provider and client in the therapy plus app condition was examined. It was assumed that the dyad in this treatment condition would be satisfied with the app. The level of outside engagement of participants was assessed and it was predicted that the participant in the app condition would have greater engagement. Finally, barriers to homework adherence

were explored, as this might impact outside engagement. It was hypothesized that the individual in the app condition would have fewer barriers due to the frequency that smartphones are used.

 To test the aforementioned hypotheses, a single-case design was employed in which dyads (i.e. clinician and client) completed assessments at the time of their sessions for 12 sessions. Clients were asked to complete their assessments before each session and the provider completed assessments after each session. During the four-week intervention phase, the client randomly assigned to the therapy plus app condition additionally received a questionnaire each session asking about their app use/completion of homework. The counseling dyad assigned to the therapy plus app condition also completed a satisfaction assessment of the app at the conclusion of the 12 sessions. The study was designed to follow an ABA format; however, removing a potentially beneficial intervention seemed unethical in this study. Therefore, at the end of the intervention phase, participants were given the option to discontinue the use of their assigned intervention thus; the study followed an AB design.

CHAPTER II

LITERATURE REVIEW

To provide the reader with a more complete understanding of the importance of examining the impact of technology on mental health clinical practice, literature on depression and technology is reviewed. First, depression is defined followed by the prevalence and effect of depression. Second, research on treatments for depression, including CBT, is examined to support the use of CBT in the present study. The use of technology is discussed next. Namely, the prevalence, definition, and advantages and disadvantages of mobile phones and apps are described. Then, empirical support for mobile phones and apps is also evaluated. Following this, research on client and provider attitudes toward technology is reviewed. Finally, the rationale for examining the current study's research questions and hypotheses with a single-case design is provided.

Understanding Depression and its Impact

Depression is extreme sadness or despair that interferes with daily life (American Psychological Association, 2010). According to criteria set forth in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5; American Psychiatric Association, 2013), to be diagnosed with at least a single episode of Major Depressive Disorder, an individual needs five or more specific depressive symptoms to be present during a two-week period that is a change from their previous functioning. At least one of the symptoms experienced needs to either be depressed mood or loss of interest or

pleasure. Other symptoms include significant weight fluctuations, changes in sleep patterns, changes in one's rate of speech, loss of energy, feelings of worthlessness, lack of concentration or increased indecisiveness, and suicidal ideation. Finally, the experienced symptoms must cause the individual distress or impairment in their lives such as, decreased job performance leading to occupational distress, withdrawal from others furthering feelings of loneliness, which results in social distress, lack of motivation, concentration, and/or energy to complete school work resulting in negative grade changes, which invokes educational distress (American Psychiatric Association, 2013).

Depression affects individuals across the lifespan with infinitely different social locations (White et al., 2014). In fact, one in ten adults suffer from depression (USA.gov, 2011) and every year 6.7% of all U.S. adults experience depressive symptoms (National Institute of Mental Health, 2014). In general, women are 1.5 to 3 times more likely than men to be depressed (DSM-5; American Psychiatric Association, 2013; Marks, Murray, Evans, & Estacio, 2011). A marked difference not only exists between genders but also between age groups. For example, individuals 18 to 29 years old are three times more likely to be depressed than individuals 60 years and older (DSM-5; American Psychiatric Association, 2013).

The prevalence of depression in the U.S. population is *so* great that it is the leading cause of disability (Aguilera & Munoz, 2011). Moreover, it is associated with an array of chronic health conditions (Aguilera & Munoz, 2011; Kazdin & Blase, 2011) like coronary heart disease, cancer, chronic pain, substance use, HIV/AIDS (Marks, Murray, Evans, & Estacio, 2011), COPD, cardiovascular disease, diabetes, sexual problems

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(Hunter, Goodie, Oordt, & Dobmeyer, 2010), epilepsy, multiple sclerosis, stroke, Alzheimer's disease, Parkinson's disease, and rheumatoid arthritis (National Institute of Mental Health, 2014). The interplay between physical and mental health conditions likely contributes to those with depression having a mortality rate almost twice that of those without depression (Burns et al., 2011). The increased risk of death among those with major depression was also found in subclinical forms of depression leading researchers to claim that, "In many cases, depression should be considered as a life-threatening disorder" (p.227, Cuijpers & Smith, 2002). Increasing the severity of the condition are the results of Whittaker et al. (2012) that those diagnosed with Major Depressive Disorder (>50%) are also diagnosed with another psychiatric disorder in their lifetime. These challenges translate into approximately $36 billion lost every year due to a decrease in productivity among workers who experience a single episode of major depressive disorder, demonstrating that depression is felt by the individual and society (Kazdin & Blase, 2011). Not only are the impacts felt on a greater societal scale, but on a more personal social level for the individual suffering with depression. For instance, if one of the partners in a couple is depressed the couple is nine times more likely to get divorced than if neither partner struggles with depression (EAP Consultants, LLC, 2013).

These accumulating costs of depression demand more research to determine treatment modalities that are more effective in treating depression. Furthermore, research should examine how to increase accessibility of effective treatments for greater numbers of those affected by depressive symptoms. Hence, adjunctive tools to therapy, like smartphone applications, that are relevant and readily available in clients' lives need to be

developed and researched to combat this debilitating mental health condition (Kazdin &
Blase, 2011; Whittaker et al., 2012).

Treatment of Depression

The treatment of depression can take many forms. Treatment typically includes
prescribed medication and/or participating in psychotherapy with a trained professional
(White et al., 2014; Dimeff et al., 2010). Certain orientations of psychotherapy have been
emphasized when treating depression due to their empirical support; typically, this is in
reference to evidence-based practices or empirically supported treatments (ESTs).
According to Dimeff et al. (2010), cognitive therapy, behavioral activation, and
interpersonal therapy are short-term highly ESTs for depression.

A primary reason psychological treatments shifted their focus to ESTs was to
close the distance between science and practice (Dimeff et al., 2010). The evidence-based
movement stressed the importance of using relevant research to inform practice in order
to improve patient outcomes and to hold psychologists and other mental health providers
accountable for the psychological treatments that they provide. According to the
American Psychological Association Presidential Task Force on Evidence-Based Practice
(2006), the goal of emphasizing evidence-based practices is to "identify treatments with
evidence for efficacy comparable to the evidence for efficacy of medication . . . to
highlight the contribution of psychological treatments . . ." (p. 272). Determining if an
intervention is efficacious involves testing that intervention in a highly controlled
environment to produce anticipated results, whereas the effectiveness of an intervention
examines if the intervention produces beneficial effects in a 'real world' setting. While
testing the efficacy of an intervention is important, the therapeutic process does not occur

in a controlled setting. Hence, the effectiveness of an intervention is likely to tell us more about the realistic application of an intervention (Gartlehner, Hansen, Nissman, Lohr, & Carey, 2006). Highlighting the effectiveness of psychological treatments could increase the importance of psychological practice within the eyes of the public and policymakers (APA Presidential Task Force on Evidence-Based Practice, 2006).

Kazdin and Blase (2011) reported that an emphasis on ESTs led to a significant increase of empirical studies on therapeutic treatments across the lifespan. They defined evidence-based treatment as "those interventions that have carefully controlled research on their behalf" (Kazdin & Blase, 2011, p. 24). Traditionally, randomized control trials (RCTs) have been the preferred methodology for studying treatment efficacy (and declaring a treatment is evidence-based), yet some researchers criticize that RCTs lack real world application with the broader population making the treatments being studied efficacious but not necessarily effective (Persons & Silberschatz, 2003).

Technology has the capacity to catalyze the closure of the research/practice gap. The availability of mobile phones allows research involving mobile technology to bridge the gap between efficacy and effectiveness studies because of the accessibility to study mobile phone interventions in more naturalistic settings that improve generalizability of findings (Dimeff et al., 2010). Thus far, this has begun to be accomplished in studies implementing technology that has more effectively and efficiently delivered ESTs, like cognitive behavioral therapy (CBT) (Dimeff et al., 2010).

CBT has been well studied and found to be efficacious and effective in treating a number of mental health conditions (e.g., depression, anxiety, driving phobia, memory aid, substance use disorders, affective disorders, mood and gambling behavior; Boschen

& Casey, 2008; Carroll et al., 2008). More specifically, CBT has been supported as an efficacious treatment for depression (Aguilera & Munoz, 2011; Watts et al., 2013) across different delivery methods, including in-person therapies, web-based therapy, and mobile phone therapy (Aguilera & Munoz, 2011; Carroll et al., 2008; Watts et al., 2013). CBT is a type of psychotherapy treatment that involves the provider and the client working collaboratively to examine the relationships between a client's maladaptive thoughts, behaviors and emotions (Duckworth & Freedman, 2012). A core element of CBT is assigning homework to clients; the purpose of which is to allow the client to translate the skills they have learned in psychotherapy into real world settings (Aguilera & Munoz, 2011; Boschen & Casey, 2008). Assignments such as mood and activity monitoring have been used in the treatment of depression (Aguilera & Munoz, 2011).

Research examining the usefulness of assigning homework has shown a linear relationship between adherence (i.e., "the extent to which a person's behaviors follow the advice given by healthcare professionals"; Clough & Casey, 2011b, p. 698) of completing assigned homework and treatment outcomes (Boschen & Casey, 2008; Clough & Casey, 2011b; Kazantis, Deane, & Ronan, 2000). Poor adherence to homework is associated with poor treatment outcomes (Aguilera & Munoz, 2011), which can be translated into a poor use of resources, staff and client time and an increase in treatment costs, as future treatment is likely still needed (Clough & Casey, 2011b). An increase in adherence is also related to lower attrition rates; hence, improving the potential successfulness of treatment (Clough & Casey, 2011b). Technology as an adjunct to in-person therapy may help improve treatment outcomes by increasing homework compliance and adherence (Boschen, 2009a; Epstein & Bequette, 2013).

In a national survey, 68% of therapists "often" or always assign homework to clients (Kazantizis, Lampropoulos, & Deanne, 2005). Unfortunately, history has shown that clients do not often complete homework assignments, such as paper diaries (11%). Electronic diaries have demonstrated increased compliance (94%); however, computers are not always available and reporting can still be retrospective and thus skewed. As a result of these limitations, electronic diaries also reduce in compliance after short periods of time (Proudfoot et al., 2010). The initial increase in homework compliance among those completing electronic diaries is encouraging.

It is possible that accessibility to and frequent use of technological advancements, like the smartphone, could be used to supplement traditional services by increasing client compliance with homework and attendance, thus improving continuity of care and enhancing treatment outcomes (Clough & Casey, 2011a; Eonta et al., 2011). A review of technological adjuncts designed to increase client adherence during face-to-face therapy concluded that more rigorous research needs to be conducted on mobile phones, especially smartphones. Nonetheless, their review of the current research indicates that technology used as an adjunctive tool to therapy seems to increase client engagement and improve treatment outcomes (Clough & Casey, 2011b; Clough & Casey, 2011a).

Although people prefer to receive the majority of their services face-to-face with their provider, computerized CBT (CCBT) alone has been shown to be as effective at decreasing depressive symptoms as face-to-face treatment (Clough & Casey, 2011a; Spek et al., 2007; Carroll et al., 2008; Watts et al., 2013). Some CCBT programs have been supported as effective in the treatment of depression when used as an adjunctive tool to traditional face-to-face treatment (Dimeff et al., 2010). As a result of these positive

research findings, in 2006, the National Institute for Health and Clinical Excellence in the United Kingdom approved CCBT for the treatment of mild to moderate depression in their nationalized health care plan (Dimeff et al., 2010).

Despite CCBT's effectiveness, getting to a computer for treatment may be inconvenient and lack privacy (Watts et al., 2013). Limitations to the use of computers for treatment may be increasing as consumer's desirability to use computers is waning. Worldwide shipments of traditional PCs declined 11.2 percent from 2012 to 2013 when mobile phone shipments grew 3.7 percent and growth is expected to steadily increase (Gartner, Inc., 2013). For the first time last year, mobile phone use, unrelated to mobile calls, surpassed that of laptops and PCs further supporting the shift in consumers' use of technology from computers to mobile phones (Fox, 2013). Highlighting this change is 63% of cell phone owners use of their phones to access the Internet with 34% almost exclusively using their cell phones for Internet as opposed to using a computer (Duggan & Smith, 2013). Additionally, computer-assisted treatment may be restricted in its feasibility because individuals seeking help might want to review treatment material in vivo, which is unlikely to be easily accomplished with a computer (Watts et al., 2013). Mobile phones may be a better alternative to CCBT in offering treatment for depression because of the limitations of utilizing a computer.

Watts et al. (2013) investigated the ability of mobile phones to offer comparable treatment outcomes to CCBT; therefore, they conducted a study of 35 participants diagnosed with Major Depressive Disorder who received treatment via either CCBT or through a mobile phone app. Findings suggest that a mobile phone app for depression was as effective as CCBT leading researchers to support the use of a CBT app for the

treatment of depression (Watts et al., 2013). Thus, a mobile phone app for the treatment of depression may also be preferred as an adjunctive tool to therapy as it is as effective as CCBT, while also having the added benefit of addressing the limitations of CCBT in that mobile phone apps would be more convenient and have more privacy than computers.

Beyond the use of CCBT for the treatment of depression, CBT text messaging (SMS) is another technological facet being used to prevent and treat depression. To prevent the possible progression of depression symptoms from developing into a depression diagnosis, researchers sent two CBT text messages a day for nine weeks to teenagers endorsing depressive symptoms (Whittaker et al., 2012). Although they have yet to publish if the intervention was shown to be effective using quantitative methods, they discovered support for the intervention by the participants who suggested the intervention was beneficial in addressing depressive symptoms. That is, more than three quarters of the participants reported that the intervention was useful in helping them to be more positive, stop negative thoughts, relax, problem-solve, have fun, and deal with school issues (Whittaker et al., 2012).

In summary, previous research has demonstrated that technology has helped to deliver CBT treatment to those with depressive symptoms and has been effective in decreasing such symptoms (Whittaker et al., 2012; Watts et al., 2013; Clough & Casey, 2011a; Spek et al., 2007; Carroll et al., 2008; Dimeff et al., 2010). Research has primarily focused on the use of CCBT and CBT SMS (Watts et al., 2013; Whittaker et al., 2012), but research and practice need to evolve with the changing times and examine the added benefits of using a CBT mobile phone app, which is the intention of this study. As CCBT and CBT SMS have been supported as effective in the treatment of depressive symptoms,

future research is needed to determine if the use of a CBT mobile phone app, as an adjunctive tool to therapy, will be effective in the treatment of depression.

<div align="center">**Technology**</div>

Use of Mobile Phones in Therapy

"Mobile telephone technology has been the single most rapidly embraced technology in world history" (International Telecommunication Union, 2009). The end of 2013 saw continued growth in mobile phones. Smartphones are now owned by more than two thirds (67%) of phone subscribers in the U.S. (Nielson, 2014). Luxton et al. (2011) defined a smartphone as "mobile telephones with computer functionality allowing users to run software apps and connect to the Internet or other data networks" (p. 505). Clough and Casey (2011a) add that smartphones are "portable computers with which the owner has a personal relationship" (p. 281). Smartphones typically include features of accessing Internet, blue tooth, camera, global positioning system (GPS), voice and video calling, and text and picture messages (Clough & Casey, 2011a).

Ownership of mobile phones is not distinct to any one population. Eighty-seven percent of African Americans and Latinos and 80% of Whites in the United States own a mobile phone (Lenhart, 2010). In fact, in 2012, 88% of all U.S. adults owned a cell phone (Smith, 2012). According to one study, 60% of homeless individuals have a mobile phone (Rice, Lee, & Tait, 2011). Mobile phones have begun to replace the use of traditional landline telephones as home phone numbers. This is evidenced as more than half of U.S. adults, aged 25-29, substitute a mobile phone for their home phone number (Boulos et al., 2011).

Torous et al. (2014) examined the ownership rates of smartphones in those with a mental health condition to draw a comparison to the general population. After surveying 100 participants who attended a psychiatric outpatient facility that primarily treats those with depression and anxiety disorders, researchers concluded that having a mental health condition is not a barrier to owning a smartphone. In this particular study, ownership among those with a mental health condition (67%) was greater than the national average (61%) at the time.

Phones have become so integrated into our lives that the term 'mobile mindset' has been used by some to describe the way consumers think about their phones and the habits and behaviors driven by phone ownership (Lookout Inc., 2012). Almost 60% of phone owners cannot go one hour without checking their phone. Mobile phones are taken everywhere, so they are used when: lying in bed (54%), using the restroom (40%), eating (30%), driving (24%), and attending religious services (9%). The loss of a phone stirs up emotional reactions like concern, desperation and panic because of the relationship owners have with their phones as a result of phones capabilities (Lookout Inc., 2012). Knowing this attachment, mobile phone and app designers attempt to capitalize on the positive feelings individuals have towards their phones to make the next invention or update even more attractive to consumers. The intense desire to have a mobile phone and the constant contact many have with their phones led Fogg and Eckles (2007) to comment that society and developers should "view the mobile-human relationship as the most personal, intensive, and lasting of all relationships" (p. 6).

