Use of Physical Activities to Decrease Depressive Symptoms in a 61-Year-Old Woman Diagnosed With Depression

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DEDICATION

I would like to dedicate this piece of my writing to Allah first, then my parents, who have given me the opportunity to get educated, where some parents in Afghanistan do not allow their children to get the necessary education. To Edres, who had stood by me in this bumpy ride for the last four years and had always encouraged me to not give up. Furthermore, I would like to dedicate this to my baby son, Emaan, who has made me a stronger woman. Lastly, I would like to dedicate this to my best friend, Sarah Obeidi, who has always been there for me in all the ups and downs of this thesis and had emotionally supported me while I was writing this thesis.
ABSTRACT

The purpose of this study was to further investigate the effects of exercise on symptoms of depression in a 61-year-old woman diagnosed with depression. Walking and yoga were implemented three times per week for four consecutive weeks. Walking was assigned twice a week while yoga once a week; each session was 30 – 60 minutes long in duration. Depression was assessed using Beck’s Depression Inventory-II and Hamilton Depression Rating Scale before and after the intervention. Results supported that physical exercise might have been effective in reducing her depressive symptoms from severe depression to moderate depression. However, this alone cannot be the cause of a decrease in her depression as the participant received additional counseling for her addiction, and anti-depressants for her depression while participating in the study, which could have decreased the symptoms of depression.
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TABLE OF CONTENTS
CHAPTER V – Discussion

Summary ................................................................. 20
Strengths................................................................. 20
Limitations ............................................................. 20
Multilevel Challenges to Service Implementation ........................................... 21
Client Level .................................................................. 21
Program Level ........................................................... 21
Organization Level ...................................................... 21
Society Level .................................................................. 21
 Contributions to the Field of Behavioural Psychology ......................................... 22
Future Recommendations .................................................. 22

REFERENCES .................................................................. 23

APPENDICES

APPENDIX A : REGISTRATION FORM ...................................................................... 29
APPENDIX B : CONSENT FORM ............................................................................... 47
APPENDIX C: Beck Depression Inventory-II During Baseline .................................... 51
APPENDIX D: Hamilton Depression Rating Scale During Baseline ....................... 52
APPENDIX E: Beck Depression Inventory-II Post-Intervention .............................. 56
APPENDIX F: Pre-and-Post Scores for Beck Depression Inventory-II .................... 57
APPENDIX G: Hamilton Depression Rating Scale Post-Intervention .................... 58
APPENDIX H: Pre-and-Post Scores for Hamilton Depression Rating Scale ............. 62
APPENDIX I: Raw Data for Frequency Recording .................................................... 63
APPENDIX J: Raw Data for Duration Recording ...................................................... 64
APPENDIX K: Gracie’s Frequency for Walking and Yoga ....................................... 65
APPENDIX L: Gracie’s Duration of Walking and Yoga ............................................. 66
LIST OF TABLES

Table 1: Summary of Baseline and Intervention Scores for BDI-II ........................................16
Table 2: Summary of Baseline and Intervention Scores for HDRS ........................................17
Table 3: Summary of Pre and Post Data for the Frequency of Yoga and Walking per Week .....18
Table 4: Summary of Pre and Post Data for Duration Recording of Yoga and Walking ............19
LIST OF FIGURES

Figure 1. *Pre-Post Scores of Beck Depression Inventory – II* ..................................................16

Figure 2. *Pre-Post Scores of Hamilton Depression Rating Scale* .............................................17

Figure 3. *Frequency Recording of Yoga and Walking* .............................................................18

Figure 4. *Results for Duration Recording for Yoga and Walking in Minutes* .........................19
CHAPTER I: Introduction

Overview

Every person has the right to live a happy and prosperous life. However, not everyone gets to lead such a life because of depression. According to Jamieson (2006), 121 million people are affected by depression worldwide, and only 25% receive treatment due to under-reporting (as cited in Donaghy, 2007). Depression not only has a negative impact on people’s everyday lives, but it also causes chronic diseases like diabetes and cardiovascular disease (Craft, Freund, Culpepper, & Perna, 2001). Furthermore, depression is an extensive health concern in the world; it was ranked fourth by the Global Burden of Disease as a worldwide burden (Rethorst, Wipfli, & Landers, 2009). Moreover, World Health Organization (WHO) predicts depression to be ranked second as a global burden by 2020; given that depression has been ranked fourth as a universal burden, and it is expected to be ranked second highest as a burden of disease, then it is a health concern of global significance (Jamieson as cited in Donaghy, 2007). Previous research supports exercise as an effective treatment for the reduction of depressive symptoms. Exercise helps the motivation of individuals by increasing their endorphin levels (Koseglu, Akboyraz, Soyur, & Ersoy, 2003); since exercise boosts endorphin levels, increasing individual levels of motivation, it is an effective treatment in the reduction of depression.

Rationale

As mentioned in the overview, many people suffering from depression do not get the necessary treatment and some do not even report it due to the negative stigma associated with it. According to the World Health Organization (WHO), not being able to access treatment is correlated to high risk of suicide, and that is why every year 850 million lives are lost, which makes depression the third highest cause of death (as cited in Donaghy, 2007). The WHO currently ranks depression as the fourth highest global burden. Furthermore, depression has high economic, personal, and social costs, and in most developed countries, the prevalence rate for lifetime depression is 13%-17% (Legrand & Heuze, 2007). Moreover, Greenberg and colleagues (2003) reported that in 2000, depression alone cost the U.S. $83.1 billion on economical level of burden which included direct medical expenses, death-related costs due to suicide, and workplace expenses (as cited in Legrand & Heuze, 2007). Keeping the above facts in mind, it is obvious that depression is a health concern of global significance (Jamieson as cited in Donaghy, 2007). Furthermore, according to a recent meta-analysis, the effects of physical activity on depression results in significantly lower scores on depressive symptoms with an effect size of -0.80 (Rethorst, Wipfli, & Landers, 2009). Exercise is one way of treating depression as it has demonstrated to decrease depressive symptoms; also, it is a cost-effective treatment with no stigma associated.

