The Effects of Meditation on Working Memory and Depression in an Older Adult: A Case Study

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The Effects of Meditation on Working Memory and Depression in an Older Adult: A Case Study

Abstract
It is well-known that both short-term memory and levels of depression are a frequent problem in older adults. The current literature purports that mindfulness meditation can have salutary effects on both of these concerns. In particular, Mindfulness-Based Cognitive Therapy (MBCT) has demonstrated to be effective in treating depression; however, no data currently exists regarding the role of MBCT on both these variables in any population, let alone in older adults. Therefore, the purpose of this pilot case study was to explore the influence of MBCT on working memory and depression. The specific hypotheses tested were that a truncated, 4-week long MBCT course would yield significant increases in levels of mindfulness, significant increases in working memory (both verbal and visuospatial), and significant decreases in depression. The results confirmed the third hypothesis revealing clinically significant decreases and reliable change in depression scores as measured on the Geriatric Depression Scale – Short Form. Additionally, results from one of two tests measuring verbal working memory yielded a clinically significant and reliable change. Qualitative data were also recorded. Implications from these results, especially for the managed care field, are discussed.

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THE EFFECTS OF MEDITATION ON WORKING MEMORY AND DEPRESSION IN AN OLDER ADULT: A CASE STUDY

A DISSERTATION
SUBMITTED TO THE FACULTY
OF
SCHOOL OF PROFESSIONAL PSYCHOLOGY
PACIFIC UNIVERSITY
HILLSBORO, OREGON

BY
ALEX R. Z. BLOOM

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PSYCHOLOGY

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Abstract

It is well-known that both short-term memory and levels of depression are a frequent problem in older adults. The current literature purports that mindfulness meditation can have salutary effects on both of these concerns. In particular, Mindfulness-Based Cognitive Therapy (MBCT) has demonstrated to be effective in treating depression; however, no data currently exists regarding the role of MBCT on both these variables in any population, let alone in older adults. Therefore, the purpose of this pilot case study was to explore the influence of MBCT on working memory and depression. The specific hypotheses tested were that a truncated, 4-week long MBCT course would yield significant increases in levels of mindfulness, significant increases in working memory (both verbal and visuospatial), and significant decreases in depression. The results confirmed the third hypothesis revealing clinically significant decreases and reliable change in depression scores as measured on the Geriatric Depression Scale – Short Form. Additionally, results from one of two tests measuring verbal working memory yielded a clinically significant and reliable change. Qualitative data were also recorded. Implications from these results, especially for the managed care field, are discussed.
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Introduction

Memory Problems in Older Adults

Memory concerns are among the most frequently reported problems by aging adults with the number of subjective complaints increasing for each older adult age group (McDonald-Miszczak, Hertzog, & Hultsch, 1995; Ponds, van Boxtel, & Jolles, 2000; Smith, Petersen, Ivnik, Malec, & Tangalos, 1996). In fact, some studies suggest as much as 56% of older adults in the community report memory complaints (Blazer, Hays, Fillenbaum, & Gold, 1997). Commonly, people over the age of 70 years complain of word finding troubles (Burke, MacKay, Worthley, & Wade, 1991; Critchley, 1984). In normal social interactions, being unable to recall a familiar name quickly or drawing a blank on a word or thought in the middle of a conversation can be quite embarrassing.

Memory problems, of course, fall within a spectrum of severity. When memory concerns reach clinically significant impairment, a range of diagnoses are considered. On the less severe end, mild cognitive impairment (MCI) is the first disorder within this span. Unfortunately, researchers have been unable to agree on a standard definition of MCI (Fisk & Rockwood, 2005). The classical definition implies that the condition yields a slow yet steady decline in cognitive functioning and will inevitably end in dementia for those who live long enough (Peterson et al, 2001; Ritchie, Artero, & Touchon, 2001). However, another definition, which other studies have clearly demonstrated, affirms that those with MCI can remain stable or can even recover (e.g., Fisk, Merry, & Rockwood, 2003; Ganguli, Dodge, Shen, & DeKosky, 2004; Palmer, Wang, Bacman, Winblad, & Fratiglioni, 2002).
On the other end of this memory impairment spectrum is the most commonly known form of significant memory impairment in older adults known as Alzheimer’s Disease (AD). AD is a brain disease that causes an inevitable death in its victims (National Institute on Aging, 2007) and is composed of seven stages, with each one leading to progressively diminished cognitive and functional impairment as well as a continual deterioration of brain matter (Desikan et al., 2009). AD is usually diagnosed in individuals over the age of 65 years (Brookmeyer, Gray, & Kawas, 1998) and their average life expectancy following diagnosis is only 4.5 years (Xie, Brayne, & Matthews, 2008). An early-onset specifier has also been identified for individuals who are diagnosed before the age of 65, with some being diagnosed as early as 30 (National Institute on Aging, 2007). At this point, there are no cures or interventions for reversing the disease. Worldwide, 26.6 million people suffer from AD and estimates have been predicted to grow to more than 106 million, or 1 in 85, by the year 2050 (Brookmeyer, Johnson, Ziegler-Graham, & Arrighi, 2007).

Even though a host of ailments can describe various types of memory impairment in older adults, it is important to recognize that not all aspects of memory erode with normal aging. Even within the common weakening of overall verbal abilities, studies have shown conflicting results. An illustration of this point is seen through word finding ability. Research has demonstrated that this ability (as measured by confrontation naming) declines less dramatically with advancing age than does verbal fluency (Huff, 1990). Furthermore, most verbal abilities appear to remain quite strong as people age (Bayles, Tomoeda, & Boone, 1985; Obler & Albert, 1985; Schum & Sivan, 1997). Additionally, language comprehension typically remains well preserved as individuals age (Wingfield & Grossman, 2006). Thus, vocabulary and verbal reasoning scores remain relatively
constant throughout the life span of normal, healthy individuals and may actually even increase to some extent.

In order to interpret and conceptualize this complex array of memory performance in aging, psychologists have formulated several theories to explain memory decline. One of these explanations is known as the processing speed hypothesis (Salthouse, 1996). Processing speed refers to the rate in which information is sorted; in short, how fast people think. Studies have linked processing speed to both memory for prose (e.g., Hultsch, Hertzog, & Dixon, 1990) as well as incidental memory (e.g., Luszcz, Bryan, & Kent, 1997).

Another theory proposed to help explain memory decline and aging is known as the executive function hypothesis (Dempster, 1992). Executive function refers to meta cognitive activity which controls other cognitive processes, including memory, planning and problem solving, and adjusting future behavior based on feedback (Rabbitt, 1997; Baddeley, 1996). Executive functioning is housed in the frontal lobe, particularly in the prefrontal cortex (PFC). Brain scans have routinely shown that parts of the brain shrink with age, especially the PFC (Greenwood, 2000; West, 1996). This loss in brain matter has routinely affected individuals’ scores on various memory-related tasks, particularly for short-term, or working memory (e.g., Parkin & Walter, 1991). On the basis of reduced working memory scores identified from the executive function hypothesis, researchers formulated a related yet unique theory; namely, that working memory significantly decreases with age (Park et al., 1996).

**Working memory.** Even though some memory deficits have been recorded for older adults, it is important to distinguish between various types of memory. The most common distinction is between short-term and long-term memory (e.g., Atkinson &
Various models of short-term memory have been proposed (e.g., Shiffrin, 1968). The most commonly accepted model – known as working memory – was first put forward by Baddeley and Hitch (1974). A primary distinction between working memory and short-term memory is that working memory involves active manipulation of information while the same or other information is concurrently being stored (Baddeley, 1996; Salthouse, 1990).

According to the working memory model, working memory can be broken down into five separate components: the visuospatial sketchpad, the episodic buffer, the phonological loop, long term memory and the central executive (Baddeley, 2000; see Figure 1).