In fact, the relationship individuals have with their phone may be a contributing factor to participants' improved compliance, engagement and adherence to therapeutic

tasks delivered via this technology (Matthews, Doherty, Sharry, & Fitzpatrick, 2008). This relationship could play a vital role in facilitating the practicing of skills from therapy to homework tasks outside of therapy. Thus, this may be important in sustaining treatment gains, especially after treatment concludes. Additionally, outside engagement through the use of a mobile phone adjunctive tool may improve client's interaction with and enjoyment of therapeutic tasks. Furthermore, client's attitudes towards their treatment plans may improve if they have a more positive attitude toward the interactive qualities of mobile phone technology (Clough & Casey, 2011a).

As the advancements in mobile phone technology increase so do the advantages to its use in research and clinical practice. This type of technology is ubiquitous, resulting in the decrease in mobile phone costs and increase in network coverage (Boschen, 2009a; Morris et al., 2010). Its penetration into our societal norms has made its use acceptable by most people; decreasing the stigma associated with using phones for mental health purposes (Boschen, 2009a; Morris et al., 2010).

The acceptability of mobile phones seems to be due to its adaptable nature, such as its evolving physical features. For instance, the phones themselves are physically small and easy to carry. Depending on the type of phone, most are programmable and offer multiple features such as audio, video, and recording. More advanced phones have significant computing power and the ability to have other devices and capabilities added on (Boschen, 2009a; Boulos et al., 2011; Boschen & Casey, 2008; Clough & Casey, 2011a; Eonta et al., 2011; Epstein & Bequette, 2013).

Another advantage is the capability of technology to be interactive allowing the provider or user to tailor content to the user's specific needs (Carroll et al., 2008; Epstein

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& Bequette, 2013). The ability to interact with one's phone through the use of a keypad or touchscreen is designed to be easy to use to allow the individual to interact with the machine (Boschen, 2009a; Boulos et al., 2011; Boschen & Casey, 2008; Clough & Casey, 2011a; Eonta et al., 2011; Epstein & Bequette, 2013). This can empower the user to control the speed of the information displayed, select topics or information input, and to review information as frequently as needed (Carroll et al., 2008; Epstein & Bequette, 2013).

Boschen and Casey (2008) posited that because of these positive attributes, mobile phones hold promise as adjunctive tools to therapy (Boschen & Casey, 2008). Mobile phones may be advantageous to record or receive immediate data entry by a client. Immediate information, rather than reflective information, may be more accurate and representative of clients' current life situations (Boschen, 2009a; Clough & Casey, 2011a).

As with all technologies, there might also be disadvantages to using mobile phones in psychological practice or research. The swift evolution of mobile phones offers new opportunities for clients, but can pose challenges to researchers and providers. Disadvantages to the use of mobile phone therapy in research or practice include: costs, security of information, regulation and standardization of phones and apps, and lack of provider familiarity.

While the costs of mobile phones are declining, a cost is still involved. The expense of owning a phone could exclude some individuals from experiencing the potential benefits such phones have to offer. As the future of phones continues to expand, mobile phone prices are likely to continue to drop.

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A common caution to technology users is to be aware that there is a lack of information security when using a mobile phone, as theft or loss is a reality for mobile phone owners (Boschen & Casey, 2008; Boulos et al., 2011; Clough & Casey, 2011a; Epstein & Bequette, 2013; Luxton et al., 2011). However, measures can be taken by the user to help ensure safety. For example, users could password protect their device and the app. Additionally, users could download apps like LookoutMobileSecurity that wipes the personal data on a phone should it become lost or stolen (Luxton et al., 2011).

The numerous kinds of mobile phones available make regulation and standardization of certain practices involving phones difficult (Boschen & Casey, 2008). Most apps are not evaluated unless private research examines the app, which means the use of apps could lead to inaccurate information, assessments, or interventions that are not in line with evidence-based practice (Luxton et al., 2011). Research on client suitability to receive treatment through the use of a mobile phone is lacking. Some initial evidence suggests that those with intense anxiety may not be good candidates for mobile phone therapy (Flynn, Taylor, & Pollard, 1992); however, this issue does not reappear in the mobile phone literature since Flynn et al. (1992) published their findings.

Providers' lack of familiarity with using this type of technology in clinical practice is another disadvantage. Feelings of unfamiliarity can lead to negative impressions. Theirs and their clients' attitudes towards technology might influence the use of technology and its potential influence on mental health outcomes (Boschen & Casey, 2008; Luxton et al., 2011). Therefore, it is important to assess provider's satisfaction with implementing technology into their clinical practice.

The awareness of the possible benefits and limitations to using mobile technology to address health concerns has led various healthcare factions to study its use. A majority of the literature examining the use of mobile phones comes from studies focused on behavioral health conditions (Eonta et al., 2011). Behavioral health providers have used mobile phone technology in research with traumatic brain injuries, intellectual disability support, severe mental illness, and tobacco and substance use (Luxton et al., 2011). The largest body of research involving the use of technology is that of smoking cessation (Boschen, 2009b; Eonta et al., 2011; Epstein & Bequette, 2013).

Medical science has also been researching the use of mobile phones in a variety of physical health concerns. Medical research has examined the use of mobile technology in the assessment, treatment, and information exchange of hypertension, asthma, diabetes, CPR instructions, sexual health, medication compliance, management of side effects, chronic obstructive pulmonary disease, obesity, exercise and physical activity, ECG monitoring, radiological imaging, immunizations, and dietary management and assessment (Boschen, 2009b; Boschen & Casey, 2008; Boulos et al., 2011; Epstein & Bequette, 2013; Luxton et al., 2011). This list continues to grow as technology continues to show benefits to its users.

Research conducted on the use of mobile phones for psychological disorders has branched into two types of categories: mobile phones used for assessment purposes and mobile phones used as interventions. Research using mobile phones as assessment tools has focused on the use of addictive substances or behaviors and assessing the mood, affect, and activity of adolescents with and without mood disorders. The research conducted on psychological treatment with the use of mobile phones includes exam

stress, driving phobia, anxiety associated with school refusal, and relapse prevention in those with psychotic illness (Boschen, 2009b). One such study found that mobile phones reduced participant depressive symptoms to the point of no longer meeting the criteria for a diagnosis of major depressive disorder. Additionally, evaluators' ratings of participants' depression symptoms improved throughout the study. The mobile intervention significantly improved participants' depression while sustaining high levels of participant satisfaction with the intervention (Burns et al., 2011).

Many of the studies researching the use of mobile phones to treat psychological disorders use SMS as the treatment intervention (Kazdin & Blase, 2011; Dimeff et al., 2010). Thus far, SMS research has been involved in sending appointment reminders, medication reminders, and health information, weight loss, diabetes, smoking cessation, and monitoring symptoms and behaviors (Aguilera & Munoz, 2011; Boulos et al., 2011). Research suggests that text messaging is an effective adjunctive tool (Aguilera & Munoz, 2011).

Although SMS has been shown to be effective and acceptable by clients, there is a greater interest on the behalf of clients to use an app to track their mental health condition(s) rather than receive text messages (Torous et al., 2014). Ainsworth et al. (2013) compared the use of a mobile phone app to SMS and discovered that although both were advantageous to individuals diagnosed with nonaffective psychosis, the app produced more entries, was faster, and was liked better by participants. The app had a significantly greater number of entries than SMS, which was likely related to the fact that the SMS entries took participants 4.8 times longer to complete. Just below significance was the perception that SMS was more disruptive and inconvenient when compared to

the app (Ainsworth et al., 2013). These findings imply that it was the technology

modality that made a difference and not the diagnosis; thus, it is likely that clients will

have similar positive reactions and experiences with a CBT app making the *app* the

preferred adjunctive tool to therapy.

The topic of mobile phones is a burgeoning area in psychological research and

because there is so much to be studied there seems to be quite a bit of breadth, but not

depth in the research so far. A single-case design of multiple subjects might add more

depth to the research available on apps as adjunctive tools to therapy. Research

previously conducted focuses on a narrow scope of psychological conditions, many of

which lack experimental rigor (e.g. no control group). The present study includes a

comparison group in an attempt to address this limitation in the literature. Thus far,

mobile phone research has been limited in its evaluation of mobile phone capabilities

(e.g. SMS) whereas; this study intends to extend what is known about apps in mental

health counseling. Finally, unlike the present study, none of the studies examined

analyzed mobile phone apps as *adjuncts* to therapy (Boschen, 2009b).

Apps

The prevalence of apps is growing. An app is defined as, "a type of software that

allows you to perform specific tasks" within your mobile device's operating system

(Goodwill Community Foundation, Inc., 2014). In 2009, 300 million apps were

downloaded. The following year the number of apps downloaded exploded to 5 billion.

This saturation supports the colloquial phrase, "There's an app for that" (Boulos et al.,

2011). In September 2010, Apple supported 7,136 health-related apps, Google Android

made 1,296 available, and Blackberry, 338. Over the span of seven months in 2010,

health-related apps made available by these providers jumped by 78% (Boulos et al., 2011). To date, over 500,000 health-related apps have been developed for smartphones (Lookout, Inc., 2014). Torous et al. (2014) reported that on average research participants with a mental health condition had 17 mobile apps on their phones as compared to Lookout Inc.'s (2012) average of 22 in the general population. Unfortunately of those 17 apps, approximately one was a health-related app. Although the number of health-related apps made available and being downloaded is increasing, Torous et al. (2014) did not reflect this, leading one to speculate if it is "healthy" populations that are downloading such apps or populations whose providers suggest and follow up with such apps.

The advantages of using mobile apps are largely unknown. However, apps may have the benefit of being an efficient means of self-reporting symptoms over time. Additionally, app-based homework assigned in therapy can be recorded and date-stamped to ensure treatment compliance. Finally, access to clinical information via apps, such as psychoeducation, provides opportunities for skill acquisition (Luxton et al., 2011).

The scarcity of knowledge available on the advantages of mental health apps is echoed in the limited awareness of the disadvantages. The disadvantages of using a mobile phone are likely to also be reflected in attitudes towards using an app, as the phone is the structural piece housing the app. Those who have reported uncertainty in using a mobile phone for treatment have stated their concern with the security of information. Consequently, it seems probable that clients might also feel this is a disadvantage of an app.

The prevalence of depression and popularity of apps makes researching an app for depression an important issue worth investigating. This researcher was unable to find a

single study examining the use of a CBT smartphone app as an adjunctive tool in the treatment of depression. Although the studies found on smartphone apps are not specific to participants with depression or to CBT, valuable information about usefulness, satisfaction, and possible treatment implications for depression may be extrapolated.

In an effort to study apps in relation to populations with mental health concerns, Rizvi et al. (2011) developed and tested the feasibility and outcomes of using a mobile phone app as an adjunct to standard Dialectical Behavior Therapy (DBT) for individuals diagnosed with Borderline Personality Disorder and Substance Use Disorder. Researchers wanted to know if clients would use the app and if they would, how they would react to it and how the app might influence outcome results. The app developed was titled the DBT Coach and was used to teach the DBT skill of opposite action. During the 10-14 days of usage, participants were able to access the app as frequently as they wanted. Results showed that on average each participant utilized the app approximately 15 times across the course of treatment. The study concluded that the app was a successful adjunctive tool to therapy as participants were highly compliant with treatment, users perceived the app as usable and helpful, depression and general distress scores decreased, and emotional intensity decreased. Future studies were recommended to incorporate a control group, greater experimental control, and a more diverse sample (Rizvi et al., 2011). This study is a great example of what might be possible when a CBT app is implemented with those in therapy for depression; however, the present study further expands the research by comparing treatment outcomes to determine if the app in addition to therapy is *more* effective than just therapy. Additionally, the provider's ratings of client depressive symptoms will be used to corroborate client self-reports.

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Another study examining the use of smartphone apps to treat psychological distress comes from the work of Morris et al. (2010). This study examined the use of a mobile phone app developed by the researchers to look at participant mood. Participants could access exercises inspired by cognitive therapy. The app involved was a "Mood Map" that had participants rate their moods. Based on their ratings, participants could access three mobile therapies including a breathing visualization, body scan and mind scan. Findings illustrated that participants reported changes in mood due to the use of the app (Morris et al., 2010). The freedom to allow the client to choose from offered coping skills in their times of need is a powerful facet of implementing an app in treatment. It empowers the client, while educating them and providing them with guidance in the practical application of skills learned from therapy.

While these studies offer an introductory look at an otherwise untapped topic, limitations exist. For example, neither study's design employed a comparison group. Only one article used the app as an adjunctive tool and it was used with a very specific population. That same article gathered some clinician input about client symptoms, but more information regarding clinician's perspectives on apps as adjunctive tools to therapy is needed. The present study integrated the foundational work conducted on apps for other mental health conditions and applied it to depression through the framework of CBT treatment.

Attitudes toward Technology

Overall, clients seem to be open to the use of technology being integrated into their healthcare treatment (White et al., 2014; Proudfoot et al., 2010). Participants interacting through a technology interface have enjoyed doing so and have in some cases

been more forthcoming in their responses and felt more accepted and less judged by the technology rather than a human alternative, but as was mentioned previously, most clients still want the majority of their treatment to be face-to-face (Epstein & Bequette, 2013; Clough & Casey, 2011a). This anonymity has allowed some users to avoid the stigma that can be associated with seeking treatment for a mental health condition (White et al., 2014).

Attitudes toward mobile phones appear to be favorable, as the use of mobile phones has been shown to increase treatment compliance (Axelson et al., 2003; Aguilera & Munoz, 2011; Matthews et al., 2008). Mobile phones use in research has been accepted by participants and has even contributed to increased engagement in research tasks and low attrition rates indicating comfort and potentially preference for using mobile phone technology (Axelson et al., 2003). In one study, approximately 80% of participants agreed or strongly agreed that receiving text messages regarding their mental health improved their attendance to therapy. A majority also felt that the messages made them closer to their therapist (Aguilera & Munoz, 2011). Compliance and preference for mobile phones in treatment is further emphasized by another study that demonstrated that research participants favored completing mood monitoring on a mobile phone (88.7%) as opposed to pen and paper (11.3%) because it was easier to use thereby, resulting in higher compliance rates among participants using mobile phones (Matthews et al., 2008).

Mobile phones in particular receive great interest from individuals desiring to monitor or manage their mental health (Boulos et al., 2011; Axelson et al., 2003; Proudfoot et al., 2010). Individuals with depression, anxiety or stress-related symptoms had an increased desire over the general population to use mobile phones to track their

mental health (Proudfoot et al., 2010). These results are congruent with the finding that those diagnosed with depression are more likely than other mental health conditions to access health-related information via the Internet (Baker, Wagner, Singer, & Bundorf, 2003). This affinity to use mobile phones to access information and track symptom changes led to longer and more frequent use of phones. Reasons for these positive attitudes towards phones included the speed, convenience, and ease of access. Moreover, use improved self-awareness, self-management, and well-being (Proudfoot et al., 2010; Aguilera & Munoz, 2011). Improved self-awareness may be achieved by helping individuals to understand the triggers of their negative moods; thereby, increasing their ability to recognize and modify distressing behaviors and cognitions (Burns et al., 2011). In addition, participants believed in the ability of mobile phones to connect those who are isolated as well as to provide access to support those with limited available services (Proudfoot et al., 2010). Those participants with less interest in mobile technology expressed that they did not like using technology, it felt too intrusive or that it lacked privacy, and that they did not see the benefit in using mobile technology (Proudfoot et al., 2010). Negative attitudes about mobile technology will likely be encountered; however, appropriate training on the technology and education on the security measures and the possible benefits of mobile phone technology may change attitudes.

It seems the relative acceptance of mobile phone features, such as mood charting, by individuals with and without a mental health condition has extended to the mobile phone app. Proudfoot et al. (2010) discovered that over 75% of participants reported that they would like to use a mobile phone app to monitor and manage their moods. Similarly, 69% of those with a mental health condition desired to use an app to track their mental

health condition, 70% would download the app, and 70% expressed that they would use the app on a *daily* basis (Torous et al., 2014).

Whereas clients appear open to using technology as an adjunct to healthcare treatment, providers have expressed negative attitudes toward technology, taken as a whole, in the past (Clough & Casey, 2011a). There is a low rate of newer technology, such as smartphones and videoconferencing technology, being used by psychologists and a high rate of uncertainty surrounding the ethics of using them (Eonta et al., 2011; McMinn et al., 2011). Providers have acknowledged a number of barriers to feeling comfortable with using technology in practice, including having a lack of knowledge about specific technologies. Some worry about the cost and time investment involved in owning, learning, and maintaining the use of certain technologies. Not only this, they hold reservations about the added value of incorporating technologies and the adjustment in their roles should they integrate such tools into their practice (Clough & Casey, 2011a; White et al., 2014).