Hypothesis

For decades, a substantial amount of research has been done to examine the effects of physical activities on depression; some studies showed significant effect of exercise in the reduction of depression (Blumenthal et al., 1999; Dimeo, Bauer, Varahram, Proest, & Halter, 2001; Craft, Freund, Culpepper, & Perna, 2007; Greist, 1979; Shin, Kang, Park, & Heitkemper, 2009). Conn (2010) has suggested in his meta-analysis for more research and practice of physical activity in treating depression. As exercise has shown to be an effective treatment for depression, it is hypothesized that the implementation of exercise program will be helpful in decreasing depressive symptoms in the participants who have been diagnosed with depression. People with depression have low motivation,
they tend to isolate themselves from others, and there is a chemical imbalance in their brains due to low serotonin levels. Therefore, taking part in physical activities can also increase the endorphin levels of people diagnosed with depression, which will then boost their moods; as a result, their depressive symptoms will decrease. Furthermore, they will be able to gain social support by connecting with clients through group exercise.
CHAPTER II: Literature Review

Overview of Depression

One of the most common health concerns in the world is depression; the rate of this disabling disorder is increasing day by day (Baxter et al., 2010). In fact, “low energy, decreased capacity for enjoyment of activities, and difficulty completing tasks or solving problems are common complaints of people with depression” (Basco, Thase, & Wright, 2006, p. 124). According to Statistics Canada, one out of seven people suffer from depression, and in 2000 depression was ranked fourth as a global burden of disease (Wang et al., 2011). Many studies have pointed out the fact that depression is predicted to be the second leading cause of ill health by 2020 (Nolan & Badger, 2005; WHO, 2007).

Depression is divided into three main types: unipolar depression, bipolar depression, and not otherwise specified depressive disorder (Davison, Blankstein, Flett & Neale, 2008). This study focuses on unipolar depression. APA, DSM-IV-TR defines unipolar depression as lowered mood, anhedonia, loss of appetite, weight gain or loss, irregular sleep, psychomotor retardation or agitation, loss of energy, feelings of guilt, hopelessness, and worthlessness, or difficulty concentrating, and/or suicidal thoughts (as cited in Legrand & Heuze, 2007). With all the above symptoms, people with depression also have relationship problems, difficulties in their academic and occupational lives. According to Baxter et al. (2010), depression not only has negative psychological effects on an individual’s life, but also on his or her immediate surroundings (i.e., family, work, and social life).

Furthermore, depression puts strain on relationships, and the partners of persons suffering from depression get overwhelmed by the extra responsibilities they have to take over. Moreover, not being able to see their partners’ mental health improve, results in agony and stress for the spouse. According to Ahrons, some partners seek divorce if depression continues for years as they cannot handle such relationships and the overwhelming responsibilities that come with it (as cited in Doheny, 2009). Divorce makes individuals with depression even more vulnerable because they lose the family support they had. Multiple studies show that divorced or separated persons are at more risk for high rates of depression (Beaudet, 1996; Wade & Cairney, 2000; Frech & Williams, 2007).

Depression also negatively affects academic lives of people suffering from depressive disorders. As these individuals have psychomotor impairment and difficulty concentrating, studying and continuing education seems impossible to them. They have difficulty paying attention, and they cannot understand the materials they read, or comprehend conversation with others (Davison, Blankstein, Flett & Neale, 2008). This is the reason some of the people with depression drop out of school or discontinue education. Chen, Rubin, Bo-shu, and Cheung (1995) reported in their studies that academic failure and lower performance at school was associated with depression; furthermore, Franklin and Streeter (1995) found in their study that school drop outs were also associated with depression.

Moreover, depression costs people their jobs as they start losing interest in their jobs and often are unable to arrive at work on time due to lack of interest, energy and focus. Several studies demonstrate that people with depression experience extreme sadness, and lose interest in their daily activities that negatively affects their occupational lives (Ormel, Oldehinkel, Brilman, & Van den Brink, 1993; Leader, & Klein, 1996; Weissman, & Klerman, 1992). This loss of interest in their jobs
increases rates of sick leaves, changing jobs frequently (Corrigan, 2002), and unemployment (Klein, Torpey, Buffered, & Dyson, 2008).

Depression may increase the likelihood of acquiring a progressive medical condition and chronic diseases, such as cardiovascular diseases and diabetes, as a result of poor coping strategies to stress overtime (Craft, Freund, Culpepper, & Perna, 2007). These diseases are one of the leading causes for death. According to Kasen, Cohen, Chen, and Castille (2003), prevalence and mortality rates are escalating because of depression, and depression is a serious threat to survival. This is why, it is important to find a more potential and effective way to treat depression. Smits et al. (2008) suggested that depression is treatable; therefore, the need to find effective ways to treat depression is crucial. If depression is left untreated, then there is an increased risk of mortality (Geerlings, Beekman, Deeg, Twisk, & Tilburg, 2002; Cuijpers, & Smith, 2002) and comorbidity (Anstey, Sanden, Sargent-Cox, & Luszcz, 2007). The aforementioned psychological, social, and emotional problems related with depression require significant attention, and exercise can be a potential treatment for depressive symptoms in adults diagnosed with depression.

**Effects of Physical Activities on Depression**

As mentioned earlier, people who suffer from depression are at high risk for developing chronic diseases like diabetes and cardiovascular disease. Also, Cassano and Fava mentioned in their study that depression is associated with high mortality and comorbidity, and Blazer stresses in his study that depression leads to decreased social, physical and cognitive functioning (as cited in Lindwall, Larsman, & Hagger, 2011). As depression leads to physical inactivity, that can be the reason why these people develop chronic diseases. Furthermore, Lindwall, Larsman, and Hagger (2011) reports that physical inactivity is a risk for developing depression. Hence, physical activity can be a treatment for depression and a preventative measure for developing depression (Blumenthal et al, 1999; Dunn, Trivedi, & O’Neal, 2001; Singh, Clements, & Fiatarone Singh, 2001). Many studies emphasize on the fact that exercise is a promising monotherapy for treating depression (Trivedi, Greer, Grannemann, Chambliss, & Jordan, 2006; Driver, & Ede, 2009). With increase in physical activity, the blood flow in the brain stimulates and releases endorphins, which helps in mood enhancement and a decrease in depressive symptoms (Donaghy, 2007).