![Figure 1. Baddeley’s model of working memory (n.d.)](image)

Information related to sounds is stored in the phonological loop for a limited amount of time while visual and spatial information is temporarily stored in the visuospatial sketchpad. Next, information from the phonological loop, the visuospatial
sketchpad, and long-term memory is temporarily gathered and combined in the episodic buffer, which is thought to be a holding place for the newly-pooled data. This episodic buffer was not included in the original 1974 model but was added by Baddeley in the year 2000. Information in the episodic buffer is then integrated into the central executive, where the individual’s decision on how to proceed is made. The central executive can be seen as a supervisory system and controls the flow of information to and from the phonological loop and the visuospatial sketchpad. It also plays a major role in paying attention, planning strategies, and coordinating behavior (Baddeley, 2001).

Regarding age-related decline in working memory, a number of studies have demonstrated this phenomenon for both verbal and spatial stimuli. For example, Parkin and Walter (1991) showed an age-related impairment on the Brown-Peterson Task (Brown, 1958; Peterson & Peterson, 1959), a measure of short-term or working memory which involves both a task to remember small bits of data over brief intervals and a distracter task to prevent rehearsal. Researchers also found that working memory decline correlated with impairments on word fluency tests and tasks usually performed poorly by individuals with frontal lobe damage (e.g., the Wisconsin Card Sorting Test; Milner, 1963). It should also be noted that the attrition of working memory in aging may itself account for a significant degree of the variance in longer term memory, as measured by tests measuring object or spatial memory (Frieske & Park, 1992).

The vulnerability of working memory to aging can also be seen when it is involved in a task demanding mental manipulation of the material, for example reversing a string of digits (Craik, 1991; Ryan, Lopez, & Paolo, 1996), mentally categorizing information, and remembering data while engaging in another activity (Baddeley, 1996; Brebion, Smith, & Ehrlich, 1997; Hultsch, Hertzog, Small, McDonald-Miczczak, & Dizon, 1992). One such
test is the Letter-Number Sequencing subtest of the Wechsler Memory Scale (WMS; Wechsler, 2009), which measures the ability to reorganize sets of letters and numbers, is sensitive to age.

**Known interventions for memory.** Throughout history people have strived to improve their memory. One of the most common mnemonic devices is known as the Method of Loci, or Roman Room technique. This process dates back to Ancient Greece and Rome and involves associating information with objects in a familiar room or on a familiar route. During recall, individuals visually evoke the items as they mentally walk the pathway again. Research has demonstrated that this approach can be particularly useful to learn a list of items in a specific order (Bellezza, 1996; Herrmann, Raybeck, & Gruneberg, 2002; Neath, 1998).

Another common mnemonic is known as chunking (Bower & Springston, 1970; Miller, 1956). Chunking, or sequential skill learning, is a relatively new technique and involves employing an organizational strategy of grouping information (e.g., letters or numbers) into meaningful familiar units, rather than in arbitrary groups. Research has validated its usefulness in increasing memory performance for both motor learning (e.g., Terrace, 2001) and for long-term memory (e.g., Gobet, de Voogt, & Retschitzki, 2004).

In studies with older adults, researchers have found that a variety of activities can slow down the speed of memory decline, reduce memory loss, and even prevent diagnosable conditions. Research has shown, for example, that memory loss can be slowed or even be reversed via a healthy lifestyle (e.g., good nutrition, visiting friends, playing a musical instrument, looking at photo albums, playing Sudoku; Petersen, 2000). Moreover, a recent study conducted through the Mayo Clinic found that craft activities (e.g., knitting, quilting), playing games, reading books, and even computer activities were
all associated with decreased odds of having MCI (Geda et al., 2011). The same study also found that moderate physical exercise and computer use were separately associated with a lowered risk of MCI; when combined they had a synergistic effect.

Research with older adults without diagnosable impairments, however, has shown that their memories still decline with age even though they are just as likely to use organized memory techniques as young adults (Dunlosky & Hertzog, 1998; Light, 2000). Therefore, utilizing other strategies to improve memory would be a fruitful endeavor.

**Meditation and Memory**

*Various forms of meditation.* Although the literature on meditation and memory is relatively limited, there is a growing body of evidence that various forms of meditation have been associated with increased memory function. For example, *Kirtan Kriya*, a form of meditation that originates from Kundalini Yoga and involves breath regulation as well as repetitive movements and chanting, has been shown to aid those with memory complaints (Newberg & Waldman, 2010). The researchers discovered statistically significant improvements in memory among subjects who participated in this meditation. Follow-up brain scans of cerebral blood flow (single photon emission computed tomography [SPECT]) revealed dramatic increases in blood flow to the posterior cingulate gyrus, the region of the brain associated with learning and memory.

Other forms of meditation have also increased memory performance. A form of Buddhist meditation known as Deity Yoga was shown to significantly enhance visuospatial processing (Kozhevnikov, Louchakova, Josipovic & Motes, 2009). Other meditation varieties (i.e., hatha yoga, kriya yoga, pranayama breathing, zazen meditation) as well as prayer have all evinced significant improvements of working memory, as
measured by a reduction in spontaneous thoughts (Fabbro, Muzur, Bellen, Calacione, & Bava, 1999).

The science behind adult brain changes in cortical structure due to experience is relatively new. Knowledge regarding this phenomenon, known as cortical plasticity, has burgeoned in recent years because the technology to measure cortical density has improved. Sensory, motor, and sub-cortical regions are continually influenced by experience throughout life (Buonomano & Merzenich, 1998; Donoghue, 1995; Gilbert, 1993; Wang, Merzenich, Sameshima, & Jenkins, 1995). Regarding meditation, researchers have not only been able to measure its psychological effects but also its impact on brain physiology. Meditation practice has been successfully linked to increased cortical thickness or density of gray matter. For example, Lazar, Kerr, Wasserman, Gray, and Greve (2005) found multiple areas of increased cortical thickness in meditators, including regions related to somatosensory, visual, auditory and interoceptive processing. They also found that regular meditation practice may reduce age-related shrinkage of the prefrontal cortex. Richard Davidson, a neuroscientist at the University of Wisconsin, has extensively studied meditation and the brain. In a series of experiments with Buddhist monks, including the Dalai Lama, he was able to demonstrate that meditation affects brain regions associated with anxiety, depression, anger, fear, attention, and the ability of the body to self-heal (Davidson & Lutz, 2008; Lutz, Greischar, Rawlings, Ricard, & Davidson, 2004).

**Mindfulness.** Mindfulness, a form of meditation increasingly studied in Western medical research, has also yielded positive results on memory. Mindfulness can be defined as “paying attention on purpose, in the present moment, and nonjudgmentally” (Kabat-Zinn, 1994, p. 4). A variety of established treatment packages have incorporated
this construct. Beginning in the late 1970s, Jon Kabat-Zinn began to integrate mindfulness meditation into a Western approach to treating psychophysiological and stress-related disorders. His treatment became known as mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1982). Originally designed for the management of chronic pain, the program was based on the idea that individuals should not continually search for an escape to pain, but instead, should embrace the suffering and eventually come to accept it. Since its introduction, MBSR has been shown to be effective in reducing symptoms associated with a wide variety of disorders (Baer, 2003). Other treatment protocols soon followed and had successful results. Marsha Linehan's Dialectical Behavior Therapy (DBT) incorporated mindfulness techniques into her treatment program for Borderline Personality Disorder (Linehan, 1993). Such techniques include "observing, describing, participating, taking a nonjudgmental stance, focusing on one thing in the moment, being effective" (p. 114). Acceptance and Commitment Therapy (ACT) approaches mindfulness in a similar way as DBT and views techniques such as acceptance and attention to present experience as skills to be learned (Hayes, Strosahl, & Wilson, 1999). In 2002, MBCT was developed to treat depressive relapse and blends mindfulness meditation and cognitive therapy (Segal, Williams, & Teasdale, 2002). More information regarding MBCT will be given below.