These traditionally held views might be changing as a study by White et al. (2014) found that various providers, including mental health professionals, were favorable to using technology in the treatment of depression. Providers felt that technology could be beneficial by providing more accurate self-report data on an ongoing basis to assist in the treatment of depression. Even though this study examined the attitudes providers hold about technology, the study did not explicitly state or explore reactions to different types of technology nor did it exclusively focus on mental health providers' perspectives as half ($n = 5$) of the participant sample was comprised of mental health practitioners (White et al., 2014).

Despite some psychologists' hesitation to use technology in their practices, technology has shown and continues to show great promise in treating individuals with mental health concerns (Kazdin & Blase, 2011). It has the capacity to deliver mental health interventions beyond the walls of the provider's office. Technology consumers seem to view smartphone apps as an acceptable platform for mental health treatment (Proudfoot et al., 2010; Aguilera & Munoz, 2011; Burns et al., 2010; Proudfoot et al., 2010; Torous et al., 2014) with mental health providers slowly following this trend (White et al., 2014). Evaluating client and provider attitudes towards apps is a next key step in exploring how perceptions might influence treatment outcomes and how development and implementation of apps could be improved.

Rationale for Single-Case Design

Recently, researchers are recognizing the importance of using single-case designs in psychological intervention research (Kratochwill et al., 2013). Single-case designs have been used to fill holes in what has been considered the "gold standard" of research, randomized controlled trials (RCTs). Single-case designs are easily translated into applied settings. They are well suited for evaluating interventions and improving the effects of interventions. One of the primary functions of a single-case design is to question if research findings are of clinical significance (Kazdin, 2011; McMillan & Morley, 2010). For these reasons, this methodology fits with the present study's examination of an app to enhance the effectiveness of in-person therapy to reduce depressive symptoms.

In an effort to emphasize the rigor of single-case designs, the What Works Clearinghouse has drafted single-case design standards to further support its

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implementation in studying evidence-based treatments (Kratochwill et al., 2013; McMillan & Morley, 2010). The purpose of the *Standards* is to demonstrate the methodological soundness of single-case designs. The *Standards* do not apply to single-case designs that include a comparison group (Kratochwill et al., 2013). Although the *Standards* do not directly apply to the present study because it involves a comparison group, they still offer support that designs incorporating single-case design features are becoming standardized and are used in evidence-based research.

The compatibility of researching technological interventions with single-case designs makes using single-case designs the best methodological choice. That is, "Single-case designs can capitalize on the ability of technology to easily, unobtrusively, and repeatedly assess health-related behavior" (Dallery et al., 2013, p. 3). A quintessential characteristic of single-case designs is continuous assessment. Technology's capacity to deliver an in the moment intervention and have the effects of that intervention evaluated over time offers valuable data in determining the effectiveness of psychological treatment interventions (Dallery et al., 2013). Technology is a burgeoning area in the field of mental health. Examining the preliminary effectiveness or efficacy of technology's use in psychology, in this instance the use of an app for depression, is important for future treatment development and single-case designs are well suited to demonstrate potential treatment effects (Dallery et al., 2013).

Renewed emphasis on employing single-case designs and in producing evidence-based treatments has led to changes in what has been traditionally considered a case study. Single-case designs still require continuous assessment, baseline assessment, stability of performance, and phase variations (Kazdin, 2011). In an effort to relate to

researchers who view RCTs as the "gold standard" in research, single-case and between-group designs can be combined. Additionally, statistical analyses have been used to support visual inspection findings. The present study integrated these designs, as there was a comparison group, which is typically considered a quality of a between-group design. However, it is a single-case design in that both conditions will engage in continuous assessment, there are fewer research participants expected than would be required for between-group designs, and visual inspection will be used (Kazdin, 2011).

Current Study

No research has examined the possible additional outcome benefits to psychotherapy when using mobile phones, especially mobile phone apps, to treat depression. Depression is a commonly occurring mental health disorder in the U.S. (Kazdin & Blase, 2011). Evidence-based practices, such as CBT, have been shown to be effective in the treatment of depression (Aguilera & Munoz, 2011). As our society has become more rapidly involved in the use of technology in everyday life, researchers have examined the effectiveness of CBT web-based treatments for depression and found them to be beneficial for clients (Carroll et al., 2008). Although treatment for depression seems to be well established in the literature, technology continues to evolve and so do our patient's lives in conjunction with progressing technology as individuals strive for ease and efficiency. One of these progressing technologies is the smartphone. The use of smartphones has exploded all around the world (International Telecommunication Union, 2009). Whereas some research has been conducted on the use of certain smartphone features, like text messaging, mobile phone apps' capacity to positively impact mental health has remained relatively untouched in the literature (Luxton et al., 2011; Boschen,

2009b). Therefore, it is essential that mental health insert itself into the reality of our clients' lives, which for many of them now lies in the realm of the digital age.

The overarching purpose of the present study is to compare depression treatment outcomes between clients randomly assigned to receive traditional in-person therapy (i.e., therapy alone) and those who receive traditional in-person therapy with the addition of a CBT depression app (i.e., therapy plus the app). To capture an aspect of this very large and growing research area, this study's purpose was four-fold. The first research question strives to determine if the combination of individual counseling and the use of the *Depression CBT Self-Help Guide* smartphone app would reduce depressive symptoms for clients at a greater rate than individual counseling alone. It was hypothesized that while both participants would show decreases in depressive symptoms, the participant in the experimental condition (therapy plus app) would show a greater rate of decrease than the participant in the control condition (therapy only) from baseline to intervention and would maintain lower depressive scores from intervention to post-intervention.

Second, it was of interest to know if the client and the provider were satisfied with the app and if they believed apps to be an acceptable form of adjunctive treatment. It was predicted that the client would be satisfied with the app and that both the client and the provider would find the app to be a useful adjunctive tool to therapy.

Third, it was of interest to examine participant differences in level of outside homework engagement, as this is likely to influence their treatment outcomes. It was predicted that the participant in the experimental condition (i.e. therapy plus app) would have an increased outside engagement due to increased accessibility to the assigned skills

via the app as compared to paper homework assigned in the control condition (i.e. therapy only).

Finally, the impact barriers might have on homework completion was explored. It was predicted that the participant in the experimental condition would experience fewer barriers due to the frequency of use that the general population accesses their smartphone.

CHAPTER III

METHODOLOGY

This study used a single-case AB design outlined by Kazdin (2011). This Methods Chapter will be divided into five subsections. First, the study design is described in further detail. Second, characteristics of participants and how they were recruited are described. Third, a description of each instrument along with an examination of its psychometric properties is included. Specifically, the Patient Health Questionnaire-9 (PHQ-9) was used to measure depressive symptoms. The Quick Inventory of Depression Symptoms-Clinician (QIDS-C) was used to measure clinician reports of client depressive symptoms. A satisfaction questionnaire was adapted to measure the level of satisfaction the user and the clinician had with the implementation of the app. Fourth, the procedures are presented describing how data was collected. Lastly, the app used in conjunction with therapy is described.

Study Design

Single-case design studies typically include six participants; however, this number can range from one individual to more than 40 participants depending on the unit of analysis being studied (Dallery, Cassidy, & Raiff, 2013). It was the intention of this study to gather approximately 12 participants, but due to complications with initiating and retaining participants the research was examined with fewer participants than hoped for.

While design challenges existed, the foci of the study remained the same. Much of the previous literature has failed to examine app users while in therapy. Moreover, research has lacked a comparison group thus, single-case design, comparing two types of therapy (i.e. therapy alone and therapy plus the app), was well suited to gather initial efficacy and effectiveness testing of an app (Dallery et al., 2013). Including a control condition, even in such a small sample size, adds value to the design methodology because it provides an evaluation of each intervention without the possibility of influencing the other as well as examining the magnitude of change between interventions (Kazdin, 2011). Participants were initially randomly assigned to a treatment condition through the use of a free online random number generator. After obtaining a control participant and having difficulty retaining an experimental condition participant, the next individual to agree to partake in the research study was assigned to the experimental condition. All participants were recruited through the provider's rural, doctoral practicum site where clients were seen for free by this author. The site was a rural medical clinic. Both participants were referred to counseling by different referral sources.

<div align="center">**Participants**</div>

Four participants started the study, but only two completed all twelve 12 sessions. One participant, assigned to the app condition, completed six sessions, but discontinued therapy. As a result of only completing two sessions of the intervention phase, her data was not utilized in this study. Another participant, also assigned to the app condition, completed seven sessions, but discontinued therapy. Her data is also not used in this study.

Please note that the names used below to discuss the participants are pseudonyms in order to help protect their identity. The participant randomly assigned to the control condition was Molly. In addition to therapy, Molly completed paper copies of a CBT dysfunctional thought log. Molly (43) identified as a Caucasian female. Her primary presenting issue was depressive symptoms related to the loss of her teenage daughter due to a tragic accident almost two years prior. She shared that she previously sought counseling related to depressive symptoms for which she was treated for approximately six months. Molly reported that she was somewhat comfortable with technology and she tried using technology on her own and in addition to counseling services in order to address her mental health issues. Specifically, she looked up related information on the Internet and connected with online support groups. She selected her comfort level with using technology in addition to therapy as 'an extreme amount.' Molly reported a household income greater than $80,000 a year.

Laura was assigned to the experimental condition where she received in-person counseling with the addition of using a CBT app during the intervention phase to complete homework. Laura (65) identified as a Caucasian female. Her primary presenting issue was depressive symptoms related to the loss of an abusive husband of more than forty years who passed away approximately a year before commencing therapy. She had no previous counseling experiences. Laura reported being somewhat comfortable with technology, but never using it on her own to address her mental health concerns. She selected her comfort level with using technology in addition to therapy as 'quite a bit.' Laura reported her annual income as $50,000-59,999.

<center>**Measures**</center>

The Patient Health Questionniare-9 (PHQ-9). The PHQ-9 (Kroenke, Spitzer, &

Williams, 2001; see Appendix B) is a 9-item, self-report, instrument that assesses

depressive symptoms. Participants rated each item (e.g., "Little interest or pleasure in

doing things" and "Feeling down, depressed, or hopeless") using a 4-point scale ranging

from 0 (*Not at all*) to 3 (*Nearly every day*). Item responses were then summed with total

scores on the PHQ-9 ranging from 0 to 27 with higher scores indicating greater

symptoms of depression. Categories of severity include minimal (0-4), mild (5-9),

moderate (10-14), moderately severe (15-19), and severe (20-27). A total score of ≥ 10

can be used as a clinical cut-off for a probable DSM-IV diagnosis of Major Depressive

Disorder. However, participants may be experiencing some depressed mood if they

endorse 2 to 4 depressive symptoms (i.e., scale items) at a rating of 2 or higher (i.e., more

than half the days) and one of those endorsed symptoms is depressed mood. This measure

has been shown to have criterion validity, as its diagnostic cut-offs were consistent with

the assigned diagnoses provided by mental health professionals. Furthermore, the PHQ-

9's overall sensitivity was found to be 80% and its specificity 92%, meaning it could

detect the prevalence of depressive disorders (i.e., true positives) as well as correctly

identify those without depressive disorders (i.e., true negatives; Gilbody, Richards,

Brealey, & Hewitt, 2007). In a ROC analysis, the area under the curve for major

depression using the PHQ-9 was 0.95, meaning the measure has a strong ability to

discriminate between patients with and without major depression (Kroenke et al., 2001).

Additionally, the PHQ-9 has been shown to have construct validity through a strong

association with the Medical Outcomes Study Short-Form General Health Survey (SF-

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20) (Kroenke et al., 2001), Satisfaction with Life Scale (Kocalevent, Hinz, & Brähler, 2013), and the 17-item Hamilton Depression Rating Scale (Kroenke, Spitzer, Williams, & Lowe, 2010). According to Kroenke et al. (2001), internal reliability of the PHQ-9 was excellent ($\alpha = 0.89$) as was test-retest reliability ($r = 0.84$) for primary care patients and obstetrics-gynecology patients (Kroenke et al., 2001).

The Quick Inventory of Depression Symptoms-Clinician (QIDS-C). The QIDS-C (Rush et al., 2003; see Appendix C) is a 16-item measure that assesses evaluator-rated depression symptom severity. The items are split into the nine-symptom criterion domains used to diagnosis depression based on the DSM-IV. The domains include sad mood, concentration, self-criticism, suicidal ideation, interest, energy/fatigue, sleep disturbance, decrease/increase in appetite/weight, and psychomotor agitation/retardation. The clinician circled the item that best described the patient in the last seven days. Item response language varied, but all items ranged from 0 to 3. An example of an item includes evaluating client mood with responses of 0 (*does not feel sad*) to 3 (*feels intensely sad virtually all the time*). Another item asks about the client's level of involvement. For this item, responses include 0 (*No change from usual level of interest in other people and activities*) to 3 (*Has virtually no interest in formerly pursued activities*). Scores are calculated by summing the responses across the 9 items. Total scores can range from 0 to 27 with higher scores indicating an increased likelihood that a diagnosis of depression is appropriate. The QIDS-C has shown to have a Cronbach's α of 0.85 with those with Major Depressive Disorder (Trivedi et al., 2004). The items in the QIDS-C come directly from the *Inventory of Depressive Symptoms* (IDS-C) (Rush et al., 1986, 1996), which has been demonstrated as comparable to the *Beck Depression*

Inventory and the *Hamilton Depression Rating Scale* (Rush et al., 1996). The QIDS-C has been found to have a strong correlation to the IDS-C ($r = 0.82$) (Rush et al., 1996).

Barriers to CBT Homework Completion Scale-Depression Version (Barriers Scale). This scale (Callan et al., 2012; see Appendix D) is a 65-item measure developed to assess potential patient, therapy, and task factors that contribute to not completing CBT homework. Participants rated each item using a 5-point Likert scale ranging from 0 (*Not at All)* to 4 (*Completely)*. Items included "I had a hard time completing dysfunctional thought records" or "My therapist gave me homework that was too complicated." Item responses are summed with total scores ranging from 0 to 260 with higher scores indicating greater perceived barriers to completing homework. The scale was developed with adults diagnosed with Major Depressive Disorder receiving CBT. Factor analyses found the scale to have two factors: (a) patient factors and (b) therapy/task factors. Item-total correlations were moderate to high. Internal consistency was high ($\alpha = .86$ to .97). Test-retest analyses were significant for the entire scale ($r = .95$), the patient subscale ($r = .94$), and the therapy/task subscale ($r = .72$). There was a moderate relationship between the Barriers Scale and the Assignment Compliance Rating Scale, indicating the Barriers Scale has some predictive validity that those with low scores will be more likely to adhere to completing homework. The Barriers Scale has adequate sensitivity (.80, .77) and specificity (.66). The scale was found to have low to moderate significant correlations with divergent measures of the Beck Depression Inventory and the Dysfunctional Attitudes Scale.

The Homework Rating Scale (HRS). The HRS (Kazantzis, Deane, & Ronan, 2004; see Appendix E) is a 12-item instrument that measures homework compliance.

Two additional items were added to the scale. They included asking the participant how many minutes they spent on their assignment and which activities they completed since their last session. Participants rated items on a 5-point Likert scale ranging from 0 (*None* or *Not at All*) to 4 (*Extensive* or *Extremely*). No psychometric properties were available for the original HRS; however, the HRS-II utilizes the same 12-items with a slight variation in wording while being true to the construct being asked about. The HRS-II is comprised of three subscales: beliefs, consequences, and engagement. The beliefs subscale measures the participants' ideas about the design, rationale and purpose of the homework assigned. The consequences subscale analyzes the expectations participants had regarding the potential outcome of completing the homework assignment. Lastly, engagement examines the degree to which the individual participated in the homework assignment (McDonald & Morgan, 2013). Higher scores on each subscale indicate positive performance in each domain. The HRS-II has demonstrated strong internal reliability overall (α = .83; Kazantzis et al., 2010, α = .89; McDonald & Morgan, 2013) and within each subscale: beliefs (α = .75), consequences (α = .80) and engagement (α = .81) (McDonald & Morgan, 2013). Items included, "How difficult was the assignment," "How well did the assignment match your therapy goals," and "How well did you understand the reason for doing the assignment?"

The Revised Usability and Acceptability Survey (UAS-Revised). Originally developed by Rizvi et al. (2011), the UAS assesses client and provider satisfaction with the smartphone app. However, the language of the items was adapted to suit the present study (see Appendices F & G). Only the client in the therapy plus app treatment condition and this clinician received the 12 items with responses on a 5-point Likert-type scale.