Moreover, several studies report that low levels of norephinephrine are associated with depression (Collis, Shepherd, 1980; Garvey, 1980; Maas, 1979). Cronan and Howley (1974), state that exercise facilitates the release of neurotransmitters that can relieve depressive symptoms. In addition, O’Neal, Dunn, and Martinsen (2000) mentioned in their study that increase in physical activity leads to an increase in monoamines like serotonin, dopamine and norepinephrine, which then leads to a decrease in depression and an increase in positive affect. This point has been proven in several studies on animals cited in Legrand, and Heuze (2007) that exercise decreases depressive symptoms as it increases norepinephrine levels in brain; Donaghy (2007) also reveals that animal studies have found an increase in dopamine, serotonin and norepinephrine during exercise.

**Benefits of Walking**

People who suffer from depression have low motivation and low energy levels; they often struggle with getting their daily activities done, which can result in a feelings of failure. When these
individuals participate in exercise, they can gain feelings of accomplishment because exercise is like a graded-task assignment in which the behaviour is broken down into smaller easier steps to achieve the tasks and enables the person to gain small successes to achieve the target behaviour: This, exercise, in return gives them a sense of control when they see their progress and achievements (Beck, Rush, Shaw, & Emery, 1979). According to Motl, Berger, and Davis (1997), high intensity exercise has been related with inconsistent changes in mood; it can sometimes result in undesirable changes; therefore, low-intensity exercise, such as walking, can be associated with enhanced mood and decrease in stress. According to public health recommendations, all adults should take part in moderate intensity exercise for 30 minutes or more for most of the weekdays (as cited in Trivedi, Greer, Grannemann, Chambliss, & Jordan, 2006). Walking is a moderate intensity physical activity that can be helpful in improving quality of life and a decrease in depression A study by Dimeo, Bauer, Varahram, Proest and Halter established that walking for 10 days can help reduce depression in clients who are clinically depressed (2001). Furthermore, walkers have significant decrease in depression and have high quality of life when compared with other exercise groups in terms of levels of depression, quality of life, exercise barriers and barriers in self-efficacy (Kraemer & Marquez, 2009). Therefore, this study included walking as one of the physical activities to help in the decrease of depressive symptoms in persons with depression.

**Benefits of Yoga**

“Yoga is an age-old traditional Indian psycho–philosophical–cultural method of leading one’s life that alleviates stress, induces relaxation and provides multiple health benefits to the person following its system” (Yardi, 2001, p. 7). A study by Streeter et al., (2007) has demonstrated that GABA, receptors that respond to neurotransmitter gamma-aminobutyric acid an inhibitory neurotransmitters in the vertebrate central nervous system, levels increased after participating in a yoga session, which was found to be low in patients with depression. Therefore, participating in yoga can decrease the depressive symptoms of clients with depression by increasing their GABA levels. Yoga not only increases GABA levels in people with depression, but it effects many other systems in the body as stated by Riley: “The mechanisms by which yoga influences well-being are likely complex biochemical and physiological mechanisms consisting of reduced sympathetic nervous tone, activation of the antagonistic neuromuscular systems, and stimulation of the limbic system” (cited in Beets & Mitchell, 2010, p. 48). Moreover, the positions of yoga helps in strengthening body muscles, balance, memory and endurance (Mahajan & Babbar as cited in Kraemer and Marquez, 2009). Parshad’s study (2004) also emphasizes on this fact that yoga is a low-intensity exercise, and its positions helps improve muscle strength, body alignment, and flexibility (2004). Netz and Lidor (2003) also reported in their study that a single session of yoga helps increase subjective well-being, enhances mood, and decreases. According to Lewinsohn & Hoberman (1982), exercise can be seen as an increase in response-contingent positive reinforcement and thus reduces depression. Thus, yoga was included as one of the physical activities in this study.

**Cognitive Implication for Exercise**

Byrne & Byrne (1993) specified that 90% studies have indicated an improvement of depression after participating in physical activities. As mentioned previously that people who suffer from depression complain about difficulty concentrating and feeling of fatigue; these individuals have somatic and cognitive-affective symptoms that interferes in their daily lives, whereas physical activity
seems to improve depressive symptoms, and thus might be able to improve these symptoms. Misra and McKean (2000) reported in their study that exercise has shown improvement in the cognitive functioning of students when taking a test which involves mental flexibility and quick responses. Furthermore, Hillman, Snook, and Jerome (2003) also accentuate this fact that individuals who participate in moderate to acute intensity exercises has shown improvement in cognitive functioning. Conversely, studies by O’Connor, Petruzzello, Kubitz, and Robinson (1995) suggested that high vigorous level of exercises decrease cognitive functioning and increase anxiety. Therefore, it is necessary to keep in mind that high intensity exercises like running can be kept as mere one component of physical activities to verify its effectiveness. A study by Dustman, Emmerson, and Shearer (1990) has favourable results for high intensity exercises; according to their study, running increases blood flow and supply, hormones like epinephrine and norepinephrine, and neurotransmitters like acetylcholine that engaged in cognitive processes and brain function. Additionally, McCann, and Holmes (1984) states that physical activities like running are associated with positive psychosocial effects as sociability, distraction and goal achievement that helps in the reduction of depressive disorders. Likewise, Norling, Sibthorp, Suchy, Hannon, and Ruddell (2010) found in their study that running is associated with the restoration of attentional fatigue; which can be helpful for individuals who suffer from depression as fatigue is one of the complains they report; according to Doyne et al., (1987), running reduces depression significantly. Hence, this study incorporated running as one of the components of physical activity, and the individuals were given the choice to participate in this activity.