The dearth of studies that exists regarding mindfulness and memory is surprising given how this type of meditation has burgeoned in recent years; however, several studies have been conducted. For example, Chambers, Chuen Yee Lo and Allen (2007) demonstrated that mindfulness training produces significant improvements in working memory. More specifically, the researchers asked subjects to participate in a 10-day mindfulness training and then compared their pre-post performance on a variety of
instruments, including self-reported levels of mindfulness, depressive symptoms, rumination, and measures of working memory performance. Levels of mindfulness were assessed with the Mindful Attention Awareness Scale (Brown & Ryan, 2003) and the results revealed significant increases in scores for the meditators across time, thus supporting the idea that the meditators became more mindful. Depressive symptoms were measured with the Beck Depression Inventory (Beck, Rush, Shaw, & Emery, 1979; Beck & Steer, 1987) and the results revealed significant decreases in scores for the meditators across time, thus supporting the idea that the training assisted in the alleviation of depressive symptoms. Working memory was assessed with the Digit Span Backward subscale of the Wechsler Adult Intelligence Scale, 3rd edition (The Psychological Corporation, 1997) and the results yielded significant improvements in scores for the meditators across time, thus confirming the hypothesis that the meditation training influences working memory performance.

Similarly, a 2010 study found that an 8-week mindfulness training along with out-of-class practice had salutary effects on working memory capacity (Jha, Stanley, Kiyonaga, Wong, & Gelfand). Two military cohorts were recruited during a high-stress predeployment period and one of the groups was given the 8-week mindfulness training. The study revealed that those with shorter logged mindfulness practice sessions scored worse on the working memory task than their earlier performance. Those with longer practices not only improved in working memory but also showed higher levels of positive affect and lower levels of negative affect than during pre-treatment.

Additionally, in a recent review article, Chiesa, Calati, and Serretti (2011) examined 15 controlled or randomized controlled studies as well as eight case-control studies for the effects of mindfulness meditation practices, or MMPs, on measures of
attention, memory, executive functions, and other miscellaneous measures of cognition. The authors summarized several significant findings. They found that early phases of mindfulness training (i.e., those with little to no prior experience), which individuals are relatively more invested in developing focused attention, can significantly increase sustained, selective, and executive attention as well as attention switching. The later phases of mindfulness training, which place more emphasis on noticing both internal and external stimuli, can improve abilities in unfocused sustained attention. Lastly, the authors stated that MMPs could bolster memory. Specifically, MMPs could enhance working memory capacity and prevent the loss of working memory abilities prior to the exposure to stressful stimuli. They also found some evidence supporting how mindfulness practices can improve some executive functions, as measured by verbal fluency, inhibition of cognitive responses, meta-awareness, and emotional interference from distracting stimuli.

Other research has also found that mindfulness training can improve aspects of memory in addition to working memory. For example, Williams, Teasdale, Segal, and Soulsby (2000) found that an MBCT program reduced overgeneral autobiographical memory in formerly depressed people. In this study, patients were randomly assigned to either treatment-as-usual or a protocol that emphasized relapse reduction (i.e., MBCT). The results revealed that participants in the MBCT-treatment group reported significantly fewer generic memories (and therefore more specific, detailed memories) than participants in the control group.

Levy, Jennings, and Langer (2011) published one of the few studies on mindfulness and memory in an older adult population. Eighty participants, with an average age of 71 and an equal ratio of males and females, were randomly assigned to one of four attention interventions. Each group was given slightly different instructions:
Please note three distinctions in each of the following pictures” (Group 1); “Please note five distinctions in each of the following pictures” (Group 2); “Please turn the page” (Group 3); “Please pay attention to each of the following pictures” (Group 4). Participants in the mindfulness groups (i.e., Groups 1 and 2) were therefore asked to study the series of pictures and both pay attention to the images and detect distinctions. Results indicated that participants in the mindfulness groups were able to remember significantly more pictures than those not given the same instructions, thus supporting the theory that mindfulness can increase both attention and recall.

Overall, applying mindfulness as an intervention to improve memory function has shown some promising results. In the past few decades, researchers have also begun applying mindfulness to other widespread complaints, such as depression.

Depression

Depression, like memory impairment, is another common mental illness in older adults. The U. S. Census Bureau has reported that the U. S. population aged 65 years and above is expected to more than double by the middle of this century, from 39.6 million in 2009 to 88.5 million in 2050 (U. S. Census Bureau, 2011). Whereas approximately 1% to 3% of adults over the age of 65 meet criteria for Major Depressive Disorder (Hasin, Goodwin, Stinson, & Grant, 2005; Weissman, Bruce, Leaf, Florio, & Holzer, 1991), an estimated 15% to 25% of adults in this age group report clinically significant depressive symptoms (Jeste et al., 1999). Other studies have found that the prevalence rates of older adults suffering from this debilitating disorder range from approximately 10% for those living independently in the community to about 25% for those with chronic illnesses (Beekman et al., 1995). Sadly, these prevalence rates in older adults are likely to increase in the coming years (Murray & Lopez, 1996).
Researchers have been able to distinguish several features associated with depression in older adults, including age of onset. For example, late-onset depression, when compared to early-onset, is often associated with reduced cognitive performance, abnormalities on neuroimaging scans, and a lowered risk of having a familial link. This suggests that etiological differences might exist between these two specifiers (Alexopoulos et al., 1997). On average, older adults who engage in treatment for depression see results more quickly than those in other age groups; however, they are also at a greater risk to relapse sooner those who are younger (Mueller et al., 2004).

Additionally, research has revealed that a relapse is more likely if depressive symptoms linger after a depressive episode has remitted than if depressive symptoms had completely abated (Chopra, Zubritsky, & Knott, 2005). Hence, continued treatment and relapse prevention are warranted even after individuals no longer meet the criteria for depression.

Adults over the age of 65 are also disproportionately likely to commit suicide. This age group comprises 13% of the U.S. population, yet accounts for 18% of all suicide deaths (Arias, Anderson, Kung, Murphy, & Kochanek, 2003). Moreover, among adults who attempt suicide, older adults are most likely to die as a result (Conwell, Duberstein, & Caine, 2002). In 2004, suicide was the leading cause of death of White men over the age of 85 in the United States; the rate of suicide deaths of men in this age group was 49.8 suicide deaths per 100,000 persons (Centers for Disease Control and Prevention, 2005).

Psychological treatments for depression in older adults have continually demonstrated impressive results such as a reduction in depressive symptoms including suicidal ideation, improved functioning and quality of life, and even a reduction in various physical symptoms (e.g., pain associated with chronic conditions; Bruce et al., 2004;
Ciechanowski et al., 2004). Studies have yielded significant results in both individual and group formats. For individual psychotherapy, Cognitive-Behavioral Therapy (CBT) has repeatedly led to significant reductions in symptoms of depression (e.g., Floyd, Scogin, McKendree-Smith, Floyd, & Rokke, 2004; Gallagher-Thompson & Steffen, 1994).

Group-based interventions for treating depression in older adults have also evinced positive findings. Even though several specific interventions have been found to be effective for depression in this population, one treatment package that has consistently produced positive results is called Improving Mood-Promoting Access to Collaborative Treatment (IMPACT; Unützer, Oishi, & the IMPACT Study Investigators, 1999). IMPACT is described as a collaborative care-management program for late-life depression and involves the incorporation of primary care into treatment. The protocol is heavily based on a problem-solving model, where clients are taught skills to systematically solve common problems they may face. Collaboration primary care practitioners and specialists is heavily emphasized to define specific problems the individual may be experiencing along with follow-up communication with the established team. More than 50 studies support the use of IMPACT to reduce symptoms of various disorders, including depression (e.g., Katon, Unützer, & Russo, 2010; Unützer et al., 2002).

Although research supports the efficacy of depression treatment in older adults, patients often receive suboptimal treatment (Lin et al., 2003; Unützer et al., 2002). A possible explanation for this is the lack of dissemination of evidence-based findings to broader practitioner audiences (Frederick et al., 2007).
Depression and Memory Impairment

The link between depression levels and reduced memory has been well established. Several meta-analyses have confirmed that patients with depression routinely score significantly lower on neuropsychological tests of explicit or recollection memory than those without depression (e.g., Zakzanis, Leach, & Kaplan, 1998) and that depression is significantly associated with recall and recognition deficits (Burt, Zembar, & Nierderehe, 1995). Imaging studies have also demonstrated that participants with recurrent depression have reduced hippocampal volumes (Bremner et al., 2000; Sheline, Sanghavi, Mintun, & Gado, 1999; Sherline, Wang, Gao, Cswernansky, & Vannier, 1996).