Items for the client included questions such as, "To what extent was the app easy to use", "How much did you enjoy the Depression CBT app", and "How helpful do you believe this tool was to you in your treatment?" Higher scores would indicate satisfaction with the use of the app. Items for the clinician included, "How helpful do you believe this app was in your client's treatment" and "How likely is it that you would use this app or another app in your clinical practice with clients?" The original *Usability and Acceptability Survey* was only administered to users of an app. Internal consistency was found to be $\alpha = .90$ (Rizvi et al., 2011). No other study has used this measure and no other psychometric properties exist for this measure; however, this scale was best suited for this study.

Fidelity Check. The fidelity check (see Appendix I) is an outlined structure of what the progressing sessions look like for each participant with specific instructions depending on the condition they were assigned. In essence, it is meant to help the provider maintain consistency with providing services across conditions, while also serving as a safety protocol in the event a participant endorses high levels of suicidal ideation. On each participant's first visit, an interview intake was conducted. The second and third sessions provided psychoeducation on CBT. Additionally, participant goals were further clarified and therapeutic rapport was built through the use of micro counseling skills such as paraphrasing, reflecting, and validating. During the intervention phase, homework from the previous week was reviewed. This included assessing their ability to complete the task or use the tool and what barriers they might have experienced and how to address them moving forward. The remainder of the session focused on teaching new skills and reinforcing previously taught skills used since our last session.

The last four sessions highlighted the progress the participants had made during therapy while managing feelings about the pending termination of therapy.

Procedure

One-page flyers describing the study and the eligibility criteria for clients to be involved in the study were hung in the practicum sites of this author (see Appendix L). Clients, aged 18 years and older, whose presenting issue was depressive symptoms, as identified by this provider and as indicated by a score of 5 or greater on the PHQ-9 were included in the present study. Additionally, clients needed to have daily access to their personal Android phone, which is capable of downloading apps. Clients were not included in the study if it was concluded that the client was at an increased risk to hurt themselves, if they were currently and actively engaging in self-harm, and/or diagnosed with any psychotic disorders.

All new clients of this author were given the PHQ-9 at intake. Those clients that met the research study's criteria were informed of the study and asked to consider participating. If they agreed, they signed the informed consent and received a copy of it. Following this, they were given demographic information to complete and at the end of the session this author completed the QIDS-C.

Each counseling dyad was involved in the research study for 12 sessions during which time the participant always completed a PHQ-9 at the beginning of the session and this author filled out a QIDS-C at the end of the session. Meta-analyses have shown that the largest outcome gains from psychotherapy are made during the first 10 sessions of therapy. Additional therapy sessions continue to benefit clients but to a lesser degree

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(Barkham et al., 1996). The length of time for this study was chosen to achieve the treatment benefits of 10 sessions, while also keeping the length of treatment phases equal.

Pairs were given four sessions to establish rapport and a stable baseline, which was treatment as usual. During these four sessions, further information regarding the participants' history and presenting issue(s) was gathered. Additionally, psychoeducation on CBT and grief was provided and counseling microskills were used to support the participants to foster a therapeutic relationship. Training on respective homework conditions was integrated into the fourth session only for both participants. The intervention phase (sessions 5-8) could not begin until the participants received education on their homework assignments during the fourth session. Molly, the participant in the therapy only condition, received education on a CBT Daily Record of Dysfunctional Thoughts to be completed during her intervention phase of the study, whereas the participant in the therapy plus app condition, Laura, received a 15 minute training on how to use the app. Laura was instructed to use the app at least one time a day during the intervention phase. For the next four sessions both participants engaged in their respective treatment conditions and completed the HRS at each session. After the eigth counseling session, Laura was given the option to discontinue her use of the app while continuing with therapy. If Laura had used the app after the eigth session she would have completed the HRS during the following session; however, while she expressed intention to use the app after the eigth session she did not actually interact with it. Both conditions continued with therapy for four more sessions as a follow up measure for a total of 12 sessions. The counseling dyad in the therapy plus app condition completed the Revised

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UAS at the end of the study to measure satisfaction with using the app as an adjunctive tool to therapy. Both participants completed the Barriers Scale during their last session.

Endorsed symptoms of depression can vary and one possible symptom of depression is experiencing thoughts of death or harming oneself therefore, a safety protocol was developed. Suicidal ideation did not occur during Molly or Laura's participation, but this clinician was prepared to make a decision about the safety of the participant and their continued involvement in the study. Participants were encouraged to share worsening depressive symptoms or thoughts of suicide or self-harm with this author or to contact 1-800-273-TALK (8255). Upon completion of the study, participants were debriefed and thanked for their participation.

App Description

The *Depression CBT Self-Help Guide App* (Depression CBT) is a free app capable of being downloaded on any Android phone. Upon being downloaded, the program icon of a blue butterfly appears within the apps section of the mobile phone. Selecting the app will launch the Depression CBT on the device. Participants can change the settings to include a daily reminder to use the app, password protection, saving data, and opting out of sending usage data to the developer. Additionally, customization options include changing text size, selecting visual accommodations for those visually impaired, hiding the app on the phone for privacy, an emotions list, irrational beliefs list, challenge list, displayed statements, and points list. An icon always available to the user is one that brings them directly to the app's primary website, www.excelatlife.com/mobile.htm, where they have access to even more information about depression. The butterfly icon within the app expands when it is selected offering

audios, such as emotion training, mindfulness training, and relaxation, articles educating

users about depression and skills used to manage their depression, the PHQ-9 as a

screener that graphs your results, a cognitive diary, and suggestions that offer a list of

coping skills and psychoeducation that then allows the user to gain points for each

suggestion attempted. Even though the PHQ-9 is available to app users within the app,

the app version will not be used for the purposes of the study. It will be made clear to the

participants that they can complete the PHQ-9 on the app if they wish for their own

purposes; however, they will be asked to complete a paper copy of the PHQ-9 as a

component of their participation in the study.

This app appears to have many features that make it user friendly. Much of the

app can be customizable to suit the learning style of the client including backgrounds,

sayings, if they want to use the points feature or graph their progress, etc. If the user

forgets how to complete a cognitive diary entry the app offers five different examples.

There are also options to guide the user should they have questions about the app. For

example, a 'how to use Depression CBT' option allows users to read about the app.

Additionally, there is a FAQs option and an 'About the app' option, which updates the

user about the developer, how recently they have made changes to the app, and the

changes they made. Finally, should the user feel like sharing the results of their app work,

like their PHQ-9 results or their cognitive diary, they can share it with others, such as

their provider, via an email account associated with the user's phone. Although clients

will be completing a paper-version of the PHQ-9 for the purposes of the study, should

they take the measure through their app and have elevated scores, the app will suggest

they contact the National Suicide Prevention Lifeline. It provides a hyperlink to the

National Suicide Prevention Lifeline website, which when selected brings the user directly to the website that boldly lists the telephone number to contact if they need immediate assistance.

Wakefield and Schaber (2012) suggest five steps for choosing a treatment app. The first step is framing the clinical question using knowledge about the population, intervention needed, comparison, and outcome desired. Next, look for and access the evidence that suggests the use of a certain app for the clinical needs identified. Scan the app store located on a mobile phone or via the Internet and compare available apps based on what is needed and what is known about certain apps. App characteristics such as capabilities and cost should be considered. Lastly, make a decision.

The Depression CBT app was chosen based on Wakefield and Schaber's (2012) recommendations. It fit the clinical question at hand, it was free, it was more comprehensive with multiple options available to users that included visual and audio components, and the foundation of its information is based in CBT, which is supported as an evidence-based treatment for depression. Although the participant pool is limited to Android users because the Depression CBT is only available to Android users and not iPhone users, this app was selected because it seemed to suit the study more than other apps made available to both Android and iPhone users. Within the Play Store, where apps are downloaded, personal users rated Depression CBT as 4.4 stars out of 5. Additionally, the Depression CBT app was named one of the best depression apps of 2013 for iPhones and Androids by Healthline.com (Cherney, 2013).

CHAPTER IV

RESULTS

As discussed above, it was hypothesized that the depressive symptoms of the participant in the therapy plus app condition would decrease more and/or at a faster rate than the participant receiving in person therapy only. This hypothesis was determined by this researcher's judgment using visual inspection that has been graphically displayed below. The analysis of single-case designs is visual inspection, which is examined by using means, levels, trends, and latency of change as shown within a line graph.

Dr. Alan Kazdin (2011) is an expert in research methodologies, particularly single-case designs. Kazdin states that visual inspection is a useful analysis tool, as it encourages "investigators to focus on interventions that produce potent effects and effects that would be obvious from merely inspecting the data" (p. 286). Visual inspection is comprised of magnitude (mean and level) and rate of change (trend and latency) across the three phases of the study. Each of these characteristics is explained in greater detail next.

Changes in magnitude are based on changes in means and levels. A change in mean refers to a shift in the average score on a given measure during each phase of the study. The means of each phase were calculated and graphed for each participant on their self-report measures of depression (PHQ-9) and clinician-rated measures of depression

(QIDS-C). A noticeable change in mean from one phase to the beginning of another might indicate that the intervention contributed to the change in questionnaire scores.

Change in levels is the other component comprising the overall changes in magnitude. Changes in levels are independent of changes in means. The plotted scores at the beginning and end of each phrase are of interest here. For example, after the baseline phase is completed did the participant's score plummet with the introduction of the intervention or did it remain the same at the start of the intervention phase and gradually decrease with time.

Rate of change involves examining possible changes in the trend or slope of each phase and the latency of change in each phrase. A change in trend or slope demonstrates systematic increase or decrease over time. A noticeable change in slope in a new phase suggests something reliable occurred. Latency of change refers to how long it takes for changes in outcome measures to occur during a phase transition. The sooner the change occurs in relation to when the change in phase occurred, the easier it is to deduce that the intervention was the mechanism of action (Kazdin, 2011).

The final criterion to consider in visual inspection is the overall pattern. This tends to be a culmination of the above four criteria. Overall pattern is concerned with observing nonoverlapping data, which means that none of the data points in the baseline phase approach any of the data points in the intervention phase. If the data do not overlap and changes are noticed in the other visual inspection criteria, then there is little doubt that a powerful treatment effect happened (Kazdin, 2011).

The present study visually inspected the data with the most commonly used graphing feature in single-case designs, the simple line graph. This graph is easy to

understand, it depicts participant performance over time, and allows for efficient inspection of the data (Kazdin, 2011). Graphing aids are employed to further assist in moving through the visual inspection criteria.

Like any research design, the use of visual inspection to analyze data has its limitations, particularly if visual inspection is the only source of data analysis. For example, there are no definitive rules or benchmarks (i.e., $p < .05$) to determine if the data show a reliable effect; hence, exact replication is challenging. Without solidified rules there is potentially room for some subjectivity and researcher bias (Kazdin, 2011). A major function of visual inspection is detecting potent treatment effects yet, if the effect is unclear, due to variability of the data points or improving baselines, then less can be inferred about the intervention without further investigation (Kazdin, 2011). To combat these limits, various graphing aids were used to help illustrate findings (Dallery et al., 2013; Kazdin, 2011).

Visual Inspection Results

Hypothesis One

It was hypothesized that while both participants would show decreases in depressive symptoms, the participant in the experimental condition (therapy plus app) would show a greater rate of decrease than the participant in the control condition (therapy only) from baseline to intervention and would maintain lower depressive scores from intervention to post-intervention. This hypothesis was measured by the client's self-report of depressive symptoms via the PHQ-9 and the clinician's rated observation of the client's depressive symptoms via the QIDS-C. This hypothesis was analyzed using visual

inspection of the mean, level, trend, latency of change, and the overall pattern of scores as displayed in line graphs.

PHQ-9. When visually comparing Molly (therapy) and Laura (therapy plus app) it seems both Molly and Laura were endorsing a large number of depressive symptoms at the start of therapy. Molly's initial score of 18 indicated moderately severe depression based on PHQ-9 cutoff scores (her second session score of 21 suggested severe depression). Laura's initial score of 16 also suggested moderately severe depression while her second session reduced her rating to mild depression (Kroenke et al., 2001). It seems clear that both individuals benefitted from therapy during the baseline phase, as an obvious decline in self-reported depressive symptoms is seen in Figure 1. It can also be observed that overtime Molly reported greater severity of symptoms than Laura.
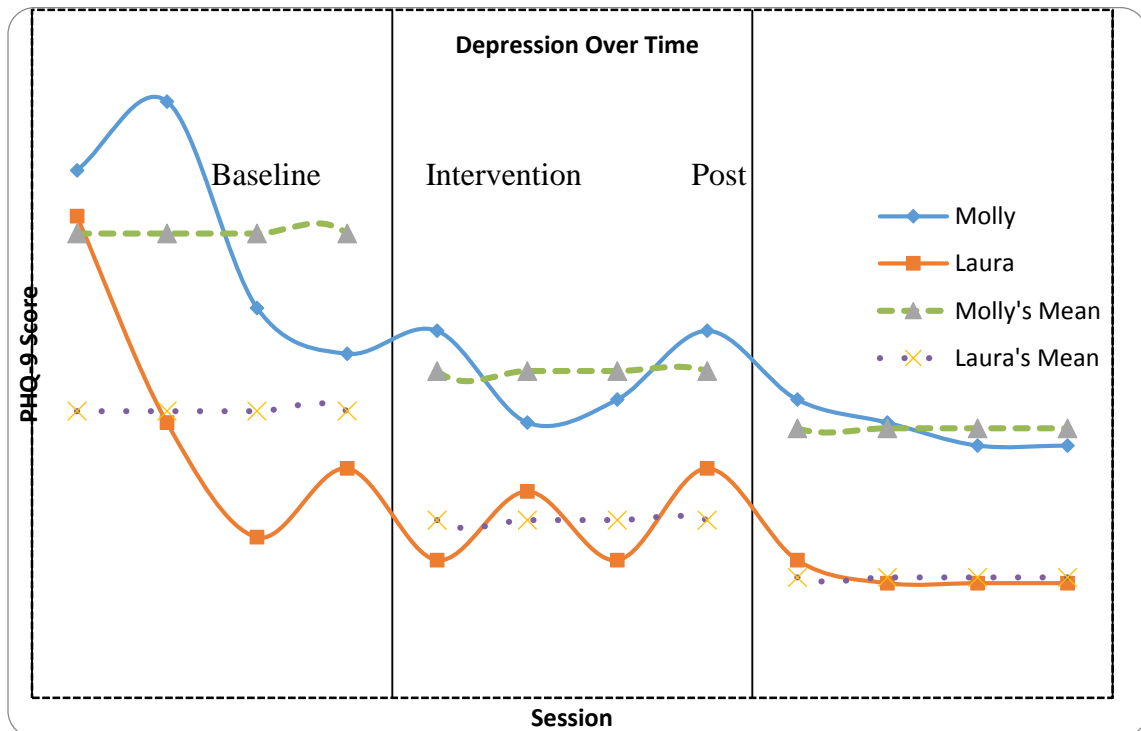
Figure 1. Depression over time. Both participants' self-report raw data and means on the PHQ-9 at each phase of the study.

Mean and level. The magnitude of change in scores was examined using visual inspection of changes in mean and level. Changes in mean were determined by analyzing shifts in the average scores between the different phases (i.e., baseline, intervention, and post). The mean and raw data scores for Molly and Laura on the PHQ-9 during each phase are pictorially represented in Figure 1. The mean total score on the PHQ-9 for Molly was 15.25 during baseline, 9.25 during intervention, and 6.75 during post-test phases. She demonstrated visable shifts from baseline to intervention phase and intervention phase to post-test phase. Based on these changes in mean level, it seems Molly's depressive symptoms decreased during all phases of the study while receiving traditional therapy services only. The mean total score on the PHQ-9 for Laura was 7.5 during baseline, 2.75 during intervention, and 0.25 during post-test phases. She demonstrated visable shifts from baseline to intervention phase and intervention phase to post-test phase. It appears as if the most significant change in mean occurred during the transition from baseline to intervention phase. Based on these changes in mean level, it seems Laura's depressive symptoms decreased during all phases of the study while receiving counseling and digital homework to complete using the app.

To analyze the changes in level, the shift of scores is examined starting at the end of the baseline (session 4) to the start of the intervention (session 5) and then at the end of the intervention phase (session 8) to the start of the post-test phase (session 9). Per Kazdin (2011), if a change in level is noticeable between phases than a reliable effect can be indicated as a result of the intervention. At the introduction of the CBT Daily Record of Dysfunctional Thoughts for Molly, there does not appear to be an immediate change yet the next session results in a decrease in endorsed symptoms. In comparing the

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completion of the intervention to the post-test phase, a slight decrease in symptoms is noticed. Unlike Molly, there appears to be an immediate change in self-rated scores when the app was introduced to Laura however, the remaining scores in the intervention phase continue to fluctuate. A comparison between the end of the intervention phase and the beginning of the post-test phase indicates another immediate reduction in self-reported symptoms.