**Physical Activity on Mood and Stress**

In a study by Descilo et al., (2010), survivors of tsunami were diagnosed with depression and post-traumatic stress disorder (PTSD); these survivors had low quality of life, generally felt strained, had trouble sleeping, and experienced anhedonia. Yoga-breath intervention was found to be beneficial for these individuals in decreasing their depressive symptoms and improving the symptoms of PTSD (Descilo et al., 2010). According to Driver and Ede (2009), participants putting effort into physical activities must be provided with a positive experience to increase their self-efficacy and enhance their mood to accomplish that activity, and these changes in mood can then be attributed to greater self-efficacy. In addition, positive mood is associated with the likelihood that participants will become more socially active, decrease relying on others, maintain employability, and enhance an overall quality of life (Armstrong; Brown, and VanderGoot; Callaghan; Arenth, Corrigan, and Schmidt as cited in Driver, and Ede, 2009). Likewise, physical activity is associated with the reduction of stress as well as enhancement of mood. According to Beets, and Mitchell (2010), yoga is one of the exercises that have been helpful in decreasing stress and improving quality of life. According to Doyne et al., (1987), physical activity strengthens cardiovascular and pulmonary systems and provides with psychological benefits; a decrease in cardiovascular response to stressful situations helps built-in shield against stress (Doyne et al., 1987). Moreover, UK National Consensus Statements (2000) supports the effectiveness of exercise on depression as exercise reduces stress, and is associated with positive mood (Biddle, Fox, and Boutcher as cited in Donaghy, 2007). Even as little as one session of physical activity resulted in an enhanced mood for a short term, and had greater effects on positive mood in clients with Major Depressive Disorder (Bartholomew, Morrison, & Ciccolo, 2005).
Physical Activity on Sleep

Individuals with depression have difficulty sleeping, and physical activity has known to be very effective for sleep disturbance. According to Youngstedt and Kline (2006), exercise has been shown to improve sleep disturbance. Furthermore, Alencar et al., (2006) also reported in their study that water exercise helped older adults improve their sleep, and which enhanced their quality of life. Additionally, Jerstad et al., (2010) state that for individuals with depression, exercise can serve as a diversion from destructive coping strategies like rumination, and this study further emphasizes on the fact that exercise decrease the risk for relapse.

Physical Activity on Self-Esteem and Self-Confidence

According to Lyubomirsky and Nolen-Hoeksema (1995), rumination is the tendency to focus on negative feelings about self, present, past, and future, thus contributing to a continued depressed mood; where physical activity is associated with a decrease in rumination in participants with depression, which results in enhanced self-perception (Craft, 2005). Furthermore, physical activity can affect the psychological mechanism that affects the mood by an increase in self-efficacy, better self-concept, and reduction in negative thoughts (Blumenthal et al., 1999). Moreover, physical activities like yoga can increase other sub-dimensions that are health-related quality of life such as physical health, self-esteem and general feelings (Beets & Mitchell, 2010). Likewise, exercise increases self-esteem that can be effective in decreasing depression (Ekeland, Heian, and Hagen, 2005). UK National Consensus Statement also support this point that with the improvement in cognitive function through exercise, there can be an improvement in body image and self-perception, which is very important for individuals with depression because of the feeling of worthlessness associated with depression (Donaghy, 2007). Besides, explaining the psychological effects of exercise and physical self-perceptions such as body image, self-esteem and self worth; 50% reported a boost in their self-esteem with the help of exercise (Donaghy, 2007); it also helps in the building of self-confidence.

Benefits of Group Exercise on Social Life

According to Brown, Gordon, and Spielman, depression has been linked with negative self-evaluation and social isolation that causes a decrease in social interaction (as cited in Driver, & Ede, 2009). Furthermore, Legrand, and Heuze (2007) state that individuals with depression have fewer social ties, increase problems in interpersonal relationships, and less support. However, many exercises are performed in groups with other individuals (Coleman & Iso-Ahola), these group exercises may give them a sense of integrating socially (Andersson), and a chance to expand their social network (Stathi, Fox & McKenna as cited in Legrand & Heuze, 2007). Likewise, Blumenthal et al. (1999) also acknowledged the fact that group exercises provide with an opportunity to socially mingle with other participants and thus is beneficial. Moreover, participation in a group exercise may provide with a sense of efficacy, enjoyment, and social connectedness, which may result in a decrease in the onset of depression (Jerstad et al., 2010). Furthermore, Donaghy (2007) in her meta-analysis reports that group exercise helps in the development of social support, which in turns is very helpful for individuals with depression as they have the tendency to isolate themselves and as a result have a feeling of loneliness.
**Physical Activity and Cost-effectiveness**

With improving social skills, physical activity is very cost-effective as well. Depression can be treated with many different methods; some examples are psychotherapies and pharmacological agents. Therapies can be hard to access, costly, time-consuming, and cause embarrassment due to stigma and may or may not be effective. According to the National Institute of Mental Health in 2000, the estimated cost was $US26 billion per year for treating depression (Rethorst, Wipfli, & Landers, 2009). Pharmacological agents can be effective, but they are not widely used because they can be costly, difficult to monitor, and cause negative side effects (Trivedi, Greer, Grannemann, Chambliss, & Jordan, 2006). Furthermore, 65-75% of patients on standard antidepressants do not achieve remission; and depressive symptoms often contribute to continued medical costs (Trivedi, Greer, Grannemann Chambliss, & Jordan, 2006). Many studies emphasize on the fact that medication can cause negative side effects that affects patients’ quality of life; those who are on antidepressant may temporarily improve and then relapse within a year after terminating treatment (as cited in Blumenthal et al., 1999). Moreover, medication does not only have negative side effects, but they are also a financial burden with no long-term benefits. Craft, Freund, Culpepper, and Perna (2007) mentioned in their study that depression costs over 80 billion dollars of loss in medical costs and productivity. Therefore, exercise can be recommended to many individuals because it does not have negative social stigma (Dunn, Trivedi, Kampert, Camillia, & Chambliss, 2005), and it is a cost-effective intervention (Donaghy, 2007) with minimal to no side-effects.