Similar to individuals in other age groups, older adults who experience depression often complain about their memory (Cipolli, Neri, Andermarcher, Pinelli, & Lalla, 1990; Dentone & Insua, 1997; Reid & Maclullich, 2006; von Gunten, Giannakopoulos, & Duc, 2005). In fact, many studies have shown that depression results in cognitive decline (Bassuk, Berkman, & Wypij, 1998; Comijs, Jonker, Beekman, & Deeg, 2001; Wetherell, Reynold, Gatz, & Petersen, 2002).

Most published studies on depression and memory concerns in older adults did not include clinical interventions; the results of studies that did include clinical interventions have been mixed. However, a consistent finding has been that individuals who are mildly depressed are more likely to have memory gains following a memory training course than individuals who are severely depressed. (Weaver & Lachman, 1989; Reiff, 1994).

Another promising finding has been that that subjective memory complaints (in the subclinical range) decrease when symptoms of depression are reduced. This shows that these memory problems are associated with depressive affect rather than to actual cognitive performance (Hanninen et al., 1994; Levy-Cushman & Abeles, 1998; Smith,
treat ing depressive symptoms as a method for lowering subclinical memory complaints is an worthwhile approach.

**Depression and Mindfulness**

MBCT is a manualized group skills training program that integrates both mindfulness techniques and various interventions from cognitive therapy. These mindfulness techniques have been adapted from Kabat-Zinn's Stress Reduction and Relaxation Program (later renamed to MBSR; Kabat-Zinn, 1990; Kabat-Zinn et al., 1992) at the University of Massachusetts Medical Center. MBCT consists of 2-hour sessions held over a period of 8 weeks in which an instructor engages the group in mindfulness activities. Homework exercises are also assigned. The overarching goal of the treatment is to increase participants' awareness to the present moment experience. Participants engage in extensive practice of bringing their attention back to the present through several modalities (e.g., the breath, sounds, walking).

MBCT is also one of the most studied forms of mindfulness as a treatment to prevent the relapse of mental disorders. Although MBCT has been researched with various psychological conditions, the protocol was specifically designed to establish prevention skills in individuals at risk for depressive relapse. The treatment has consistently been shown to be effective for treating recurrent depression in adults (Ma & Teasdale, 2004; Teasdale et al., 2000).

One of the earliest and most cited studies regarding the effects of MBCT on depression examined relapse/recurrence rates (Teasdale et al., 2000). The researchers found that MBCT significantly reduced the risk of relapse/recurrence rates by half for patients with three or more previous episodes of depression. Furthermore, the study
became the first to demonstrate that a group-based psychological intervention for individuals who had recovered from depression could significantly decrease the risk of future depression relapse/recurrence. Subsequent studies also supported the effectiveness of MBCT in reducing rates of depression relapse (Ma & Teasdale, 2004; Segal, Williams, & Teasdale, 2002).

Several articles have been published that review the efficacy of prior mindfulness-based interventions on depression. In 2007, Coelho, Canter, and Ernst reviewed the literature regarding the effectiveness of MBCT as a relapse-deterrent intervention. On the basis of the studies analyzed, they found that MBCT has a significant impact on preventing relapse in patients with three or more previous depressive episodes. Additionally, two recently published meta-analyses reviewed the impact of mindfulness-based protocols (i.e., MBCT and MBSR) as a direct intervention to reduce symptoms of both depression and anxiety (Bohlmeijer, Prenger, Taal, & Cuijpers, 2010; Hofmann, Sawyer, Witt, & Oh, 2010). Even though the effects sizes of these two studies varied, the Hoffman meta-analysis yielded an impressively robust effect size of 0.97 for anxiety and of 0.95 for depression in patients with clinical levels of Anxiety and Mood Disorders.

These newer investigations (e.g., Barnhofer et al., 2009) that demonstrated that MBCT, in particular, is useful as a direct intervention for reducing symptoms of depression are incredibly important. After all, most studies have only used the mindfulness-based protocol as a prophylactic with participants who were not currently in a depressive episode; participants were therefore either in partial remission or free from symptoms at the time of the study.

MBCT’s effectiveness in treating recurrent depression may have important implications for older adults, because this population has the highest prevalence rates of
recurrent depression (Mueller et al., 2004). The introduction of MBCT in treating a population with such high relapse could, therefore, prove to be efficacious. Also worth noting is the effectiveness of MBCT in reducing suicidal ideation (Williams, Duggan, Crane, & Fennell, 2001). This is particularly important because, as stated earlier, older adults have the highest rates of suicide of any age group; thus, introducing MBCT as a treatment for suicide prevention in such a high-risk population seems relevant and could prove to be effective.

Very few studies have been published on the use of mindfulness with older adults. Many of these studies have taken place in the context of assessing the usefulness of mindfulness interventions in older adults who experience chronic pain (e.g., Morone, Greco, & Weiner, 2007; Morone, Rollman, Moore, Li, & Weiner, 2009); however, some studies have focused on emotional health. For example, Young and Baime (2010) examined whether an MBSR training can successfully manage the physical and psychological difficulties that come with aging. The results of this study with 161 older adults revealed that both overall emotional distress and mood (as measured on the Profile of Mood States – Short Form) significantly improved over time. The training yielded more than a 50% reduction in the number of participants who reported clinically significant symptoms of anxiety and depression.

Smith (2004) conducted a qualitative study to explore the impact of MBCT on depression among a small sample of older adults. Smith reported that the majority of participants found MBCT to be helpful in five general domains: cognitions (e.g., becoming more aware), emotions (i.e., feeling more joy), physiology (i.e., feeling calmer and more relaxed), behaviors (e.g., acting more assertively), and general benefits (e.g., liking themselves better). The reasons MBCT might be particularly effective in an older
adult population relate to several factors inherent in the intervention. These factors include support from other group members as well as the destigmatizing aspect of being surrounded by others who have experienced similar difficulties. These factors may be especially propitious to older individuals because ageism can profoundly affect how they view themselves. Furthermore, mindfulness may also suit the lifestyle of older individuals. Even though some may lead busy lives, many older adults have adequate free time to practice the skills necessary for the mindfulness treatment.

Recently, Splevins, Smith, and Simpson (2009) conducted the first, and currently only, quantitative study exploring MBCT with an older adult population. The authors reported that depression, anxiety, and stress levels had significantly decreased in the 43 individuals who had participated in the MBCT course. The effect sizes ranged from medium (anxiety) to large (depression and stress). Similar effect sizes have been obtained in other studies investigating mindfulness in younger adults (e.g., Carmody & Baer, 2008) as well as for cognitive-behavior therapy in older adults (Pinquart, Duberstein, & Lyness, 2007). In the Splevins et al. (2009) study, mindfulness levels also significantly increased after the intervention, with effect sizes ranging from medium to large. This is consistent with prior findings in the literature (Baer et al., 2008; Baer, Smith, & Allen, 2004; Carmody & Baer, 2008).

As stated above, research on the role of mindfulness as a treatment for recurrent depression is in its infancy. Because the prevalence rates of depression are estimated to increase in the coming years (Murray & Lopez, 1996), further investigations into additional forms of treatment are recommended. The potential benefits of the use of mindfulness as an intervention in older adults warrant further research.
The research regarding the effects of meditation on memory and depression is also relatively young and in need of additional support. Very few studies have focused on an older adult population. Therefore, the purpose of this study will be to investigate the impact of an 8-week mindfulness meditation protocol on mindfulness levels, working memory, and depression of a single older adult. More specifically, I hypothesize that an older adult’s participation in an MBCT group will result in clinically significant changes, as follows:

1. Increase in mindfulness.

2. Increase in working memory performance.
   a. Increase in verbal working memory.
   b. Increase in visuospatial working memory.

3. Decrease in depression.
Method

Attempts were made to recruit participants via flyers posted at LifeWorks NW; however, these efforts proved unsuccessful. Initially, the project was intended to be a group intervention, but due to these recruitment difficulties it transitioned into a single case study. The one subject who was successfully recruited was initially informed about the study through her individual therapy session with me. The participant signed an informed consent form. In the informed consent, she was notified that she could voluntarily withdraw from the study at any time without prejudice by notifying me. A $40 incentive was also included in the study, with a $20 distribution at the end of session 4 and again at the end of session 8 (after the post-treatment measures were completed). This study was conducted with the approval of the Pacific University Institutional Review Board and with the consent of LifeWorks NW.