Trend and latency. The rate of change in scores on the PHQ-9 were assessed by examining the trend or slope and latency of change. The purpose of the trend or slope is to look for increases or decreases in depression scores over time and across phases. Molly appears to have an overall negative slope indicating a decrease in depressive symptoms throughout the study (Baseline slope = -2.67, Intervention slope = 0, Post slope = -0.67). Latency of change refers to the lapse of time between the start or end of a phase and the change in scores. It seems unclear if the intervention phase made much of a direct difference on Molly's depression because initially her scores decreased at the introduction of the intervention, but then increased before the intervention phase concluded only to then decrease after the intervention was removed. Laura appears to have an overall negative slope, as well, signifying a decrease in depressive symptoms throughout the study (Baseline slope = -3.67, Intervention slope = 1.33, Post slope = -0.33). Laura's scores immediately reduced each time a new phase was introduced leading one to believe that the phase change contributed to her decrease in endorsed depressive symptoms.

Overall PHQ-9 results. A visual inspection of Figure 1 indicates that hypothesis one was supported. Both participants appear to have a notable decrease in depressive

symptoms however, the particant enrolled in the experimental condition, Laura, which

utilized the app seemed to demonstrate a greater decrease in self-rated depressive

symptoms than Molly who was exposed to a paper-version of CBT homework.

Additionally, Laura's self-rated depressive symptoms maintained at a lower severity level

than Molly's following the intervention phase as predicted.

QIDS-C. When comparing clinician-rated depressive symptoms of Molly

(therapy) and Laura (therapy plus app), it seems the means of both Molly and Laura are

largely the same across all phases of the study. Both participants were observed by the

clinician to demonstrate a decline in depressive symptoms over time as seen in Figure 2.
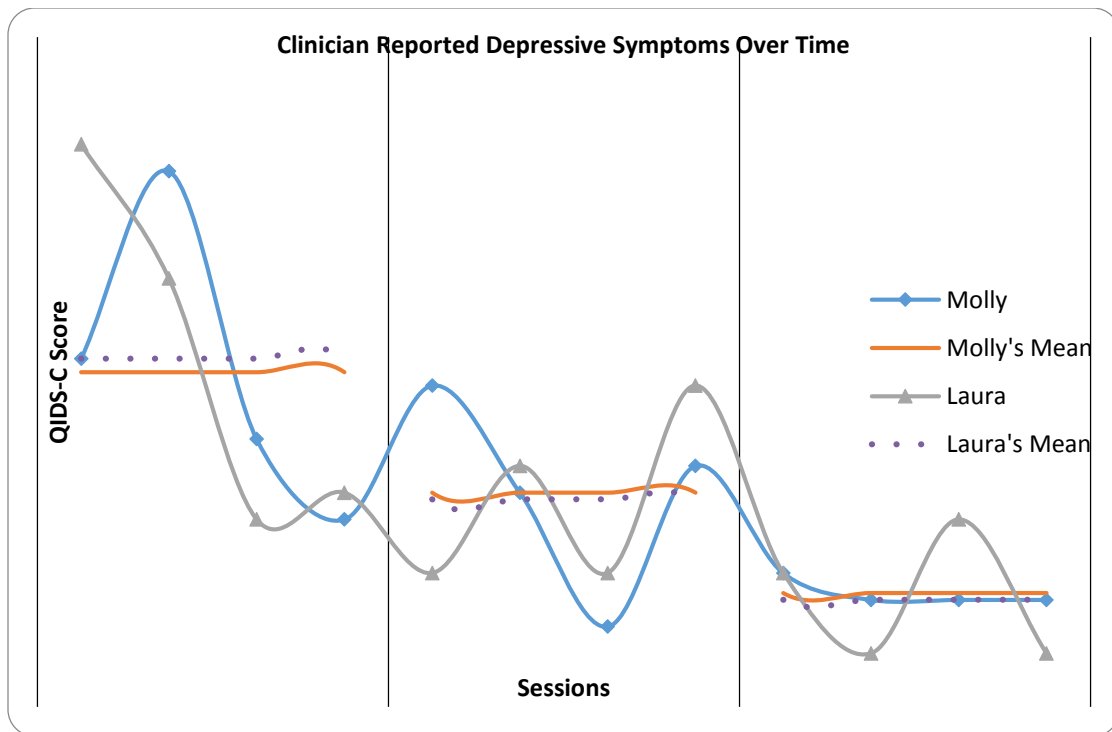
Figure 2. Clinician reported depressive symptoms over time. Both participants'
depression scores as observed by the clinician including raw data points and means for
each participant at each phase.

Mean and level. The magnitude of change in scores, as reported by the clinician, was examined using visual inspection of changes in mean and level. Changes in mean were determined by analyzing shifts in the average scores between the different phases (i.e., baseline, intervention, and post). The mean and raw data scores for Molly on the QIDS-C during each phase are pictorially represented in Figure 2. The mean total score on the QIDS-C at baseline for Molly was 12.5, 8.0 during intervention, and 4.25 during post-test. She demonstrated visable shifts from baseline to intervention phase and intervention to post-test phase. Based on these changes in mean level, it seems Molly's depressive symptoms decreased during all phases according to the clinician. The mean total score on the QIDS-C for Laura was 13.0 during baseline, 7.75 during intervention, and 4.0 during post-test phase. The clinician-rated means represent a clear decline in observed depressive symptoms from the prior phase. A greater change in mean occurred between the baseline and intervention phases. As a result, it seems Laura's observed depressive symptoms decreased during all phases of the study while receiving therapy and the app.

To analyze the changes in level, the shift of scores is examined starting at the end of the baseline (session 4) to the start of the intervention (session 5) and then at the end of the intervention phase (session 8) to the start of the post-test phase (session 9). If a change in level is noticed between phases, a reliable effect can be indicated as a result of the intervention (Kazdin, 2011). Per the clincian's reported observations of Molly's depression symptoms, symptoms did not immediately decrease at the introduction of the intervention however, the next two sessions showed a decline in observed depressive symptoms. At the start of the post-test phase the client's depressive score declined and

remained stable throughout the remainder of the study. At both transition points (session 5 and session 9) for Laura, the observed symptoms were less than the prior session. The timing of the declines suggest that a decrease in symptoms could be the result of the intervention and follow up procedure.

   Trend and latency. The rate of change in scores on the QIDS-C were assessed by examining the slope and latency of change. The purpose of the trend or slope is to look for increases or decreases in depression scores over time and across phases. The clinician-rated observations of Molly suggest an overall negative slope indicating a decrease in depressive symptoms throughout the study (Baseline slope = -1.3, Intervention slope = -1.0, Post slope = -0.3). Latency of change refers to the lapse of time between the start or end of a phase and the change in scores. The immediate impact of the intervention did not seem to take affect as her observed depressive symptoms were elevated compared to the session prior to the intervention. When the intervention was removed, Molly's observed depressive score dropped slightly and then remained stable*.* Laura also had an overall negative slope, signifying a decrease in depressive symptoms throughout the study (Baseline slope = -4.3, Intervention slope = 2.3, Post slope = -1.0). Laura's observed scores immediately reduced each time a new phase was introduced indicating that the phase change contributed to her decrease in clincian-rated depressive symptoms. It seems clear she had an extreme decline during the baseline phase, but had some mixed depression ratings during the intervention and post-intervention phases.

   Overall QIDS-C results. A visual inspection of Figure 2 also lends support for hypothesis one. Molly and Laura had a visible decrease in depressive symptoms, as rated by the clinician. The participants' means for each phase considerably declined with

Laura's being slightly lower than Molly's during the intervention and post-test phases even when she started the baseline phase with a marginally higher depression rating. The immediate decline seen in Laura's scores when starting a new phase, rather than the delayed effect in Molly's scores, suggests the intervention may have contributed to Laura's improved observed depressive symptoms. Although there was some fluctuation in observed raw data points during the intervention and post-intervention phases for Laura, her negative slopes were stronger in the baseline and post-intervention phase than Molly's.

Hypothesis Two

Hypothesis two stated that Laura, the participant engaged in therapy with the addition of the app, and the provider would approve of the app and find it to be a useful adjunctive tool, as measured by the UAS-Revised (Rizvi et al., 2011) for clients and clinicians. As a reminder, the UAS-Revised has been adapted to include a client and provider version that addresses the use of an app as an adjunctive tool to therapy.

The provider answered five questions regarding the usability and acceptability of the app. It was the provider's impression that the client enjoyed the app "some" and that the app was "somewhat helpful" in the client's treatment. Whereas this clinician agreed that she would personally use the app or something similar to it, she was "undecided" if she would use this or another app in clinical practice with clients. Overall, the app was rated as "somewhat helpful" in assisting the client to learn and practice CBT skills.

Laura responded to twelve questions on her last session that assessed her level of usability and acceptability of the app in addition to therapy. She reported that the app was "very enjoyable" and that it was "somewhat helpful" in her treatment. Despite being

"undecided" if the app was relevant to her current treatment, she is "likely" to use this app in her treatment and initiate using this app or others like it on her own. Laura endorsed that the app "somewhat held" her interest and was "very easy" to understand. Additionally, it was rated as "very easy" to use. The overall app was found to be "somewhat easy" to navigate with the navigation menus being identified as "very easy" with regard to clarity and ease of understanding. Lastly, Laura selected that the app was "somewhat informative" in providing feedback and was overall "helpful" in terms of assisting her learning and practice of CBT skills.

Overall, hypothesis two was partially supported. It seems the provider endorsed some support for the usefulness and acceptability of the app, but is hesitant in using the app in the future with clients due to uncertainty about its helpfulness in reinforcing CBT skills. The participant on the other hand seemed to enjoy the app and find it easy to use and understand. Laura acknowledged that the app was helpful to some degree in her treatment and that she might use this app or one similar in the future.

Hypothesis Three

Hypothesis three posited that increased outside engagement of therapeutic skills, as measured by the HRS (Kazantzis et al., 2004), would be greater for Laura in the experimental condition with the use of the app as compared to Molly's use of a paper thought log.

During the intervention phase, Molly used the HRS to rate her completion of her dysfunctional thought record and use of other techniques she was taught during therapy. In addition to filling out the HRS during sessions 5-8, she listed the approximate time she spent on her homework tasks and what tasks she attempted. Figure 3 demonstrates

Molly's scores on the three subscales of the HRS: engagement, consequences, and beliefs across the intervention phase. Additionally, the amount of time she spent on her homework is graphically represented. Molly's engagement (7, 11, 12, 11) and consequences (10, 12, 13, 12) remained relatively high and stable. Her belief in the usefulness of the assigned tasks steadily grew over the four sessions (13, 17, 17, 18). The maximum score on the engagement subscale was 12, consequences was 16, and beliefs was 20. The amount of time Molly dedicated to engaging in therapeutic work outside of her counseling hour rapidly declined (30, 20, 5, 5 minutes). She appropriately completed the dysfunctional thought record each session while also practicing deep breathing and grounding techniques.
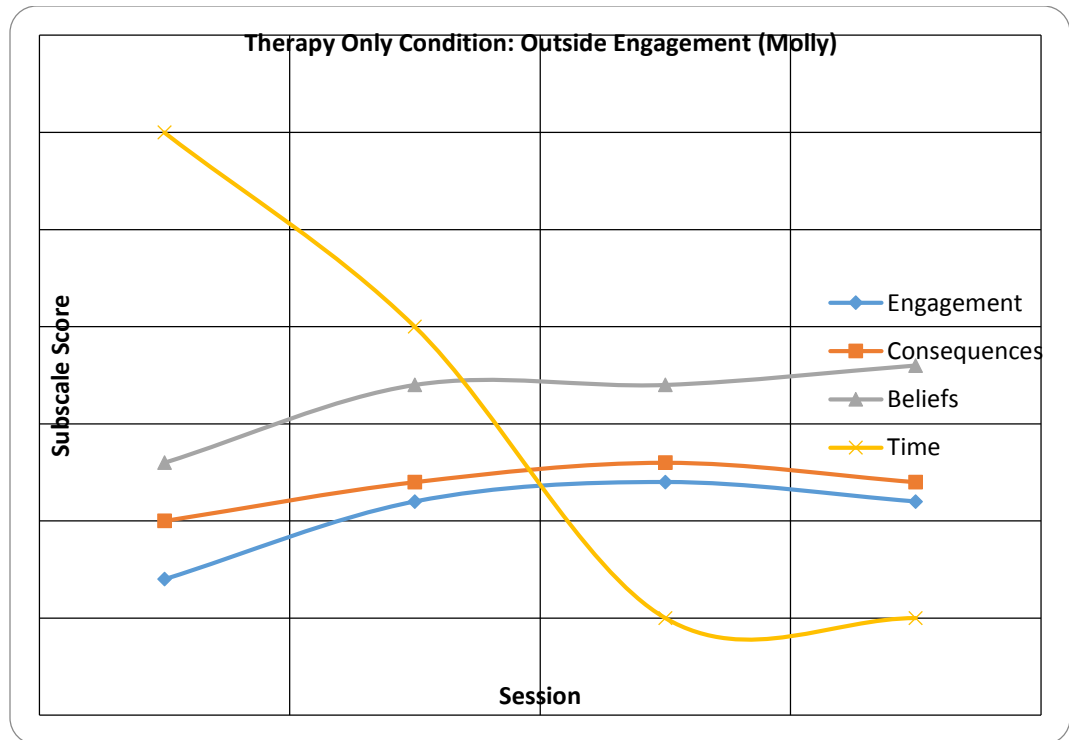
Figure 3. Therapy Only Condition: Outside Engagement (Molly). Molly's outside engagement measured by the HRS and the time she spent completing homework.

Laura also rated her use of the app to complete homework tasks. She too listed the amount of time she spent involved with therapeutic tasks outside of counseling and which tasks she attempted. Figure 4 shows Laura's scores on the HRS engagement, consequences, and beliefs subscales, as well as the amount of time she invested in her homework. Initially, Laura's engagement gradually increased, but in the final intervention session (session 8) this dramatically dropped (7, 9, 10, 4). The same is true of her consequences scores (8, 10, 11, 3). Her scores on the beliefs subscale appear to fluctuate (13, 17, 13, 18), as does her reported time spent on the homework tasks (12, 90, 90, 0 minutes). Laura's first use of the app involved adding one bad day's emotions. Next, she logged exercising, reading psychoeducation articles via the app, using the cognitive diary, and interacting socially. Her last use of the app was prior to session 7, when she recorded showering every other day, exercising, and cooking for herself.

When visually comparing Figures 3 and 4 (outside engagement), it seems hypothesis three was partially supported. When each subscale of the HRS was averaged for each participant, Molly, in the control condition, scored higher on all three subscales meaning she felt that she had a greater level of engagement with the homework, expected a better outcome from doing the homework, and believed in the purpose of the homework assigned. Despite her HRS scores, Molly's self-reported time spent on completing her homework assignments was far less than that of Laura, in the experimental condition. On average, Laura engaged with the app significantly more each week ($M = 48$ minutes) than Molly did with her paper dysfunctional thought log ($M = 15$ minutes).
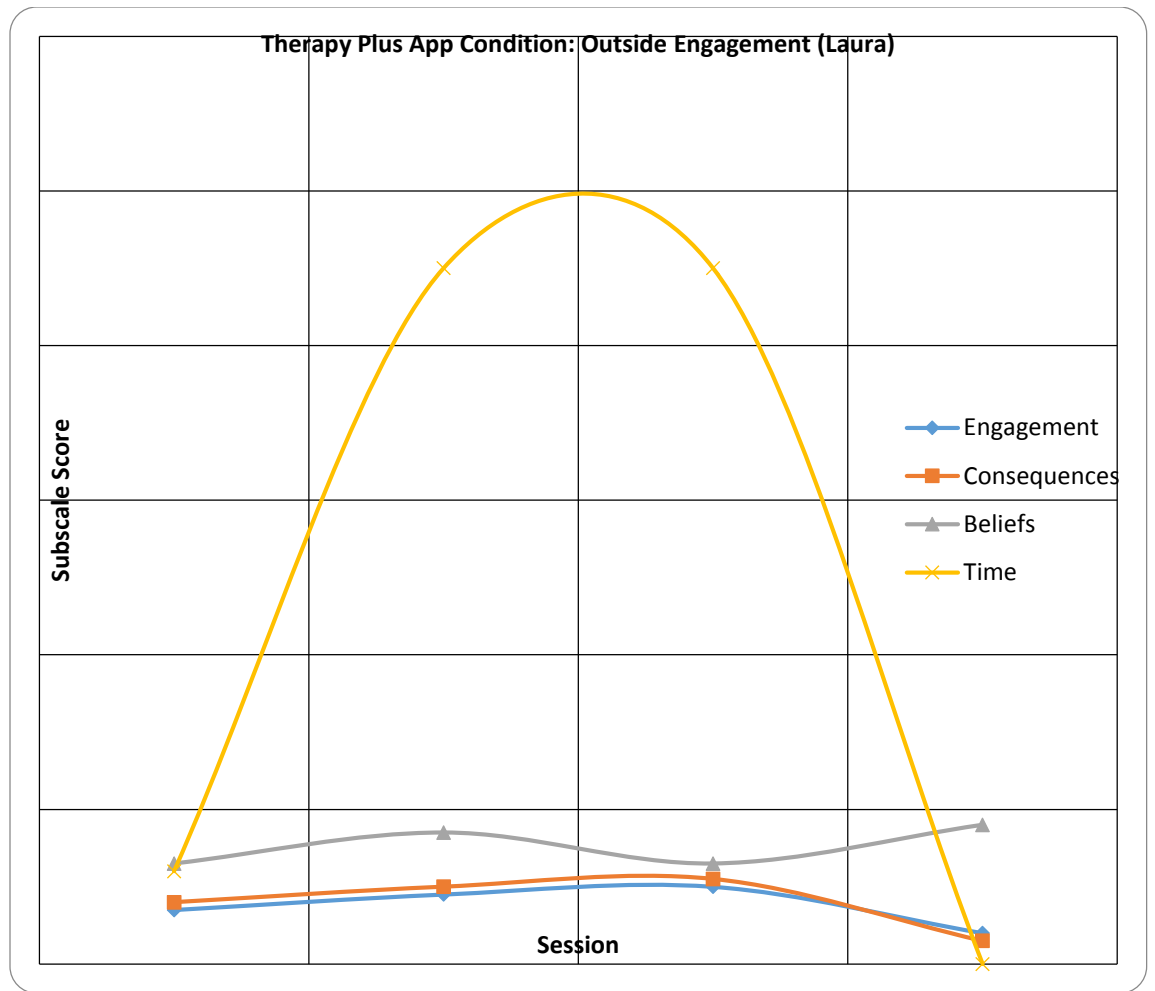
Figure 4. Therapy Plus App Condition: Outside Engagement (Laura). Laura's outside engagement measured by the HRS and the time she spent completing homework.