**Physical Activity on Global Health**

Exercise not only improves mental health, but it also helps in the improvement of global health. Keysor (2003) state that increase in physical activity is associated with a decrease in risk of developing diseases and disability (2009). According to Driver and Ede (2009), those individuals who are physically active have an improvement in their overall health due to decrease in depression, tension, confusion, fatigue, and increase in energy. Several studies suggest that exercise has a number of psychological advantages such as mood enhancement, increase in cognitive functioning, and improvement in an overall well-being (Emery & Gatz, 1990). Moreover, Bauman, Sallis, Dzewaltowski, Owen and Fiatarone Singh (2002) state that regular exercise is universally attributed to the maintenance of independent and healthy lifestyle. Likewise, Impett, Daubenmier and Hirschman (2006) found in their study that yoga has been associated with higher quality of life. Additionally, Schell, Allolio, and Schonecke state that exercises like yoga has shown greater improvement in positive mood, life satisfaction, and the ability to cope with stress (Kraemer & Marquez, 2009). Based on a meta-analysis done by Donaghy (2007), exercise helps increase levels of brain-derived neurotrophic factor, and this substance is known to enhance mood and help in the survival of brain cells, which can also be linked to better cognitive function. Hence, exercise also helps in the prevention of chronic illnesses such as diabetes, cardiovascular diseases, obesity, and hypertension (Donaghy, 2007).

**Physical Activity on Mortality Rates**

Nolan & Badger (2005) state that depression that has not been treated or managed properly can have various negative outcomes such as poor somatic health, problems in marital life, fatigue and suicide. Sometimes depression goes under-reported and these individuals do not access treatment which can result in higher risk for suicide. According to WHO 850 million lives are lost every year due
to depression, which is the third highest causes of death (Donaghy, 2007). Furthermore, according to Tsang, Chan, & Cheung (2008), literature shows that 60% of completed suicides can be associated with depression. As well, depression is associated with one or more chronic illnesses like cardiovascular diseases and diabetes, disabilities, and these chronic diseases can lead to increase in mortality (Blumenthal et al., 1999). Whereas, participating in exercise has been associated with reducing depressive symptoms and affecting mood (Blake, Mo, Malik, & Thomas, 2009). The mental health foundation report on exercise therapy also states that participating in physical activity gives a sense of control to individuals with depression over their recovery, which can have therapeutic effects because individuals with depression often have feelings of hopelessness and inability (2005). Moreover, the feeling of hopelessness is often related to suicidal ideation and giving up on the world; hence a decrease in hopelessness can be associated with a decrease in suicidal thoughts, and mortality rates.

**Attendance and Self-Monitoring**

Another problem with depression is that individuals with depression lack motivation and energy, and they may not adhere to the physical exercise, this may affect clients’ attendance. According to Jerstad, Boutelle, Ness, and Stice (2010), depression may interfere in the clients’ termination of later exercises, due to anhedonia, and psychomotor retardation. To make sure that this problem does not interfere with the study the participants were asked to self-monitor their progress, and attendance. According to a study by Makil, Rudrud, Schulze, and Rapp (2008), showed that use of self-recording increased clients’ participation in exercise. Hence, this study used self-monitoring as well, which is a very simple process to teach, and it can help participants observe their progress which will then give them a sense of accomplishment.

**Physical Activity in Other Populations**

Exercise is not only effective in individuals with depression, but many other populations such as people with traumatic brain injury (TBI), anxiety, schizophrenia, and PTSD, and it is an intervention suitable for all age groups and both sexes. Individuals with TBI often experience changes in mood like, anxiety, aggression, frustration, and depression after a traumatic brain injury (Driver & Ede, 2009). More recent research demonstrate that participating in exercise can reduce the above negative mood changes that can then positively affect their overall rehabilitation by helping them avoid the negative cycle of psychosocial problems such as developing destructive coping strategies like substance abuse (Driver, & Ede, 2009). Moreover, Brown and Gerbarg (2005) discover in their study that the breathing techniques used during yoga help in the relief of PTSD, depression, chronic pain, anxiety and many other stress-related somatic illnesses. As well, Descilo et al., (2010) found out in their study that yoga breath program reduced symptoms of PTSD in a six week intervention and the decrease in PTSD was maintained after 24-week follow-up. In addition, exercises like yoga with antipsychotics medication has been reported to have significant improvement in schizophrenia patients’ pathological behaviours and negative symptoms (Duraiswamy, Thirthalli, Nagendra, & Gangadhar, 2007); they also improved in their occupational, social and overall quality of life.

**Summary**

According to WHO (2007), the symptoms of depression like feeling of unhappiness, anhedonia, feeling of worthlessness, guilt, disturbed sleep, and difficulty concentrating impairs peoples’ lives and
interferes with their occupational, social and interpersonal lives. Furthermore, depression is a leading cause for suicide, and about 850,000 lives are lost every year (WHO, 2007). In addition, depressive disorders are among the leading causes for disability (WHO) and chronic diseases (Craft, Freund, Culpepper, & Perna, 2007). Depression can be diagnosed and treated; however, less than 25% of people have access to treatment (WHO, 2007). The cause for not accessing treatment can be the cost, negative stigma and side effects related to it, pharmacological or psychotherapies. Exercise is a preventative measure for those at risk for depression and it is a potential treatment for those who are suffering from depression (Trivedi, Greer, Grannemann, Chambliss, & Jordan, 2006; Driver, & Ede, 2009). Exercises like walking, yoga and running has been reported to be significantly beneficial for depression. Where walking is a low intensity exercise and can be seen as a better start for beginning physical activities, and it provides individuals with the feeling of accomplishment and does not put strain on these individuals. Moreover, yoga is a mind-body exercise that increases the GABA levels of participants, which is said to be low in people with depression (Streeter et al., 2007). Furthermore, yoga helps in strengthening musculoskeletal system, and memory (Mahajan & Babbar as cited in Kraemer & Marquez, 2009) where running improves mental and cognitive flexibility and can be used as an exercise of participant’s preference. As it is a high-intensity exercise, this study does not want to put strain on the individuals unless they themselves want to take part in it. Furthermore, exercise helps in the enhancement of mood and decrease of stress; it also helps in sleep as sleep disturbance is a common complain among depression (Youngstedt & Kline, 2006). Likewise, exercise helps improve self-esteem and confidence by providing individuals with control over their recovery and that helps diminish the feeling of hopelessness. One other benefit of exercise is that it helps build social skills in individuals with depression; individuals with depression often tend to isolate themselves where exercise provides them with social support when performed in a group (Brown, Gordon, & Spielman, 2003). Another advantage of exercise is that it is cost-effective with no negative stigma or side effects and with an overall improvement in global health. Best of all, exercise helps decrease mortality rates due to depression, helps decrease the global burden on the world, and is beneficial to other populations as well. Therefore, exercise is an effective treatment for depression which can be equivalent to psychotherapy or placebo treatment (Blumenthal et al., 1999).
CHAPTER III: Method