Client Characteristics and Presenting Problem

“Rose” is a 64-year-old Caucasian heterosexual woman. At the time of the intake, she met criteria for Major Depressive Disorder, Recurrent, Moderate according the DSM-IV-TR criteria (American Psychiatric Association, 2000), due to her reported symptoms of depressed mood, anhedonia, hypersomnia, difficulty concentrating and memory trouble, feelings of worthlessness, helpless, and fatigue. She also endorsed having at least two prior major depressive episodes throughout her life and stated her symptoms during prior depressive episodes were similar to those reported prior to the current treatment episode. She denied any current or historical suicidal ideation. Further, she denied current or historical use of alcohol or other drugs. She stated her current depressive episode began soon after she moved from California to her current retirement center (i.e., several months
before the intake session). Rose admitted she had no close friends in the area and that her only son and his wife lived in Australia.

**Assessment procedures**

**Clinical Interview.** I had previously seen Rose at Lifeworks NW, a community mental health clinic in Beaverton (OR) for symptoms of depression. This previous treatment, which started in fall 2009, was conceptualized from a cognitive-behavioral perspective. Rose had been seen for a total of seven sessions. The current treatment episode, which started in July of 2010, commenced with a brief intake to gather information about her symptoms at the time.

Rose met with me for a pre-screening session where I introduced the informed consent. The informed consent described how she had the right to voluntarily withdraw from the study without prejudice or negative consequence, and that she may withdraw by notifying me. After she signed the document, I then described the study’s details and assessed Rose to determine eligibility of participation in the study. I administered the Saint Louis University Mental Status Exam (SLUMS) to assist in ruling out delirium, amnestic disorder and psychotic disorders. The SLUMS demonstrates good psychometric qualities and recent evidence suggests that the SLUMS is effective in detecting mild neurocognitive disorders (Tariq, Tumosa, Chibnal, Perry, & Morley, 2006). Rose scored 27 on the measure which classified her as functioning within the normal range.

The standard Lifeworks Northwest intake procedure was also utilized. Please note the intake procedure does not include a formal document of questions and, in turn, is not included in the appendix. This procedure is a semi-structured intake interview used to obtain information regarding presenting problems and to diagnose and rule out mental health disorders. This procedure also inquired about the eligibility criteria including the
presence of chronic illness, and willingness and ability to engage in the expectations of group and the study. Rose was assessed for, and subsequently denied having, any chronic medical illnesses or being prescribed any medications for physical or mental health. This was undertaken because medications commonly interfere with cognitive performance and could thereby have created a confound for the study.

Due to the fact that Rose successfully passed the pre-screening intake and SLUMS and consented to further participation in the study, she was determined eligible for the next step in the pre-screening process. I then administered the second pre-screening tool, the Geriatric Depression Scale (GDS), to determine the significance of her depressive symptoms. Due to her score (11) being above 10, she met inclusion criteria and was allowed to continue with the next steps regarding participation in the study. Rose was then given the pre-testing measures, each of which will be described in detail below. The GDS administered in the pre-screening part of the session was also utilized as a pre-test measure. I also described the intervention, a 4-week long MBCT group therapy, and explained what participation would include. Due to my time constraints, Rose was asked to attend group meetings twice per week in addition to her practicing daily meditation and completing various homework exercises; therefore, the length of MBCT-course was truncated in half.

Measures

**Mindful Attention Awareness Scale (MAAS).** The MAAS is a 15-item self-report measure in which respondents indicate their level of awareness as well as attention to present events and experiences on a 6-point Likert-type scale ranging from 1 (*almost always*) to 6 (*almost never*) (Brown & Ryan, 2003). In developing the scale, the authors attempted to measure the attentional components of mindfulness rather than the intent or
attitudinal approaches. They did so with the purpose of obtaining the actual experience that may be indicative of mindfulness instead of the intent or feeling attained from being in a mindful state. Moreover, Brown and Ryan argued that acceptance and tolerance of events as they happen is implied in the capacity for present-centered attention and awareness. Sample MAAS items include *It seems I am “running on automatic”, without much awareness of what I’m doing*” and *I find it difficult to stay focused on what’s happening in the present.* A mean rating score was calculated with higher scores suggesting greater levels of mindfulness. The MAAS demonstrated good internal consistency across a wide variety of samples ($\alpha = .80 - .87$) and excellent test re-test reliability over a 1-month time period ($r = .81$; Brown & Ryan, 2003). The MAAS also demonstrated negative relationships with psychological distress (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), depressive symptoms (Brown & Ryan, 2003), depressive affect (Brown & Ryan, 2003; Carlson & Brown, 2005; Zvolensky et al., 2006), and rumination (Brown & Ryan, 2003).

Brown and Ryan (2003) also found that individuals who do not have prior meditation experience vary considerably in their levels of mindfulness. Additionally, Brown and Ryan (2003, 2004) found that meditators scored higher on the MAAS than nonmeditators and that there is a positive correlation between MAAS scores and length of time meditating among meditators. Therefore, the MAAS is considered to be an instrument of trait mindfulness which is sensitive to changes that can occur through meditation practice.

**Toronto Mindfulness Scale (TMS).** The TMS is a 13-item questionnaire measuring the state of mindfulness and is meant to be administered immediately following a meditation session (Lau et al., 2006). Responses on the TMS are rated on a 5-
point Likert-type scale ranging from 0 (not at all) to 4 (very much) and are based upon a two-factor model. The two factors are curiosity and decentering. Curiosity is defined as “awareness of present moment experience with a quality of curiosity” and decentering as “awareness of one’s experience with some distance and disidentification rather than being carried away by one’s thoughts and feelings” (p. 1452). Sample TMS items include I was curious to see what my mind was up to from moment to moment and I was aware of my thoughts and feelings without overidentifying with them. The TMS demonstrated high internal consistence with an alpha coefficient of .95 and an average item-total correlation of .53 (Lau et al., 2006).

**Wechsler Adult Intelligence Scale – Fourth Edition (WAIS-IV).** Two subtests from the WAIS-IV were used to assess for verbal working memory (Wechsler, 2008), Letter-Number Sequencing and Digit Span Backward (a component of the Digit Span subtest). Both Letter-Number Sequencing and Digit Span are found within the Working Memory Index. Only parts of the Working Memory Index were chosen because not all subtests fully assess working memory (Lezak, Howieson, & Loring, 2004, pp. 358-359). Letter-Number Sequencing is an auditory task in which the test subject listens to strings of randomized numbers and letters (in alternating order) of increasing lengths (from two to eight units). He or she is then asked to repeat these numbers and letters, starting with the lowest in each series and beginning with the numbers. For example, on hearing “6-F-2-B,” the subject should respond “2-6-B-F.” This requires subjects to keep the items in mind long enough to rearrange their order. The span is increased until the subject fails all three items of one length. Internal consistency for Letter-Number Sequencing for those aged 55-64 is quite good (α = .87; Wechsler, 2008).
Digit Span is a subtest that consists of three separate tasks: Digit Span Forward, Digit Span Backward, and Digit Span Sequencing. Digit Span Backward involves the examinee reading a string of numbers and then recalling them in reverse order. The sequence of numbers is gradually increased until the subject fails two trials in a row. The Digit Span Backward was selected for this study based on research which has demonstrated how it involves more working memory compared to Digit Span Forward, due to its more effortful involvement (Banken, 1985; Black, 1986; Kaufman & Lichtenberger, 1999). Internal consistency of Digit Span Backward for those in Rose’s age group is moderate (α = .82; Wechsler, 2008).