Hypothesis Four

It was predicted that the participant in the experimental condition would experience fewer barriers as measured by the Barriers to Cognitive Behavioral Therapy Homework Completion Scale-Depression Version (Callan et al., 2012). This measure was used to draw conclusions about the obstacles both participants faced in accomplishing their assigned homework tasks. It helps to validate the participants' ability

to engage in outside therapeutic homework and therefore the potential impact on their depressive scores.

Hypothesis four was supported, as Laura scored 14 on the barriers scale as compared to Molly's score of 19. Laura's greatest barrier to completing her CBT homework was feeling unorganized. She rated wanting to avoid painful feelings and feeling as if her depression has been going on for so long as a 'moderate' barrier in her ability to complete her homework. Laura identified feeling unmotivated, hopeless, forgetful, not doing many things well in life, poor concentration and avoiding homework that brought up painful memories as 'somewhat' distracting in completing her assigned app homework.

Molly endorsed more overall barriers than Laura. Her most challenging barriers were rated as 'moderate' and they involved feeling as if her depression had been going on long and feeling hopeless. She identified 15 other barriers that interfered 'somewhat' with her completion of her thought log. These barriers included: fear of failing, not feeling well, feeling helpless, overwhelmed, frustrated, not being able to take action, poor concentration, not able to do many things well in life, unorganized, depressed, lacking energy, too much going on in life, lacking support, certain assignments brought up painful emotions, and having a difficult time completing the thought records.

Based on the total number of barriers endorsed and the specific barriers selected, it appears hypothesis four was supported. Laura reported five fewer overall barriers than Molly. Furthermore, Molly selected barriers that she felt overwhelmed and that she had a difficult time completing her dysfunctional thought log.

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CHAPTER V

DISCUSSION

This chapter discusses the results of the four hypotheses, as well as what the results may mean for implementing a CBT app in addition to in-person therapy. The hypotheses are explored, while considering relevant research and individual differences. This chapter is divided into the following areas: general discussion, limitations, implications and directions for future research.

General Discussion

Hypothesis One

The first hypothesis posited that both participants would demonstrate a decrease in depressive symptoms however, it was expected that Laura (experimental condition), would exhibit a greater decrease in depressive symptoms compared to Molly (control condition). Findings supported that both participants' self and clinician rating depression symptoms decreased throughout the course of the study. The assertion that Laura would show a greater decrease in depression symptoms from baseline to intervention phase and maintain lower depression scores from intervention to post-intervention phase was partially supported.

Self-reports of depressive symptoms upheld the first hypothesis however; clinician-rated depressive symptoms did not support the assumption that Laura's depression was more impacted by the additional use of an app as compared to Molly's

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use of paper homework. At every data point, Laura's self-report was lower than that of

Molly's. Although Laura's depression rating on intake was lower than Molly's, both

participants' scores placed them in a moderately severe depression range based on the

PHQ-9 cutoff scores. Additionally, Laura's self-reported scores immediately declined

following transition into a new phase, unlike Molly's during the intervention phase.

For these reasons, it would seem that Laura did improve more or at a greater rate

than Molly with her use of the app however, per the clinician observations, the

participants did not differ greatly as evidenced by similar means at each phase of the

study. Despite participant means being observed as similar, the clinician also recorded

that Laura's depressive scores were lower at the introduction of each new phase, again,

unlike Molly's observed score during the first session of the intervention phase. It

appears that the positive slope reported by the clinician during Laura's intervention phase

fails to support the first hypothesis. This change in slope might suggest that the app was

less beneficial in addressing her depressive symptoms or that this was a significant time

in Laura's life and her depressive symptoms waxed and waned during this portion of the

study according to the clinician.

That both participants benefitted from CBT therapy and CBT homework assigned

via different formats reflects the literature that CBT provided as in-person therapy and

mobile phone therapy are both effective at treating depression (Aguilera & Munoz, 2011;

Carroll et al., 2008; Watts et al., 2013). Laura's perceived depression was lower than

Molly's at intervention and post-intervention phase. Her lower depression scores

corresponded to the amount of time she invested in her homework assignments, which is

consistent with research examining the relationship between homework adherence and

treatment outcomes (Boschen & Casey, 2008; Clough & Casey, 2011b; Kazantis et al., 2000). Moreover, Luxton et al. (2011) discovered that apps allow for the participant to have constant contact with clinical information that increases their opportunities to practice skills learned in therapy. This seems to ring true for this study as Laura supplemented her understanding of her diagnosis through reading articles about depression on the CBT app. Her self-reported time investment was greatest during the intervention phase, which was likely reflected in her lower self-report depression scores. It seems her high degree of access to her smartphone may have led to greater engagement with her homework. The present finding that using an app as an adjunctive tool to therapy results in participant perceived lower depression is congruent with the work of Rizvi et al. (2011) and the DBT Coach app for individuals diagnosed with Borderline Personality Disorder and Substance Use Disorder.

Overall, it seems that the findings of this study are largely supported by the literature in that both participants benefitted from CBT and that the participant assigned to use the app in addition to therapy improved more than the participant completing paper homework assignments. As a result of conflicting evidence between the self-report and clinician ratings, the first hypothesis is partially supported. It is difficult to determine which recording holds greater weight that of the subjective perspective of the participant or the more objective rating of the clinician.

Hypothesis Two

The second hypothesis that Laura and the provider would like the app and find it to be useful was somewhat supported. Laura had the option to discontinue her use of the app after session 8 and she stated intentions to continue its use; however, she did not

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report actually using it. She shared with the provider that she liked that she knew it was available to her when she needed it. Hypothesis two was supported in that Laura enjoyed the app, found it easy to use and understand, and "helpful" in reinforcing her understanding and practice of CBT skills. Unfortunately, the provider's responses were mixed. While the clinician believed the app to be "somewhat helpful" in Laura's treatment, she was undecided about future clinical use of incorporating an app into mental health services. This uncertainty stemmed from the provider's lack of familiarity with knowing how to integrate features of an app into their theoretical orientation and tailored treatment planning. For instance, it was difficult to assess the client's ability and willingness to engage with the app on a continuous basis as well as balancing how instructive to be in terms of which specific features of the app to use, when to use them, and how to use them. The multi-faceted components of this study's app may have posed as a barrier in projecting how helpful other apps might be if incorporated into future clinical practice.

The present findings on client perception are representative of the literature reviewed. Previous research found that mobile phones increase access to information and allows the individual to track their symptom changes, which leads to longer and more frequent use of phones (Aguilera & Munoz, 2011; Proudfoot et al., 2010); this is reminiscent of Laura's statements about finding comfort in using the app as she needed it. In fact, Proudfoot et al. (2010) reported that 75% of participants want to use an app to monitor and manage their moods. Moreover, those with depression had a stronger desire than the general population to track their mental health with a mobile phone (Proudfoot et al., 2010; Torous et al., 2014).

Laura's opinion that the app was easy to use and understand and that it was helpful to her is consistent with previous research that participants are accepting and open to the use of mobile phones in addressing their healthcare needs (Ainsworth et al., 2013; Axelson et al., 2003; Proudfoot et al., 2010; Rizvi et al., 2011; White et al., 2014). Whittaker et al. (2012) found qualitative support from participants using CBT SMS stating that it successfully addressed symptoms of depression. Again, in the case of the DBT Coach app as an adjunct to therapy, participants deemed the app as usable and helpful (Rizvi et al., 2011). It is not a stretch then that the participant in this study also found that a facet of technology (i.e. the app) delivering CBT decreased her depressive symptoms.

Mobile phones have such an affect on its users that the term 'mobile mindset' was coined to describe the positive relationship users have with their phones (Lookout Inc., 2012). As a result of this relationship, 60% of phone users cannot go more than one hour without checking their phone. This same influential relationship may contribute to the increased compliance of homework assigned via an app (Matthews et al., 2008), as was the case with Laura in this study. Many of the advantages of mobile phones such as the ability to tailor the phone to an individual's needs (Carroll et al., 2008; Epstein & Beguette, 2013), interactive qualities (p. 16), and small size and ease of use (Boschen, 2009a; Boulos et al., 2011; Boschen & Casey, 2008; Clough & Casey, 2011a; Eonta et al., 2011; Epstein & Bequette, 2013) may have been some of the reasons Laura liked the CBT app and found it helpful in treating her depression. Attitudes, like Laura's, toward the integration of technology in mental health services have led to greater acceptability

and decreased stigma with individuals using their mobile phones for mental health reasons (Boschen 2009a; Morris et al., 2010).

The provider's generally positive attitude and uncertainty about incorporating an app in to future clinical work is congruent with the limited research examining clinician attitudes toward the integration of technology in mental health. The provider reportedly found the app to be somewhat enjoyable and useful for the client, but was undecided if they would use this app or others like it in future clinical practice. It seems this is consistent with the literature that clinicians were skeptical of incorporating technology into their work (Clough & Casey, 2011a; White et al., 2014); however, the trend is moving towards providers demonstrating increasingly favorable attitudes (White et al., 2014). For example, providers in behavioral health (Eonta et al., 2011) and medical science (Luxton et al., 2011) have been using mobile phones to provide healthcare services for years. According to White et al. (2014) providers were favorable to using technology specifically with depression due to the ability of technology to provide more accurate self-report data on depressive symptoms.

In summary, hypothesis two was mostly supported in this study and was representative of the current research on attitudes toward technology incorporated within mental health services. The available research is narrow in scope and therefore has limited findings specific to patient and provider attitudes toward the use of apps, particularly apps for depression and depression apps as an adjunctive tool to therapy. However, this study's findings on perceived ease of use and helpfulness aligned with the research on the topic of technology in general and its involvement in mental health services.

Hypothesis Three

The present study asserted that Laura would engage more with her homework through the use of the app than Molly would with her paper homework. This hypothesis was supported in terms of estimated time of engagement per the clients' report; however, clients' responses on the HRS was not as anticipated. Laura reported spending significantly more minutes on her homework than Molly; however, Molly's subscale scores on the HRS were typically higher than Laura's. Molly's greater scores indicate she believed in the assignments more, had greater outcome expectation as a result of completing the homework, and that she felt that she sufficiently put forth effort in completing her homework.

Laura's greater time investment in practicing her CBT skills is consistent with research on technology as an adjunct to therapy and its relation to homework compliance. Researchers support that technology as an adjunct to therapy likely increases homework compliance (Aguilera & Munoz, 2011; Axelson et al., 2013; Boschen, 2009a; Epstein & Beguette, 2013). When comparing different types of technology and their ability to increase homework compliance, Ainsworth et al. (2013) found that participants used and liked an app for tracking their mental health more than SMS. Similarly, Rizvi et al. (2011) revealed that participants using an app were highly compliant. Upon a comparison between completing mood monitoring with technology versus pen and paper, almost 89% of those in the technology group we compliant with homework compared to only 11% using pen and paper. Laura's greater outside engagement during the intervention phase, in terms of minutes, fits with the reviewed literature.

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Even though technology compliance markedly surpasses that of pen and paper, Molly's homework participation seems to fall within the 11% of individuals who follow through with paper assignments (Proudfoot et al., 2010). Molly completed all four of her thought logs and reported higher HRS scores than Laura. The difference in HRS scores could be due to individual differences and/or that the provider had greater experience with explaining the dysfunctional thought log and the rationale for its use as compared to having less familiarity with providing psychoeducation on the use of the app and its specific features.

The third hypothesis focused on outside engagement was partially supported. The time Molly spent on her homework paled in comparison to Laura's time investment. Yet, Molly was compliant for all four sessions of the intervention phase whereas Laura did not practice her skills on the last session of the intervention phase. Laura's rapid decline from 90 minutes to no practice during the final session of the intervention phase could suggest that her depression was stable enough that she felt the homework was unnecessary. Molly's HRS scores may have differed from Laura's due to clinician bias, as she had greater experience in assigning dysfunctional thought logs as homework.

Hypothesis Four

The last hypothesis posited that Laura would experience fewer overall barriers than Molly. The final hypothesis was supported. Laura reported 14 barriers while Molly endorsed 19. In addition, Laura reported fewer barriers than the patients whom the scale was normed on (17) (Callan et al., 2012)**.** Research focused on barriers to homework adherence when utilizing a CBT app as an adjunct to therapy for depression is rare. Some researchers suggest that the accessibility of technology might increase homework

compliance and therefore treatment outcomes (Clough & Casey, 2011a; Eonta et al., 2011). Within that assertion it may be implied that homework adherence is greater due to decreased barriers as a result of technology's accessibility.

Limitations

The limitations of this study include the restrictions of using a single-case design involving a small number of participants. With only two participants and no clear effect depicted by visual inspection, defined outcomes are difficult to see if clear distinctions even exist. Due to the few number of participants in the study and the numerous external factors, it is impossible to conclude if the results of this study are due to the actual interventions being examined. Additionally, the small sample size limits generalizability. The use of an app only designed for Android smartphones may have been a contributing factor in the small sample size. As a result of involving only one clinician, who is also the researcher, the clinical observations may have been biased or skewed and this again may have contributed to a smaller sample.

According to Kazdin (2011), an element of utilizing a single-case design includes seeing a stable trend develop within the baseline phase in order to draw more accurate conclusions about the impact of the intervention in the next phase. Unfortunately, a stable baseline was not established due to the improvements noted in both participants' baseline scores, which were likely therapeutic benefits of CBT, catharsis, and/or developing a therapeutic relationship with the provider. As a result of the study being time limited with equivalent number of sessions in each phase, not establishing a stable baseline impaired the ability to draw conclusions about the intervention. Due to the clients improving during the intervention phase (i.e. depressive scores decline) and the prediction that the

intervention will improve depressive symptoms, it makes it more difficult to evaluate the effect of the intervention versus the other factors mentioned.

A limitation in evaluating the third hypothesis of outside engagement was that it was difficult to directly compare the tasks assigned to each participant when those tasks were different (e.g. personal hygiene, bibliotherapy, exercise, grounding techniques). A more accurate comparison would have been to examine specific features of CBT such as the thought log versus the cognitive diary of the app. This focus then lessens the assumptions that can be made about the effectiveness of using an app in addition to therapy, as the greater essence of analyzing the various skills of CBT is lost.

Unfortunately, the Barriers scale did not extensively assess external barriers such as time and access, which may have told us more about the interventions as opposed to internal personal conflicts preventing the participants from completing homework. As it stands, there is not another Barriers scale specific to depression, CBT, and there is no scale that objectively assesses those facets in combination with smartphones. As a result of the limitations of the scale, the method of analysis and the lack of research on this specific area, it is hard to conclude that Laura had fewer barriers due to using an app.