Participants

Inclusion and Exclusion Criteria

The inclusion criteria for this study was that participants were required to be between the ages of 18 – 70, male or female diagnosed with depression according to the DSM-IV-TR criteria. These participants were to be the current clients of the mental health agency and were to be referred by their case-managers or workers from the agency using the registration forms (Appendix A). The participants were required to have good motor skills and should have been cleared by their physicians before participating in this study. Also, clients who had self-injurious or suicidal behaviours were to be excluded from this study for their own safety and the welfare of others, and they were to be referred for counselling. Participation in this study was on voluntary basis, and those participants who volunteered to participate had to complete the consent form (Appendix B).

Pre-Group Meeting

After the participants were referred to the study, the researcher arranged a pre-group meeting in a room at the agency. The researcher reviewed the consent form (Appendix B) with the participants and explained the consent form both in verbal and written forms. Furthermore, the participants were informed that their participation in this study was on voluntary basis, and that they have the right to withdraw from the study at any time devoid of explanation and without facing any consequences. Also, it was explained in this meeting that their information and the data related to them will be deleted if they decided to leave the study. After signing the consent form, the participants were asked to complete the Beck’s Depression Inventory-II (BDI-II) (Appendix C) and the Hamilton Depression Rating Scale (HDRS) (Appendix D) to see where the participants scaled in terms of depression as a baseline data measure for the study. Furthermore, the participants were explained the procedure of the study that the exercises in group will take place three times a week for 30 – 60 minutes. Also, participants were informed that they had a choice whether to practise physical activity at their own time and place or to join the group. The participants were then provided with the timetable of the group exercises. The participants were allowed to ask any questions regarding the study and if they wanted to take the consent form home and read over it at their own time and pace. One of the participants chose to take the consent form home and to read it at home.

Description of Participants

There were three participants referred to this study, only two participants participated during the first week of the intervention. After one week of participation in the group exercise, one of the two clients dropped out of the study, and this is the reason she has not been described in the next section. The third participant did not contact the researcher until the last week of the study therefore she was not included in the study. There was only one participant left in the current study and her description is as follows:

Gracie Smith
Gracie Smith, a fictional name, was a Caucasian 61-year-old female who received a diagnosis of depression by her physician; she was married and lived with her husband. In addition, she has no children and was currently unemployed. She worked contracts occasionally while her partner was retired; Gracie owned a house with her husband and was well-off financially. Furthermore, she had completed some courses at a college, and had done jobs internationally with her husband. The participant was recently arrested for public misconduct in the summer and was heavily under the influence of alcohol; she got into arguments with her neighbours and was under criminal charges for uttering threats; arson twice and mischief four times. This was the first time she had these charges. After this incident, she requested help and was referred to the agency’s court support unit. Prior to this incident, she was uninterested in medication or support, and reported that depression is part of her life and medication or therapies would not help. She was granted bail during the Fall, and she seemed very depressed after that. She reported no appetite, suicidal ideation, feelings of guilt and continual rumination. Her case-worker from the agency assessed her risk for suicide and determined that she had no intent to suicide, and had ideation from perceived hopelessness at her present situation. Moreover, with respect to her alcohol use, she was referred to the addiction team at the agency; she has been compliant with the addiction services and has always been present for her appointments. Moreover, she has been prescribed Prozac for her depression, which she had been taking it for over six weeks.

Gracie had many strengths such as she is social, reliable, punctual, tidy, and an independent woman, who is not afraid to bring her point of view across. Furthermore, she likes to cook different ethnic food. She had a great support from her husband, and received support from the addiction and court support units of the agency. In addition, Gracie was a woman of medium built and appeared to be physically healthy.

**Design**

The research design was a single-subject design that consisted of repeated measures comprised of pre-and-post tests using the BDI-II and the HDRS. The participants were asked to complete these scales before the study begun and after the last session of the study. The study consisted of twelve sessions occurring three times a week for four weeks. Each session was 30 – 60 minutes in length.

**Independent variable**

The independent variable in this study was the physical activity that included walking, yoga, and/or running.

**Dependent variable**

The dependent variable will be a measure of depression scores. The participants’ levels of depression will be measured using the BDI-II and the HDRS.
Data Analysis

Beck’s Depression Inventory-II (BDI-II)

The pre-test scores (Appendix C) and post-test scores for the BDI-II are displayed in Appendix E. Also, the visual analysis for these pre-and-post test scores is displayed in the form of bar graphs in Appendix F.

Hamilton Depression Rating Scale (HDRS)

The pre-test scores (Appendix D) and the post-test scores for the HDRS are displayed in Appendix G, and the visual analysis of these scores is displayed in the form of bar graphs in Appendix H.

Frequency and Duration Recording

The pre-and-post raw data for frequency and duration recording is included in tables in the next chapter. The mean, median and standard deviation is also included in the next chapter with a visual analysis in the form of a line graph.

Setting/Materials

The walking sessions took place outside of the agency. The participant and the researcher walked from the agency in downtown Kingston for 30-60 minutes and came back to the agency after finishing the session. The researcher and the participant also went to the Cataraqui Mall for a walk during two sessions when the weather was not permitting for a walk (i.e., snowing outside). Furthermore, one yoga session was offered to the participant on a weekly basis by the agency in a fitness studio at the agency. Moreover, the participant was asked to wear comfortable clothes or gym clothes with proper running shoes for her safety. Also, the agency provided the participant with yoga mats for the yoga sessions. In addition, the researcher carried a cell-phone during the walking sessions for emergency purposes, for example, if the client gets injured or needs medical attention then the researcher could call the hospital and inform the agency as well.