Theorists such as Logie (1995) proposed that some working memory systems have a central executive processor and two “slave” systems: one that stores and processes verbal material and the other that processes visual-spatial stimuli. Thus, the various Wechsler subtests that were administered assessed both of these slave systems: the visual-spatial system was assessed by Symbol Span and the verbal system by Letter-Number Sequencing as well as Digit Span Backward. Even though some theorists have deemphasized the verbal-visual distinction in working memory (e.g., Richardson, 1996), most researchers studying this construct agree that it involves the temporary storage of active information.

Wechsler Memory Scale – Fourth Edition (WMS-IV). The Symbol Span subtest of the WMS-IV was used to assess the participant’s visuospatial working memory. Symbol Span is a visual counterpart to the Wechsler Adult Intelligence Scale – Fourth Edition (WAIS-IV) Digit Span subtest and is a new addition to the WMS subtests. During the subtest, the examinee is shown a series of symbols that are difficult to describe. He or she must then point to the correct symbols that had been displayed as well as their proper
order from left to right. The subtest measures an individual’s ability to mentally hold an image as well as its spatial relation to the page (Wechsler, 2009). According to Baddeley’s (2000) model, this ability would represent an individual’s use of the visual sketchpad along with assistance from the central executive.

The WMS-IV demonstrated excellent internal consistency ($\alpha = .93 - .98$) and test-retest reliability across the indexes ($r = .81 - .83$; Wechsler, 2009). For Symbol Span, the subtest used within this protocol, the test-retest reliability is also high (average $\alpha = .88$) for 55-64 year-olds, Rose’s age group (Wechsler, 2009).

**Geriatric Depression Scale – Short Form (GDS-SF).** The GDS-SF is a 15-item self-report questionnaire that is used to identify depression in older adults (Sheikh & Yesavage, 1986). It consists of yes/no questions and is a commonly used depression self-report. THE GDS-SF is a condensed version of the original GDS, which consisted of 30-items (Brink et al., 1982). Sample items include *Are you basically satisfied with your life* and *Do you feel you have more problems with memory than most*. Research has shown that the GDS-SF has sufficient internal consistency reliability ($\alpha = .80$) as well as test-retest reliability ($r = .81$; Brown & Schinka, 2005).

**Case Conceptualization and Treatment**

As stated above, Rose reported at the time of the intake that she had at least two prior depressive episodes in her lifetime. During the intake, she met criteria for Major Depressive Disorder, Recurrent, Moderate. Rose had been spending increasing amounts of time in her room, away from the other residents and group activities, and most of her day consisted of reading and watching TV. She stressed that even spending time with her cat had become “unpleasurable.” In short, her attempt to self-soothe after an uneasy transition across states ironically had added to her depression. Rose was avoiding most if
not all social interactions because she had deemed some fellow residents to be unfriendly. This increased isolation slowly led her to also lose touch with other enjoyable aspects of living. Her experience of negative cognitions (e.g., how “sad” life had become since her recent move to Oregon, how people in her facility were “gossipers”) in the presence of depressed affect appears to have triggered her relapse. Her low mood further contributed to her tendency to ruminate and reinstate the negative thinking patterns experienced from her prior episodes. She had also noticed a considerable change in her memory over the past several months. Rose stated she had become more forgetful and described her memory as “hazy” at times.

The following is a session-by-session breakdown of the MBCT procedure.

**Session 1:** The theme of this session was on automatic pilot. It began with an orientation to the class, and implementation and feedback of the raisin exercise and body scan practice. We also held a discussion about the client’s understanding of meditation, prior experience, and personal expectations. Homework was then introduced and assigned.

**Session 2:** The theme of this session was dealing with barriers. The session began with a body scan practice followed by homework review and a variety of other exercises, including thoughts and feelings exercise and a sitting meditation (the participant was comfortable with lying on the floor). The Pleasant Events calendar was introduced and homework was assigned.

**Session 3:** The theme of this week’s session was on mindfulness of the breath. A variety of other new mindfulness exercises were introduced during this week’s class as well (i.e., seeing/hearing, 3-minute breathing space, mindful stretching, mindful walking. The stretching exercise was modified by limiting the range of the stretch based on her
physical mobility and the mindful walking exercise was modified in its pace so the participant was asked to complete the exercise at a normal pace and not slowed. This likely decreased the chances of a fall. The Unpleasant Calendar was introduced and homework was assigned.

**Session 4:** The focus for this week’s session was on staying present. The seeing/hearing exercise and 3-minute breathing space introduced in last week’s session were employed in addition to watching the first half of *Healing from Within* video. The client and I spent the rest of the session discussing the video followed by the assignment of homework.

**Session 5:** The focus for this week was on allowing and letting be. The session began with a sitting meditation followed by review of practices and homework. The second half of the Mindfulness-Based Stress Reduction video was viewed followed by a discussion. I also introduced several concepts and quotes from *Full Catastrophe Living* that supplemented the content of the video. Homework was then assigned.

**Session 6:** The theme of this week’s class was on how thoughts are not facts. A sitting meditation commenced the session followed by the usual review of practice and homework. A moods, thoughts, and alternative viewpoints exercise was also introduced as well as the CBT model. Homework was then assigned.

**Session 7:** The theme of this session was on how to best take care of yourself. It began with the usual sitting meditation followed by an exercise exploring the link between activity and mood. A discussion on how to best schedule pleasure and mastery activities followed as well as having the client identify her particular relapse warning signals and develop a plan of action on what to do when faced with future low moods. Homework was then assigned.
**Session 8:** The theme of this last session was on using what has been learned to deal with future moods. A body scan exercise began the session followed by a review of the entire course. A discussion was held on how to keep up the momentum developed over the past 4 weeks.

**Design**

To test the hypotheses, Rose’s pre- and post-treatment scores were calculated to assess for reliable change (RC) and cut-off scores to assess for clinical significance (c) using the methods discussed by Jacobson, Roberts, Berns, and McGlinchey (1999). The following formulas were used:

$$RC = \frac{x_{post} - x_{pre}}{\sqrt{2(1 - r)^{\frac{1}{2}} \frac{s_{pre}^2 + s_{post}^2}{s_{pre} + s_{post}}} \frac{1}{2^n}}$$

Reliable change values higher than 1.96 indicate that the changes in scores on a measure are due to factors beyond random chance and error. RC values must also pass cutoff points (c) for the change in scores to be deemed clinically significant, meaning that the client’s post-treatment scores are closer to nonclinical than clinical ranges. There are three distinct methods for calculating clinical significance cutoff scores (Jacobson, Follette & Revenstorf, 1984). The method that was chosen for this study states that clinical significance is achieved when an individual’s level of functioning falls within two standard deviations below the mean of the normal population.
Results

Hypothesis one posited that the MBCT intervention would lead to significant increases in levels of mindfulness. To test this hypothesis, Rose completed two self-report measures, the MAAS and the TMS, at both pre- and post-treatment. As can be seen in Table 1, her initial MAAS score at intake was 52 and she scored 39 after the last session. Even though her change in scores was reliable, it was in the opposite than expected direction (i.e., her mindfulness level significantly decreased; RC = 2.36). Clinical significance was not achieved because her post-treatment score had not moved to within two standard deviations of the normal mean (c = 2.69).

Table 1

Pre- and post-treatment scores

<table>
<thead>
<tr>
<th>Measure</th>
<th>Pre-treatment</th>
<th>Post-treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAAS</td>
<td>52</td>
<td>39</td>
</tr>
<tr>
<td>TMS</td>
<td>29</td>
<td>23</td>
</tr>
<tr>
<td>Curiosity</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>Decentering</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>LNS</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>DSB</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>SS</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>GDS-SF</td>
<td>11</td>
<td>5*</td>
</tr>
</tbody>
</table>

Note. MAAS = Mindful Attention Awareness Scale, TMS = Toronto Mindfulness Scale, LNS = Letter-Number Sequencing, DSB = Digit Span Backward, SS = Symbol Span, GDS-SF = Geriatric Depression Scale – Short Form. *= clinical significance and reliable change.