Individual differences are bound to limit the findings of the study. Each participant has their own perception of therapy, their homework and their depression and therefore directly comparing the subjective self-reports is challenging. Additionally, the provider to both participants inherently has biases. Greater familiarity with assigning 'traditional' CBT homework may have contributed to Molly's higher HRS scores. Less experience with incorporating an app into therapy could have also influenced the provider's attitude toward the app, as this was a new experience for her.

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Although limitations exist, no other study has examined the use of an app as an adjunctive therapy in the treatment of depression. This study adds to what is known about provider and client attitudes toward the integration of an app into therapy, as well as the provider's perspective on the depressive symptoms of a participant engaging with an app. The present study strove for experimental rigor by including a comparison group and by highlighting the effectiveness of the interventions in a 'real world' setting despite only having two participants. Additionally, an initial examination of barriers to homework completion when comparing an app to pen and paper was provided.

Implications

Practice

The findings of the present study suggest that an app as an adjunct to therapy may be as effective as 'traditional' pen and paper methods of assigning homework within the CBT orientation. Even for clients endorsing moderately severe depression, depression scores declined over time regardless of homework format. Not only did the app potentially contribute to an improvement in depression symptoms, but it was generally accepted by the client and provider. The acceptance by the participant in this study in conjunction with fewer barriers to adhering to homework may have led to increased homework compliance and therefore successful treatment that resulted in post-intervention sessions of self-reports endorsing minimal to no depressive symptoms.

The integration of an app into the treatment of depression might mean a more efficient method of teaching clients CBT skills that they can carry with them whenever and wherever they might need to implement such skills. Constant access to the app with information about the skills being taught in therapy has the potential to serve as

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reminders to clients about their therapy or to be greatly reinforcing about their skill use. Due to these advantages, clients in frequent crisis or who are a great distance from a mental health provider or who experience recurrent depressive episodes, might notice a reduction in clinic visits as their depressive symptoms are being maintained through practicing CBT skills via the app.

Training

The present study has major implications for the training of mental health providers. Education on client and provider perceptions of an app as an adjunct to therapy as well as updated research on technology's impact on mental health services could increase those interested in incorporating technology into their practice. Those already utilizing technology might benefit from further education to better guide them in their integration of technology, so that it does not harm clients or interfere with the therapeutic benefits of in-person therapy, but is additive to treatment outcomes.

Psychologists-in-training might grow from learning how to provide psychoeducation on the rationale for introducing technology into the therapeutic relationship and process and how to continually integrate the technology in an effective manner with client work. The combined knowledge that behavioral sciences has researched and used technology in clinical practice for a number of years with the growing number of behavioral services offered by mental health providers due to the integrated healthcare movement creates an area of competency in the graduate training of future mental health providers not yet established.

Future Research

Research on the integration of technology into mental health services and its impact is a burgeoning area being studied and for this reason there a numerous directions future research could explore. Foremost, this study seems to serve as a pilot to be replicated on a grander scale. More participants would allow for statistical analysis with clearer defined rules about the data collected, which might result in more confident findings about whether or not an effect was found when comparing the use of a smartphone app to pen and paper homework. Objective results with a larger sample size would result in greater generalizability and stronger implications for research informed practice. The continued use of a comparison group would provide valuable information about the potential superiority of apps as the new method of assigning therapeutic homework. It is recommended that an app be chosen that is accessible to iPhone and Android users to increase participant numbers and diversity of participants. Additionally, an app that is less multi-faceted might be a better choice so that direct comparisons between it and paper homework can be drawn.

Seeming as how this is a newer area of exploration it would behoove the literature base if psychometrically sound instruments assessing client and provider attitudes about technology, barriers specific to technology, and homework completion via technology were developed to strengthen future research studies. The validity of this studied suffered from having to adapt various measures that lacked adequate psychometric properties due to having been developed out of necessity without experimental testing to determine validity and reliability of the instrument. More detailed and reliable findings can be made when better-suited measurements become available to the field.

Much like the veteran's administration has done with various apps for veterans, research should evaluate the effectiveness of specific depression apps in combination with therapy. Information gleaned from such studies could inform app development and which apps mental health providers feel safe and confident in when incorporating technology into their practice. What is more is if specific apps were found to be effective in decreasing depressive symptoms that thousands if not millions of individuals suffering with depression might find greater relief.

The use of phones to address mental health issues has improved self-awareness, self-management, and well-being (Aguilera & Munoz, 2011; Proudfoot et al., 2010) therefore, a longitudinal study following research participants who use apps versus paper homework might provide insight into continued improvement, decline, or maintenance of skills and progress. The capacity for apps to provide time-stamped data points would allow researchers to follow how frequently participants accessed the app over the course of 6 months, a year, or 5 years. The results of a longitudinal study might have implications for those individuals who suffer from recurrent depressive episodes.

Provider attitudes toward integrating mental health likely contribute to how successful the technology is in assisting the client's therapeutic gains. Very few studies have examined provider attitudes and beliefs about using technology, especially an app, as complementary to in-person therapy. A measure of knowledge and attitudes about utilizing technology as adjunctive tools to therapy before and after an educational seminar on the role of technology in mental health services could highlight the importance of provider education.

Conclusion

Even though limitations existed, this study advanced what is known about using a CBT-based app in addition to therapy when treating depression. Not only were client and provider depression ratings measured, but so were client and provider attitudes toward the app, level of outside engagement, and barriers to homework compliance. All four hypotheses were supported to some degree despite using the more subjective method of visual inspection. The lack of a causal relationship and limited control of external factors makes it impossible to determine the actual impact the studied interventions had on the outcome measures examined. The trials and triumphs of this research serve to improve research studies expanding this line of research.

APPENDICES

APPENDIX A

CLIENT DEMOGRAPHICS

Age:

Race/Ethnicity:
- ○ Native American
- ○ African American/Black
- ○ Asian American/Pacific Islander
- ○ Caucasian
- ○ Latino/Hispanic
- ○ Biracial
- ○ Multiracial
- ○ Other

Gender:
- ○ Male
- ○ Female
- ○ MF Transgender
- ○ FM Transgender
- ○ Other

How comfortable are you with technology?
- ○ None
- ○ Little
- ○ Some
- ○ A Lot

How many sessions have you met with your current provider?
- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5+

What do you believe are the advantages to using apps to treat depression? Please select all that apply.
- ❍ Easy to use
- ❍ Convenient
- ❍ Manage/track mental health condition
- ❍ Preventative care for those with limited access to healthcare services
- ❍ Practice skills learned in therapy
- ❍ Quick
- ❍ Cost efficient

What do you believe are the disadvantages to using apps to treat depression? Please select all that apply.
- ❍ Cost
- ❍ Inconvenient
- ❍ Difficult to use
- ❍ Time consuming

Have you sought counseling before?
- ❍ Yes
- ❍ No

Answer If Have you sought counseling before? Yes Is Selected

Was your previous experience(s) in counseling related to depression?
- ❍ Yes
- ❍ No

Answer If Was your previous experience(s) in counseling related to depression? Yes Is Selected

How long have you been treated for depression?

Have you ever used technology in addition to counseling services to treat your mental health?
- ❍ Yes
- ❍ No

Have you ever used technology on your own to address your mental health concerns?
- ❍ Yes
- ❍ No

What did you use?
○ Mental-health related app
○ General health related app
○ Looked up information on the Internet
○ Connected with supports online (i.e., social media, online support groups, etc.)

What is your current household income?
○ < 10,000
○ 10,000-19,999
○ 20,000-29,999
○ 30,000-39,999
○ 40,000-49,999
○ 50,000-59,999
○ 60,000-69,999
○ 70,000-79,999
○ > 80,000

What is your comfort level with using technology in addition to therapy?
○ None
○ Some
○ Quite a Bit
○ An Extreme Amount

PATIENT HEALTH QUESTIONNAIRE-9

PHQ-9

Over the last week, how often have you been bothered by any of the following problems?

Little interest or pleasure in doing things
○ Not at all
○ Several days
○ More than half the days
○ Nearly every day

Feeling down, depressed, or hopeless
○ Not al all
○ Several days
○ More than half the days
○ Nearly every day

Trouble falling or staying asleep, or sleeping too much
○ Not at all
○ Several days
○ More than half the days
○ Nearly every day

Feeling tired or having little energy
○ Not at all
○ Several days
○ More than half the days
○ Nearly every day

Poor appetite or overeating
○ Not at all
○ Several days
○ More than half the days
○ Nearly every day

Feeling bad about yourself--or that you are a failure or have let yourself or your family down
○ Not at all
○ Several days
○ More than half the days
○ Nearly every day

Trouble concentrating on things, such as reading the newspaper or watching television
○ Not at all
○ Several days
○ More than half the days
○ Nearly every day

Moving or speaking so slowly that other people could have noticed? Or the opposite-- being so fidgety or restless that you have been moving around a lot more than usual
○ Not at all
○ Several days
○ More than half the days
○ Nearly every day

Thoughts that you would be better off dead or of hurting yourself in some way
○ Not at all
○ Several days
○ More than half the days
○ Nearly every day

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?
○ Not difficult at all
○ Somewhat difficult
○ Very difficult
○ Extremely difficult

QUICK INVENTORY OF DEPRESSION SYMPTOMS-CLINCIAN

QIDS-C

Please select the response to each item that best describes your client for the last seven days.

Sleep Onset Insomnia:
○ Never takes longer than 30 minutes to fall asleep
○ Takes at least 30 minutes to fall asleep, less than half of the time
○ Takes at least 30 minutes to fall asleep, more than half of the time
○ Takes more than 60 minutes to fall asleep, more than half of the time

Mid-Nocturnal Insomnia:
○ Does not wake up at night
○ Restless, light sleep with few awakenings
○ Wakes up at least once a night, but goes back to sleep easily
○ Awakens more than once a night and stays awake for 20 minutes or more, more than half the time

Early Morning Insomnia:
○ Less than half the time, awakens no more than 30 minutes before necessary
○ More than half the time, awakens more than 30 minutes before need be
○ Awakens at least one hour before need be, more than half the time
○ Awakens at least two hours before need be, more than half the time

Hypersomnia:
○ Sleeps no longer than 7-8 hours/night, without naps
○ Sleeps no longer than 10 hours in a 24-hour period (include naps)
○ Sleep no longer than 12 hours in a 24-hour period (include naps)
○ Sleeps longer than 12 hours in a 24-hour period (include naps)

Mood (sad):
- ◯ Does not feel sad
- ◯ Feels sad less than half the time
- ◯ Feels sad more than half the time
- ◯ Feels intensely sad virtually all the time

Appetite (Decreased):
- ◯ No change from usual appetite
- ◯ Eats somewhat less often and/or lesser amounts than usual
- ◯ Eats much less than usual and only with personal effort
- ◯ Eats rarely within a 24-hour period, and only with extreme personal effort or with persuasion by others

Appetite (Increased):
- ◯ No change from usual appetite
- ◯ More frequently feels a need to eat than usual
- ◯ Regularly eats more often and/or greater amounts than usual
- ◯ Feels driven to overeat at and between meals

Weight (Decrease):
- ◯ Has experienced no weight change
- ◯ Feels as if some slight weight loss occurred
- ◯ Has lost 2 pounds or more
- ◯ Has lost 5 pounds or more

Weight (Increase):
- ◯ Has experienced no weight change
- ◯ Feels as if some slight weight gain has occurred
- ◯ Has gained 2 pounds or more
- ◯ Has gained 5 pounds or more

Concentration/Decision Making:
- ◯ No change in usual capacity to concentrate and decide
- ◯ Occasionally feels indecisive or notes that attention often wanders
- ◯ Most of the time struggles to focus attention or make decisions
- ◯ Cannot concentrate well enough to read or cannot make even minor decisions

Outlook (Self):
- ❍ Sees self as equally worthwhile and deserving as others
- ❍ Is more self-blaming than usual
- ❍ Largely believes that he/she causes problems for others
- ❍ Ruminates over major and minor defects in self

Suicidal Ideation:
- ❍ Does not think of suicide or death
- ❍ Feels life is empty or is not worth living
- ❍ Thinks of suicide/death several times a week for several minutes
- ❍ Thinks of suicide/death several times a day in depth, or has made specific plans, or attempted suicide

Involvement:
- ❍ No change from usual level of interest in other people and activities
- ❍ Notices a reduction in former interest/activities
- ❍ Finds only one or two former interests remain
- ❍ Has virtually no interest in formerly pursued activities

Energy/Fatigability:
- ❍ No change in usual level of energy
- ❍ Tires more easily than usual
- ❍ Makes significant personal effort to initiate or maintain usual daily activities
- ❍ Unable to carry out most of usual daily activities due to lack of energy

Psychomotor Slowing:
- ❍ Normal speed of thinking, gesturing, and speaking
- ❍ Client notes slowed thinking, and voice modulation is reduced
- ❍ Takes several seconds to respond to most questions; reports slowed thinking
- ❍ Is largely unresponsive to most questions without strong encouragement

Psychomotor Agitation:
- ❍ No increased speed or disorganization in thinking or gesturing
- ❍ Fidgets, wrings hand and shifts positions often
- ❍ Describes impulse to move about and displays motor restlessness
- ❍ Unable to stay seated. Paces about with or without permission

APPENDIX D

BARRIERS TO CBT HOMEWORK COMPLETION SCALE-DEPRESSION VERSION

Instructions: Everyone misses all or part of a homework assignment at some point during CBT treatment. This questionnaire lists some of the problems that might get in the way of completing CBT Homework assignments. Please examine each potential problem. Check the circle that most accurately describes the degree to which each problem may have interfered with the completion of homework assignments since you began CBT therapy. The following are problems that may be particular to you, how you were feeling, your attitudes, or expectations about CBT therapy.

	Not at All	Somewhat	Moderately	Very Much	Completely
I didn't expect therapy to include homework assignments.	❍	❍	❍	❍	❍
My personal characteristics or style got in the way.	❍	❍	❍	❍	❍
Homework just reminded me that I was depressed.	❍	❍	❍	❍	❍
I wanted to avoid painful feelings.	❍	❍	❍	❍	❍
Doing homework didn't seem to help.	❍	❍	❍	❍	❍

I was afraid of failing.	○	○	○	○	○
I didn't feel very good about myself.	○	○	○	○	○
Homework felt like a burden.	○	○	○	○	○
I didn't want to do the homework.	○	○	○	○	○
I felt helpless.	○	○	○	○	○
I wasn't in a regular pattern of doing homework.	○	○	○	○	○
I was overwhelmed.	○	○	○	○	○
I was frustrated.	○	○	○	○	○
I wasn't very motivated.	○	○	○	○	○
I couldn't seem to take action.	○	○	○	○	○
This depression's been going on so long.	○	○	○	○	○
I felt hopeless.	○	○	○	○	○
I had poor concentration.	○	○	○	○	○
I forgot.	○	○	○	○	○
I was never able to do too many things well in my life.	○	○	○	○	○
I wasn't organized.	○	○	○	○	○

When I was mad or annoyed I just didn't do what I was asked.	○	○	○	○	○
I couldn't decide what was the most important thing to do first.	○	○	○	○	○
I thought about the homework so much, I couldn't get it done.	○	○	○	○	○
I had another clinical problem other than depression that interfered.	○	○	○	○	○
I was so depressed.	○	○	○	○	○
I didn't have much energy.	○	○	○	○	○
When I first started therapy if I didn't succeed with homework my confidence went down.	○	○	○	○	○
Too much was going on in my life.	○	○	○	○	○
I didn't understand the emotions-behavior connection.	○	○	○	○	○
I was afraid to disappoint my therapy.	○	○	○	○	○

When I didn't do well with homework, it didn't give me confidence to do it the next time.	○	○	○	○	○
I didn't have the means to do the assignment.	○	○	○	○	○
I just had too many other responsibilities.	○	○	○	○	○
I didn't believe in the CBT approach.	○	○	○	○	○
I didn't want to do a therapy that took so much effort.	○	○	○	○	○
The word "homework" just has such a negative meaning to me.	○	○	○	○	○
I had to do everything perfectly all of the time.	○	○	○	○	○
I didn't want to do homework by myself.	○	○	○	○	○
I waited until the last minute and then don't get it done.	○	○	○	○	○
I didn't have enough time in my schedule to do homework.	○	○	○	○	○
I didn't have much support.	○	○	○	○	○

I didn't want to change.	○	○	○	○	○
Certain homework assignments brought up painful emotions.	○	○	○	○	○
Any assignment involving writing seemed hard.	○	○	○	○	○
The homework seemed so mechanical.	○	○	○	○	○
I had a hard time completing dysfunctional thought records.	○	○	○	○	○
When I didn't design it myself it was harder to do.	○	○	○	○	○
I didn't really think homework was very important.	○	○	○	○	○
Assignment was confusing.	○	○	○	○	○
I didn't trust my therapist.	○	○	○	○	○
My therapist and I didn't have a good connection.	○	○	○	○	○
The therapy moved too quickly.	○	○	○	○	○

CBT therapy didn't feel very flexible.	○	○	○	○	○
The therapist assigned homework I couldn't do.	○	○	○	○	○
The therapist didn't stress the importance of homework.	○	○	○	○	○
Homework was new to deal with in therapy.	○	○	○	○	○
My therapist wasn't very flexible.	○	○	○	○	○
My therapist didn't always check my homework.	○	○	○	○	○
My therapist didn't explain the homework completely.	○	○	○	○	○
My therapist seems new at this.	○	○	○	○	○
My therapist didn't really explain how CBT works very well.	○	○	○	○	○
My therapist gave me assignments that took too much time to do.	○	○	○	○	○

My therapist gave me homework that wasn't really planned around my specific needs.	○	○	○	○	○
My therapist gave me homework that was too complicated.	○	○	○	○	○

HOMEWORK RATING SCALE (HRS)

Please read each question carefully, and pick out the one response that best describes your experience. Fill in the circle beside the response you have picked. If several statements apply equally well, fill in the circle with the lesser statement for that group. Be sure that you do not choose more than one response for any question.