Measures

Beck’s Depression Inventory-II (BDI-II)

The BDI-II is an easy, user-friendly, self-report measure of depression; it is an upgraded and revised version of BDI. It is a 21-item scale with a 4-point Likert scale ranging from 0 (not present) to 3 (severe); it takes an average person five to ten minutes to complete (Beck, Steer, & Brown, 1996). This test is designed at a fifth grade level for ages 13 and older. There were four items changed in the BDI-II from the previous version; those changes included body image change, difficulty working, somatic preoccupation, and weight loss. These four items were replaced by agitation, loss of energy, worthlessness, and difficulty in concentration to fulfill the DSM-IV criterion for depression. According to Beck, Steer and Brown (1996), the BDI-II is a fairly researched assessment tool with an extensive amount of support for its validity and reliability. Furthermore, this tool should not be used as a
diagnostic tool, but as an indicator of measure of depression. Moreover, this tool may have high under-reporting or over-reporting when used as a suicide screening tool (Beck and Steer, 1996). In addition, because BDI-II is a self-report, clients may intentionally tailor the report and distort the results for social desirability or skewed self-reporting.

**Hamilton Depression Rating Scale (HDRS)**

The HDRS was published in 1960 and was invented by Max Hamilton. It is a multiple choice questionnaire used by clinicians to determine the severity of and change in clients’ depressive symptoms (Hedlund, & Viewig, 1979). This scale contains 17-items related to symptoms of depression experienced by the client for over the past week. The administration takes about 20-30 minutes and is designed for adult population only. One of the limitations of HDRS is that it does not assess the atypical symptoms of depression like hypersomnia, and hyperphagia (Hamilton, 1960). According to Hamilton (1960), HDRS is used for patients who are already diagnosed with depression, and this scale should not be used for diagnostic purposes. This scale should be used during an interview between the clinician and the patient, and it should be filled by the interviewer to properly assess the patient (Hamilton, 1960). This scale contains 17-items related to symptoms of depression experienced by the client for over the past week. Some of these items are described by a series of categories through increase in the intensity of depression, and the others through equal-valued terms (Hamilton, 1960). The items are measured either on 5-point or 3-point scale. For scoring purposes, Hamilton suggests that two raters independently score the same interview, and this will help obtain interrater reliability. The study by Bagby, Ryder, Schuller, and Marshall (2004) report that HDRS has an adequate internal reliability; however, most of the items on the scale are a poor measure for the severity of depression. Also, the scale has poor interrater, retest reliability and poor content validity. HRDS has satisfactory convergent and discriminant validity; this scale is said to be conceptually and psychometrically flawed (Bagby, Ryder, Schuller & Marshall, 2004).

**Procedures**

Prior to the recruitment of subjects for this study this study, the registration forms (Appendix A) were provided to the case-managers or workers to enrol their clients for this study. Also, an announcement email was sent out via the receptionist and the supervisor of the case-management team of the agency to other branches for recruitment purposes. Once the clients were referred, the researcher assessed client’s depression using BDI-II and HRDS during the pre-group meeting and after the last session. Also, the clients gave their consent for participating in the study by signing the consent forms provided by the researcher. The intervention was carried out over a four weeks period; the physical activities took place three times a week for 30-60 minutes. The intervention consisted of only group activities in the beginning of the study because the client decided not to take part in any individual physical exercises. Once the study began, the participant was given the duration and frequency recording forms to self-monitor her weekly activities. The duration recording forms were used to see how long the participant has been involved in the activity for during each session. The frequency recording forms were used to see how often the participant has been performing physical activities each week. Also, the researcher and a volunteer from the agency monitored the duration and frequency of the participant’s physical activities using duration and frequency recording forms to assure that the participant performed the exercise for atleast 30 minutes. Furthermore, the clients were verbally prompted by the student researcher of their upcoming exercise as a reminder a day prior to the
scheduled activity. In addition, modeling was used to help the participant perform yoga, and the reinforcement was used in the form of verbal praise after every session to motivate the client’s participation in the activities.
CHAPTER IV – Result

Gracie completed both pre- and post assessments using the BDI-II and HDRS. The scores for both the BDI-II and HDRS are presented in tables and graphs below. The data demonstrates an improvement in depressive symptoms on both scales.

Results for Beck Depression Inventory - II (BDI-II)

Beck Depression Inventory – II demonstrates an improvement in the scores from pre to post intervention. Gracie scored 44 on the BDI – II during the baseline, which is indicated of depression rated as severe. During post intervention, Gracie scored 26 on BDI-II; this score indicated of depression rated at moderate. The participant decreased by 18 points on Beck Depression Inventory – II (Refer to Appendix C and E for raw scores). The results are summarized in Table 1 and graphed in Figure 1 and Appendix F.

Table 1
Summary of Baseline and Intervention Scores for Beck Depression Inventory - II

<table>
<thead>
<tr>
<th>Baseline</th>
<th>Intervention</th>
<th>Difference Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beck Depression Inventory - II Scores</td>
<td>Pre 44</td>
<td>Post 26</td>
</tr>
</tbody>
</table>

Figure 1. Pre-Post Scores of Beck Depression Inventory – II
Results for Hamilton Depression Rating Scale (HDRS)

The HDRS also demonstrated an improvement in Gracie’s scores from pre to post intervention. During baseline, Gracie scored 24 on HDRS; this score supports that she had very severe depression. Participant score improved after the exercise intervention, and she scored 13 during post-intervention and her score demonstrated that she had moderate depression, which showed a decrease of 11 points on HDRS (Refer to Appendix D and G for the scores). The data has been summarized in Table 2 and graphed in Figure 2 and Appendix H.