Similarly, Rose’s score on the TMS also decreased over time from a pre-treatment score of 29 (Curiosity = 14, Decentering = 15) to a post-treatment score of 23 (Curiosity =
Hypothesis two held that MBCT would lead to detectible differences in both verbal and visuospatial working memory scores. To test this hypothesis, Rose completed several subtests within the WAIS-IV and WMS-IV at both pre- and post-treatment. Regarding the first subhypothesis of verbal working memory, Rose’s scaled score on Letter-Number Sequencing during pretest was 5, which falls in the 5th percentile rank and is in the Borderline range. Her scaled score at posttest was 9, which falls in the 37th percentile rank and is in the Average range. Clinical significance was achieved (c = 4.00) because her posttest score had moved to within two standard deviations of the normal mean and her change in score was deemed reliable (RC = 2.62).

Rose’s scaled score on Digit Span Backward during pretest was 10, which falls in the 50th percentile rank and is in the Average range. Her scaled score at posttest was 8, which falls in the 25th percentile rank and is also in the Average range. Clinical significance was not achieved (c = 3.00) nor did her post-treatment score reach reliable change (RC = -1.11). The results concerning the verbal working memory were mixed and, therefore, the overall subhypothesis could not be adequately met.

Regarding the second subhypothesis of visuospatial working memory, Rose’s scaled score on the Symbol Span during pretest was 9, which falls in the 37th percentile rank and is in the Average range. Her score at posttest did not change; hence clinical significance and reliable change could not be calculated and the subhypothesis was rejected.

Hypothesis three predicted that MBCT would decrease depressive symptoms. Consistent with this hypothesis, Rose evinced considerable improvement over time on the
GDS-SF (see Figure 2). Her initial score was in the range (D’Ath, Katona, Mullan, Evans, & Katona, 1994) of severe depression (11), yet after the four weeks, her score dropped to the lowest score possible within the mild range of depression (5). Rose achieved both reliable change (RC = 2.29) and clinical significance (c = 15.74) in her change in depression scores.

Figure 2. GDS-SF Scores.
Discussion

The aim of this dissertation was to assess the effectiveness of a mindfulness-based protocol (i.e., MBCT) in increasing mindfulness and working memory, and decreasing depression in an older adult individual client. To the best of my knowledge, this was the first study to assess the effects of MBCT on these variables in an older adult population. Specifically, I formulated three hypotheses related to clinically significant increases in mindfulness levels, significant increases in working memory, and clinically significant decreases in depressive symptom scores as a result of the intervention.

Regarding the first hypothesis, the results revealed that the client’s levels in mindfulness decreased over time, thus leading to a rejection of the hypothesis. This reduction was captured in both inventories, with the MAAS scores reaching significant reduction levels. This outcome is inconsistent with prior studies, in which added practice was linked with an increase in mindfulness scores (e.g., Carmody & Baer, 2008). Numerous possible explanations exist as to why these results were found and I will discuss these later in this section.

The results from the second hypothesis regarding working memory were also generally incongruent with the stated supposition. Three subtests were given to measure the two subhypotheses regarding working memory (i.e., verbal and visuospatial), which yielded a mixture of outcomes and led to neither subhypothesis being adequately met. Specifically, Rose’s scores on Letter-Number Sequencing was the only subtest to evince clinical significance and reliable change, with her scores moving from the Borderline to the Average range of functioning. This change across time is consistent with prior findings which have reported significant boosts in working memory performance after
regular mindfulness practice (Chambers, Chuen Yee Lo, & Allen, 2007; Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010). Her results from the Digit-Span Backward, however, failed to produce similar results. The subtest that measured visuospatial working memory, Spatial Span, evinced no change at all. Again, these findings are inconsistent with prior literature (Kozhevnikov, Louchakova, Josipovic & Motes, 2009).

Next, the hypothesis regarding a reduction in depressive symptoms was confirmed. Prior to treatment, the participant endorsed eleven items on the GDS-SF; at the end of treatment, she only listed five items. The five items listed during the posttest included feeling that her life is empty, often getting bored, feeling unhappy most of the time, preferring to stay at home rather than going out and doing new things, and not feeling full of energy. This clinically significant reduction found for Rose’s depression scores is consistent with existing research, which showed that MBCT can be used as a direct intervention for symptom reduction (e.g., Barnhofer et al., 2009). The fact that the present study confirmed this hypothesis is stirring because it adds further evidence to the idea that MBCT has many facets, including utility as a direct symptom reduction program for depression and not solely for relapse prevention. It is also important to note that these results are promising because they demonstrate validity for using the MBCT protocol with a shortened timeframe.

Qualitative data were also collected during the study. Similar to what Smith (2004) reported, Rose spoke about the difficulty she faced with completing the meditations during the initial few sessions, but her complaints tapered as treatment progressed. Over time, she would report being able to use her newfound tools in a variety of settings (e.g., the grocery store, in the dining hall) and viewed the process as less of a “fight” or “chore.” Beginning in session five, she mentioned feeling more like herself and during the
last session stated she was “pleased to be me.” When asked, she reported that it had been at least two to three years since the last time she could say something positive about herself. At the end of treatment, Rose also discussed how she had been isolating herself less frequently and had been interacting more with others at mealtime. She reported feeling more hopeful about the future as well, stating “I have realized there’s a light at the end of this dark tunnel.” Rose further explicated on this newfound change to in how she views the future by stating, “I always have techniques I can use to help me, regardless of where I am or what I am doing.” She went on to describe that the three-minute breathing space was the most useful technique she had acquired from the four weeks in the program due to both its utility and short length of time. Lastly, I inquired to her thoughts about continuing the practice after the program. Rose responded by saying “While this isn’t required now, I’m requiring it for me because I have seen how helpful it can really be. It’s part of what makes me feel healthier and more whole.”

**Limitations of the study**

There are numerous limitations to the study that might help explain why Rose evidenced clinically significant change in only depression and on one of the three subtests measuring working memory. Perhaps the most salient of these is the length of time of the intervention. Due to time constraints, the intervention consisted of a four-week MBCT-course, instead of the usual eight-week course. Four weeks may have been insufficient for Rose to expand her levels of mindfulness as well as overall working memory capacity. In other words, it is possible Rose may not have reached the time threshold needed for her to experience significant gains in these variables. In the majority of published articles on mindfulness interventions and their relationship with levels of mindfulness and working memory, the duration of the mindfulness interventions have been either the standard eight
weeks (e.g., Carmody & Baer, 2008; Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010) or involved an intensive 10-day retreat with participants meditating for most waking hours (Chambers, Chuen Yee Lo, & Allen, 2007).

Another limitation that may have affected the treatment was the design of the study. Even though the study was originally meant to be in group format, difficulties with recruiting participants led to a transition of the study into a single case design. This study design change could have altered the outcomes in several ways. One obvious limitation is the restriction of data to only one subject. If more participants had been successfully recruited for the study, it is possible that significant differences for all the variables might have been found. Further, as discussed in Smith (2004), one of the benefits garnered from a group format is the solace gained from having other members contributing to the discussion, allowing for de-stigmatization of the issues that the subjects face (e.g., depression, meditation, ageism) and for the normalization of these issues to take place. Therefore, limiting Rose’s experience by not having others to whom she could relate on these various levels might have restricted the amount of gain she could have received.

Additionally, a factor that may have affected the outcomes was Rose’s inconsistent completion of the assignments. During numerous sessions, particularly toward the beginning, she would often report being unable to meditate for the duration of the exercise (40 minutes). Even though this incompletion could have affected her post-treatment working memory scores, it could have particularly influenced her final scores on the mindfulness measures, neither of which yielded an increase over time.

One last limitation involved the TMS mindfulness measure. It was administered at pre-treatment, and thus, before the study commenced; however, the inventory was intended to be administered at the end of a meditation session. Even though one can only
speculate as to why Rose’s overall mindfulness scores decreased so substantially, it is possible that the initial timing of the TMS might have skewed the results for that measure. Rose might not have understood the questions adequately or was too unfamiliar with what they were asking; thus, when she completed the post-treatment measures, she gave more accurate responses. It is also possible that she was using the skills from a distraction- or denial-based approach, instead of one based on acceptance, to assist with her depressive symptoms. If so, her ability to expand her levels of awareness over time would thus be negatively affected.