How much of the assignment were you able to do?
○ None
○ A little
○ Some
○ A lot
○ All

How well did you do the assignment?
○ Not al all
○ Somewhat
○ Moderately
○ Very
○ Extremely

How difficult was the assignment?
○ Not al all
○ Somewhat
○ Moderately
○ Very
○ Extremely

How much did obstacles interfere with assignment?
○ Not at all
○ Somewhat
○ Moderately
○ Very
○ Completely

How well did you understand what to do?
○ Not at all
○ Somewhat
○ Moderately
○ Very
○ Completely

How well did you understand the reason for doing the assignment?
○ Not at all
○ Somewhat
○ Moderately
○ Very
○ Completely

How much involvement did you have in planning the assignment?
○ None
○ A little
○ Some
○ A lot
○ Extensive

How specific were the guidelines on how to do the assignment?
○ Not at all
○ Somewhat
○ Moderately
○ Very
○ Extremely

How well did the assignment match your therapy goals?
○ Not at all
○ Somewhat
○ Moderately
○ Very
○ Extremely

How much did you enjoy the assignment?
- ◯ Not at all
- ◯ Somewhat
- ◯ Moderately
- ◯ Very
- ◯ Extremely

How much did the assignment help you to gain control over your problems?
- ◯ Not at all
- ◯ Somewhat
- ◯ Moderately
- ◯ Very
- ◯ Extremely

Did the assignment help with your progress in therapy?
- ◯ Not at all
- ◯ Somewhat
- ◯ Moderately
- ◯ Very
- ◯ Extremely

How many minutes did you spend on the assignment since your last session?
_____minutes

Please list the assignment activities that you completed since your last session?

_____   _____
_____   _____
_____   _____
_____   _____

APPENDIX F

REVISED USABILITY AND ACCEPTABILITY SURVEY-CLIENTS

How much did you enjoy the Depression CBT app?
- ○ Not enjoyable
- ○ Somewhat not enjoyable
- ○ Neutral
- ○ Somewhat enjoyable
- ○ Very enjoyable

How helpful do you believe this app was to you in your treatment?
- ○ Not Helpful
- ○ Somewhat Not Helpful
- ○ Neutral
- ○ Somewhat Helpful
- ○ Very Helpful

How relevant was the app to your current treatment?
- ○ Not relevant
- ○ Somewhat not relevant
- ○ Undecided
- ○ Somewhat relevant
- ○ Very relevant

If this app and others like it were available for use by you in your treatment, would you make use of it on your own initiative?
- ○ Yes
- ○ No

How likely is it that you would use this app in your treatment?
- ○ Very Unlikely
- ○ Unlikely
- ○ Undecided
- ○ Likely
- ○ Very Likely

How well did the app hold your interest?
○ Didn't hold my interest
○ Somewhat didn't hold my interest
○ Neutral
○ Somewhat held my interest
○ Completely held my interest

How easy was the material to understand?
○ Very Difficult
○ Somewhat Difficult
○ Neutral
○ Somewhat Easy
○ Very Easy

To what extent was the app easy to use?
○ Very Difficult
○ Somewhat Difficult
○ Neutral
○ Somewhat Easy
○ Very Easy

How easy was it to navigate the app?
○ Very Difficult
○ Somewhat Difficult
○ Neutral
○ Somewhat easy
○ Very Easy

Were the navigation menus clear and easy to understand?
○ Very Difficult
○ Somewhat difficult
○ Neutral
○ Somewhat easy
○ Very Easy

How informative was the feedback you received in the app?
- ❍ Not at all informative
- ❍ Somewhat not informative
- ❍ Neutral
- ❍ Somewhat informative
- ❍ Very Informative

Please rate the app overall with respect to how helpful it would be in assisting your learning and practice of CBT skills?
- ❍ Not helpful
- ❍ Somewhat helpful
- ❍ Helpful
- ❍ Very Helpful
- ❍ Extremely Helpful

APPENDIX G

REVISED USABILITY AND ACCEPTABILITY SURVEY-PROVIDER

How much do you think your client enjoyed the Depression CBT app?
- ○ None
- ○ A little
- ○ Some
- ○ A lot

How helpful do you believe this app was in your client's treatment?
- ○ Not Helpful
- ○ Somewhat Not Helpful
- ○ Neutral
- ○ Somewhat Helpful
- ○ Very Helpful

If this app and others like it were available for use by you in **your** treatment, would you make use of it on your own initiative?
- ○ Yes
- ○ No

How likely is it that you would use this app or another app in your clinical practice with clients?
- ○ Very Unlikely
- ○ Unlikely
- ○ Undecided
- ○ Likely
- ○ Very Likely

Please rate the app overall with respect to how helpful it would be in assisting your clients' learning and practice of CBT skills?
- ○ Not helpful
- ○ Somewhat helpful
- ○ Helpful
- ○ Very Helpful
- ○ Extremely Helpful

Session #:_____   Date:_____   Participant #:_____

INFORMED CONSENT

The Impact of Outside Homework Adherence on Depressive Symptoms

Principal Investigator: Caitlin Massop, M.A.
  Department of Counseling
  Psychology & Community Services
  University of North Dakota
  (507) 380-8755
  Email: Caitlin.massop@my.und.edu

Description: The purpose of this study is to examine the impact of outside homework engagement on the treatment of depression. There are no right or wrong answers, please select the responses that apply to your situation. In order to receive the most accurate results please answer every question; however, if you are uncomfortable with answering a question you have the right to choose not to answer. Your participation as a client in the study will last for 12 sessions with each completion of assessments taking approximately five to ten minutes to complete. Assigned homework will depend on your level of engagement and investment and may take 5-30 minutes a day. Depending on the treatment condition you are assigned to, you may also receive approximately 15-30 minutes of training during a scheduled counseling session. At the conclusion of the study, all participants will be debriefed of the study's purpose and preliminary findings.

Voluntary Participation: Your participation is voluntary. You may choose not to participate or you may discontinue your participation at any time without penalty or loss of benefits to which you are otherwise entitled. Your decision whether or not to participate will not affect your current or future relations with the University of North Dakota or with Caitlin Massop.

Eligibility to Participate: This study is limited to adult (18 years or older) clients with the presenting problem of at least mild depressive symptoms who own an Android smartphone.

  _____ _____
    Initials   Date

Session #:_____   Date:_____   Participant #:_____

Confidentiality: The information you provide will be kept completely confidential. Your name is not required on materials to participate and all information will be protected using passwords, locked file cabinets, and antivirus, spyware and firewall computer software. After the informed consent and demographic information are completed, the data will be placed in a locked file cabinet in this author's personal office. The remainder of the completed assessments will be kept in a locked cabinent in the counseling psychology department separate from the file cabinet containing the informed consent and demographic information. Only myself, Caitlin Massop, my research advisor, Dr. Rachel L. Navarro, and those who audit IRB procedures will have access to the research data. All information will be protected for a minimum of seven years at which point the data and informed consents will be destroyed through confidential shredding within the Counseling Psychology department. Any password protected electronic data will be permanently deleted.

Benefits: Participants in both treatment conditions might benefit from receiving treatment by experiencing a decrease in their depressive symptoms. Participating clients would be contributing to psychological research and practice by improving treatment offered to those suffering with depression.

Risks: There are no anticipated physical or financial risks associated with this study. There is a risk associated with keeping all outside therapeutic engagement confidential; however, steps to help secure privacy will be taken and explained to you upon your assignment to a treatment condition.

Participants may encounter frustration with new experiences. If participants experience this, assistance will be provided in session. Additionally, participants will be informed that negative emotions might be experienced as the therapeutic relationship can fluctuate and feelings towards clients and providers can vary throughout the duration of the study. Topics discussed in therapy can also be difficult and can bring up negative experiences. Participants will be encouraged to share these negative emotions with me, their provider. Upon each client's intake they will be given a list of emergency numbers should they need immediate assistance. A symptom of depression can be experiencing thoughts of death or harming oneself. If these occur during the process of therapy, as can happen, my judgement, as their provider, about their safety will dictate if the client is suitable to remain in the study. Participant's PHQ-9 assessments, will be visually scanned following their completion at the beginning of each counseling session. If clients endorse suicidal ideation on question nine of the PHQ-9, a suicide assessment will be immediately conducted. The suicide assessment will be immediately and separately documented for the purposes of the research study. Clients requiring hospitalization, as the result of a suicide assessment, will no longer be eligible to continue participation in the study. Clients are encouraged to share worsening depressive symptoms or thoughts of suicide or self-harm with me, their provider, or to contact 1-800-273-TALK (8255).

_____   _____
Initials   Date

100

Session #:_____   Date:_____   Participant #:_____

Contacts and Questions: The researcher conducting this study is **Caitlin Massop,** M.A. If you have questions, concerns, or complaints about the research please contact Ms. Massop using the contact information at the top of this form. You can also contact Ms. Massop's advisor, Dr. Rachel L. Navarro via telephone at 701-777-2635 or via email at rachel.navarro@email.und.edu. If you have questions regarding your rights as a research subject or if you have any concerns or complaints about the research, you may contact the University of North Dakota Institutional Review Board at 701-777-4279. Please call this number if you cannot reach research staff, or you wish to talk with someone else.

By completing this survey, you are indicating that this research study has been explained to you, that your questions have been answered, and that you agree to take part in this study.

_____ I agree to participate
_____ I do not agree to participate

_____   _____
Participant signature   Date

_____   _____
Witness signature   Date

APPENDIX I

FIDELITY CHECK

<u>Pre-intervention: (Session 1-4) Rapport Building</u>

_____ Meet with client to conduct therapy:

       <u>Inclusion Criteria:</u>

       _____ 18 years or older

       _____ Score of 5 or greater on PHQ-9 intake

       _____ Own a personal Android phone

       <u>Exclusion Criteria:</u>

       _____ Score on #9 on PHQ-9 intake greater than one

       _____ Diagnosed with a psychotic disorder

       _____ Actively engaging in self-harm or using substances

_____ Complete research informed consent and demographic form

_____ Have client complete survey weekly (PHQ-9)

       _____ If the client scores greater than 1 on question #9, conduct an immediate suicide assessment and determine if client is still eligible for the study

       _____ Consult with clinical supervisors

_____ I need to complete survey weekly (QIDS-C)

_____ At the end of session 3, for those assigned to the app condition ask them to bring their Android phone to session the next week

_____ At the end of session 4, introduce homework assignment

       _____ If client is randomly assigned to app condition provide 15-30 minutes of training

Intervention: (Session 5-8)

Session 5-7:

_____ Have clients complete the PHQ-9 and HRS

      _____ If the client scores greater than 1 on question #9 of the PHQ-9, conduct an immediate suicide assessment and determine if client is still eligible for the study

      _____ Consult with clinical supervisors

_____ Ask if clients completed their homework.

      _____ If they said no, ask why

      _____ If app participants said they are having technical issues, address these and troubleshoot with the client or demonstrate how to navigate the app and its features

_____ I must complete the QIDS-C

Session Eight:

_____ Have clients complete the PHQ-9 and HRS

      _____ If the client scores greater than 1 on question #9 of the PHQ-9, conduct an immediate suicide assessment and determine if client is still eligible for the study

      _____ Consult with clinical supervisors

_____ Ask if clients completed their homework.

      _____ If they said no, ask why

      _____ If app participants said they are having technical issues, address these and troubleshoot with the client or demonstrate how to navigate the app and its features.

_____ I must complete the QIDS-C

_____ At the end, notify clients that they have the option to discontinue their homework assignments

Follow up: (Session 9-12)

Session Nine:

_____ Have clients complete the PHQ-9 and HRS

> _____ If the client scores greater than 1 on question #9 of the PHQ-9, conduct an immediate suicide assessment and determine if client is still eligible for the study

> _____ Consult with clinical supervisors

_____ Ask if clients completed homework

> _____ If app participants said they are having technical issues, address these and troubleshoot with the client or demonstrate how to navigate the app and its features

> _____ Record response

> _____ Ask if they have any intention of doing homework for future sessions

> _____ If clients have no intention to continue using the app, have clients and myself complete the Revised Usability and Acceptability questionnaire

_____ I must complete the QIDS-C

Session 10-11:

_____ Have clients complete the PHQ-9 and HRS

> _____ If the client scores greater than 1 on question #9 of the PHQ-9, conduct an immediate suicide assessment and determine if client is still eligible for the study

> _____ Consult with clinical supervisors

_____ Ask if clients completed homework

> _____ If app participants said they are having technical issues, address these and troubleshoot with the client or demonstrate how to navigate the app and its features

_____ Record response

_____ Ask if they have any intention of doing homework for future sessions

_____ If clients have no intention to continue using the app, have clients and myself complete the Revised Usability and Acceptability questionnaire

_____ I must complete the QIDS-C

<u>Session 12:</u>

_____ Have clients complete the PHQ-9 and HRS

_____ If the client scores greater than 1 on question #9 of the PHQ-9, conduct an immediate suicide assessment

_____ Consult with clinical supervisors

_____ Ask if clients completed homework

_____ Record response

_____ If clients have used the app until this point, have clients and myself complete the Revised Usability and Acceptability questionnaire

_____ I must complete the QIDS-C

_____ Ask clients if they knew the purpose of the study and record the response

_____ Clients must complete the Barriers to CBT Homework Completion Scale-Depression Version

_____ Debrief clients on the true purpose of the study

_____ Thank them for their participation in the research study

APPENDIX J

APP TRAINING CHECKLIST

☐   Access online website (square button: half blue/half gray)
☐   Logging out of app (3 vertical dots button)
☐   Show functions button (the butterfly icon)
☐   Show 'Home' button
☐   Show 'Audios', 'Articles', 'Test' buttons (test is the same one filled out weekly-can graph it for yourself to track your progress if you want), (**Please try:** 'Cognitive Diary', 'Suggestions', and 'Audios) (points and graphing available)
☐   Demonstrate 'Info' button
☐   Demonstrate 'Settings' button-daily reminder option, password protection, save or do not save information, don't send data, text size, etc.
☐   'Customize' button-history, emotions list, irrational beliefs list, challenge list, (**Please try:** emotions, irrational beliefs list and challenge list)
- When customizing colors or design if there are grey circles in the bottom center of the screen, that means scroll your finger to the left or right to see new options
☐   'Back' button (< button)

* Please attempt to use the app at least once a day.

APPENDIX K

CBT DYSFUNCTIONAL THOUGHT RECORD

Daily Record of Dysfunctional Thoughts

Situation	Emotion(s)	Automatic Thought(s)	Rational Response	Outcome
Describe what led to you experiencing an unpleasant emotion, whether it was: • An actual event • A stream of throughts, a daydream, a memory, or an image	1) Record whether you were feeling scared, angry, sad, etc 2) Rate how strong the feeling was (0-100%)	1) Record the automatic thought(s) that went through your mind just before the unpleasant emotion 2) Rate how strongly you believe in the automatic thought (0-100%)	1) Write a rational response to the automatic thought(s) 2) Rate how strongly you believe in the rational response (0-100%)	1) Re-rate how strongly you now believe in the automatic thought(s) (0-100%) 2) Record your emotions linked to the automatic thought(s) (0-100%)

FEELING BLUE?

Researchers at the University of North Dakota are seeking adults struggling with depression who meet the following criteria:

- 18 years and older
- Own an Android smartphone
- Never diagnosed with a psychotic disorder

Information about this research:

- Goal: Decrease your depression symptoms
- Meet one time a week for 40-60 minutes at VCHC
- Meet for 12 weeks
- **Free** services

Please contact Caitlin Massop, M.A. at
caitlin.massop@my.und.edu
for more information

Feeling Blue Study
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