On the bases of the present study, there are several implications for the professional psychology field. One possible implication related to managed care. As health care costs continue to rise in the United States, cost effective forms of mental health treatment have become paramount. The results of the current study indicate that condensing the length of the protocol from the eight to four weeks can still produce significant reductions in depressive symptoms. Even though follow-up studies are needed to confirm the replication value, these initial results are promising.

Another implication of the current findings involves demographics. As mentioned earlier, although mindfulness-based interventions have produced positive results for older adults, this arena remains in its infancy. The current study supports this newly-emerging field of Complimentary and Alternative Medicines for older adults by bolstering the claim that MBCT can be effective for someone who falls within this age range.

Finally, there are a myriad of suggestions that other researchers should consider for future studies. One pursuit worth continuing is the investigation of efficacy for both MBCT and other mindfulness-based interventions in an older adult population. Included in this suggestion would be the study of working memory for the full eight weeks
because, as suggested above, it could be postulated that the added length of time could
yield significant improvements in performance. Relatedly, exploring the measurement of
working memory in participants who are not currently experiencing a Major Depressive
Episode is another interesting angle worth assessing due to how depression levels can
negatively impact working memory performance (e.g., Kaneda, 2009).

Another consideration involves data collection points. The present study only
contained two data points (i.e., pre- and post-treatment); thus, establishing another period,
possibly after the fourth session, would help create a better foundation for claiming
clinically significant change. Moreover, continued measurement of progress at several
intervals after termination of treatment would also be worthwhile, because this could
validate the long-term sustainability of gains.

A final suggestion for future studies includes the use of additional measures to
assess the variables. This would be particularly helpful in capturing working memory
performance because only two subtests and a section of a subtest within the Wechsler
tests were used, all of which produced varying results. Utilizing the entire subtest protocol
within the Working Memory Index of the WAIS-IV, for example, would yield a more
unified and reliable approach in assessing this variable.

In sum, the results obtained from this study revealed that meditation practice can
significantly decrease levels of depression in an older adult. The outcomes regarding
levels of mindfulness and working memory were generally not consistent with prior
studies, many of which have yielded significant increases in both variables. One of the
two subtests measuring verbal working memory did produce significant results; however,
this subhypothesis was still unmet because the results were not uniform. The decline in
severity of depression symptoms adds to the growing body of literature that a mindfulness
intervention can not only be helpful for lowering the risk of relapse but also as a direct intervention for symptom reduction. Even though this study did not reveal overall significant findings for the other variables, future studies in the investigated areas are warranted.
References


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Appendix A

Measures

Geriatric Depression Scale

Choose the best answer for how you have felt over the past week:

1. Are you basically satisfied with your life? YES / NO
2. Have you dropped many of your activities and interests? YES / NO
3. Do you feel that your life is empty? YES / NO
4. Do you often get bored? YES / NO
5. Are you in good spirits most of the time? YES / NO
6. Are you afraid that something bad is going to happen to you? YES / NO
7. Do you feel happy most of the time? YES / NO
8. Do you often feel helpless? YES / NO
9. Do you prefer to stay at home, rather than going out and doing new things? YES / NO
10. Do you feel you have more problems with memory than most? YES / NO
11. Do you think it is wonderful to be alive now? YES / NO
12. Do you feel pretty worthless the way you are now? YES / NO
13. Do you feel full of energy? YES / NO
14. Do you feel that your situation is hopeless? YES / NO
15. Do you think that most people are better off than you are? YES / NO
Saint Louis University Mental Status Exam (SLUMS)

VAMC
SLUMS Examination
Questions about this assessment tool? E-mail aging@slu.edu

<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Is patient alert?</th>
<th>Level of education</th>
</tr>
</thead>
</table>

1. What day of the week is it?
2. What is the year?
3. What state are we in?
4. Please remember these five objects. I will ask you what they are later.
   | Apple | Pen | Tie | House | Car |
5. You have $100 and you go to the store and buy a dozen apples for $3 and a tricycle for $20.
   | How much did you spend? |
   | How much do you have left? |
6. Please name as many animals as you can in one minute.
   | 0-4 animals | 5-9 animals | 10-14 animals | 15+ animals |
7. What were the five objects I asked you to remember? 1 point for each one correct.
8. I am going to give you a series of numbers and I would like you to give them to me backwards.
   | For example, if I say 42, you would say 24. |
   | 87 | 649 | 8537 |
9. This is a clock face. Please put in the hour markers and the time at ten minutes to eleven o’clock.
   | Hour markers okay |
   | Time correct |
10. Please place an X in the triangle.
   | Which of the above figures is largest? |
11. I am going to tell you a story. Please listen carefully because afterwards, I’m going to ask you some questions about it.
   | Jill was a very successful stockbroker. She made a lot of money on the stock market. She then met Jack, a devastatingly handsome man. She married him and had three children. They lived in Chicago. She then stopped work and stayed at home to bring up her children. When they were teenagers, she went back to work. She and Jack lived happily ever after.
   | What was the female’s name? |
   | When did she go back to work? |
   | What work did she do? |
   | What state did she live in? |

TOTAL SCORE

<table>
<thead>
<tr>
<th>High School Education</th>
<th>Less than High School Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>27-30</td>
<td>Normal</td>
</tr>
<tr>
<td>21-26</td>
<td>MCND*</td>
</tr>
<tr>
<td>1-20</td>
<td>Dementia</td>
</tr>
</tbody>
</table>

* Mild Neurocognitive Disorder

Mindful Attention Awareness Scale

Below is a collection of statements about your everyday experience. Using the 1–6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what really reflects your experience rather than what you think your experience should be.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almost Always</td>
<td>Very Frequently</td>
<td>Somewhat Frequently</td>
<td>Somewhat Infrequently</td>
<td>Very Infrequently</td>
<td>Almost Never</td>
</tr>
</tbody>
</table>

_____1. I could be experiencing some emotion and not be conscious of it until some time later.
_____2. I break or spill things because of carelessness, not paying attention, or thinking of something else.
_____3. I find it difficult to stay focused on what’s happening in the present.
_____4. I tend to walk quickly to get where I’m going without paying attention to what I experience along the way.
_____5. I tend not to notice feelings of physical tension or discomfort until they really grab my attention.
_____6. I forget a person’s name almost as soon as I’ve been told it for the first time.
_____7. It seems I am “running on automatic” without much awareness of what I’m doing.
_____8. I rush through activities without being really attentive to them.
_____9. I get so focused on the goal I want to achieve that I lose touch with what I am doing right now to get there.
_____10. I do jobs or tasks automatically, without being aware of what I’m doing.
_____11. I find myself listening to someone with one ear, doing something else at the same time.
_____12. I drive places on “automatic pilot” and then wonder why I went there.
_____13. I find myself preoccupied with the future or the past.
_____15. I snack without being aware that I’m eating.
Toronto Mindfulness Scale

Instructions: We are interested in what you just experienced. Below is a list of things that people sometimes experience. Please read each statement. Next to each statement are five choices: “not at all,” “a little,” “moderately,” “quite a bit,” and “very much.” Please indicate the extent to which you agree with each statement. In other words, how well does the statement describe what you just experienced, just now?

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all</td>
<td>A little</td>
<td>Moderately</td>
<td>Quite a bit</td>
<td>Very much</td>
</tr>
</tbody>
</table>

1. I experienced myself as separate from my changing thoughts and feelings.
2. I was more concerned with being open to my experiences than controlling or changing them.
3. I was curious about what I might learn about myself by taking notice of how I react to certain thoughts, feelings or sensations.
4. I experienced my thoughts more as events in my mind than as a necessarily accurate reflection of the way things ‘really’ are.
5. I was curious to see what my mind was up to from moment to moment.
6. I was curious about each of the thoughts and feelings that I was having.
7. I was receptive to observing unpleasant thoughts and feelings without interfering with them.
8. I was more invested in just watching my experiences as they arose, than in figuring out what they could mean.
9. I approached each experience by trying to accept it, no matter whether it was pleasant or unpleasant.
10. I remained curious about the nature of each experience as it arose.
11. I was aware of my thoughts and feelings without overidentifying with them.
12. I was curious about my reactions to things.
13. I was curious about what I might learn about myself by just taking notice of what my attention gets drawn to.