Table 2
Summary of Baseline and Intervention Scores for Hamilton Depression Rating Scale (HDRS)

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Intervention</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hamilton Depression</td>
<td>Pre</td>
<td>Post</td>
<td>Points</td>
</tr>
<tr>
<td>Rating Scale Scores</td>
<td>24</td>
<td>13</td>
<td>-11</td>
</tr>
</tbody>
</table>

Figure 2. Pre-Post Scores of Hamilton Depression Rating Scale
Results for Frequency and Duration of Yoga and Walking

Gracie’s data for frequency and duration of yoga and walking was recorded using frequency and duration recording forms. During baseline, she did not participate in any physical activity so her score was 0 for both frequency and duration recording. Gracie participated in yoga for the first two weeks and stopped going to yoga classes for the remaining of the intervention due to a pinch nerve in her arm. She participated in all walking sessions during the intervention. Frequency and duration recording was used for attendance purpose and to help boost client’s confidence by seeing her progress session by session, which gave a sense of accomplishment to the client. The raw score for frequency and duration recording can be found in Appendix I and Appendix J. The data for frequency and duration recording is summarized in Table 3 and Table 4 and graphed in Figure 3, Figure 4, Appendix K and Appendix L.

Table 3
Summary of Baseline and Intervention for the Frequency of Yoga and Walking Session per Week

<table>
<thead>
<tr>
<th>Baseline</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Week 1</td>
</tr>
<tr>
<td>Mean</td>
<td>3</td>
</tr>
<tr>
<td>Median</td>
<td></td>
</tr>
<tr>
<td>St. Dev.</td>
<td></td>
</tr>
</tbody>
</table>

Figure 3. Frequency Recording of Yoga and Walking
Table 4
Summary of Pre and Post Data for Duration in minutes recording of Yoga and Walking Sessions

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Duration for Yoga</td>
<td>Duration for Walking</td>
</tr>
<tr>
<td>Session 1</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Session 2</td>
<td></td>
<td>45</td>
</tr>
<tr>
<td>Session 3</td>
<td></td>
<td>55</td>
</tr>
<tr>
<td>Session 4</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>Session 5</td>
<td></td>
<td>35</td>
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<tr>
<td>Session 6</td>
<td></td>
<td>50</td>
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<td>Session 7</td>
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<tr>
<td>Session 8</td>
<td></td>
<td>60</td>
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<tr>
<td>Session 9</td>
<td></td>
<td>57</td>
</tr>
<tr>
<td>Session 10</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Session 11</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>Session 12</td>
<td></td>
<td>58</td>
</tr>
</tbody>
</table>

Mean 52.5  
Median 56  
St. Dev. 8.77

Figure 4. Results for Duration Recording for Yoga and Walking in Minutes
Summary

This study was designed to further evaluate the effectiveness of physical activities in adults with depression. It was hypothesized that participation in exercise will decrease client’s depressive symptoms. Gracie had a significant improvement on both Beck Depression Inventory-II and Hamilton Depression Rating Scale. Both these scales reported consistent results on client’s depressive symptoms (i.e., the client score at pre-intervention assessed her at severe depression while post-intervention scores placed her at moderate depression for both assessments). Moreover, Gracie reported that she had started taking part in household chores after she had joined the physical activity group. In addition, she reported to be more active after each session and was able to accomplish additional tasks. It was also hypothesized that participant’s global health will improve with the use of exercise. Gracie’s participation in household chores and consistent attendance to the session suggests that there has been an improvement in her global health or improvement in motivation. Furthermore, she stated that she will continue exercise with her partner after the termination of this study. Moreover, the rapport between the researcher worked as a social support for the client and that can be the reason that she was very punctual during all the sessions. In addition, the participant expressed disappointment in the duration of the study as she wanted the study to continue for longer period of time. She even volunteered for a follow-up of this study, but due to time-constraints, it was not possible.

Strengths

The primary strength of this study was that there was a significant improvement in the assessment scores from pre-to-post intervention within a short period of time. The client’s depression score decreased from a severe to moderate depression on both BDI-II and HDRS scales. The secondary strength of this study was that the treatment gains were generalized into other areas of life (e.g., the client reported that she decreased on her alcohol consumption). Moreover, exercise is socially acceptable treatment, which decreased the stigma that is attached to other treatments, therapies and anti-depressants. Furthermore, the client had a good rapport with the researcher, which helped in gaining social support from the researcher. Also, exercise was easily accessible and a cost-effective intervention; the client was open to part-take in it. Hence, the study accommodated the participant’s needs (e.g., the researcher arranged indoor walks during bad weather, walks at the mall).

Limitations

With the above strengths, there were numerous limitations to this study. The fundamental limitation of this study was that exercise might not have been the sole factor of decreasing depressive symptoms because the participant was using anti-depressants and was attending therapy for her addiction problem. Another drawback was that the study started as a group intervention and later became a case study due to participants’ attrition. The client might have dropped out due to the intensity and frequency of the exercise, or exhaustion. Another limitation of this study was a very small sample size, which was not representative of the population, and that is why this study could not be generalized to other demographics as there was a single participant in the study. Lack of control group was another limitation for this study, which could have been helpful in comparing the current results with the results of the controlled group, to help prevent from specifying a spontaneous recovery,
and to help eliminate extraneous variables. Persons with depression have the probability to recover spontaneously without any cause. Lastly, the decline in depression may have been due to spontaneous remission, which is often observed in clients with depression.

**Multilevel Challenges to Service Implementation**

During the implementation of this study, there were various multilevel challenges encountered by the researcher at client, program, organization and society level.

**Client Level**

Due to depression, clients lack motivation and often did not want to participate in the exercise, which could be one of the reasons the second client dropped out of the group. Another reason for the client’s dropout could be the frequency, intensity and duration of the exercise. The client often complained about knee-ache after the walk and might have found the sessions too intense, long, and frequent. Also, the weather played a significant role in the dropout of the other participant. Gracie was able to come to most of the sessions because the researcher arranged indoor walks with her and she had access to a car, but other participants might not have the transportation to come to different places in a bad weather. Moreover, participants might have dropped out of the group because of the stigma attached to coming to a mental health agency to decrease their depressive symptoms. Hence, it is necessary to tailor the study according to clients’ needs.

**Program Level**

At the program level, there was not sufficient time for the study to carry on and to see the effect of exercise after the study had been terminated. Another challenge was that the clients were not compliant with some of the exercises due to lack of motivation and energy. If the study would have been more flexible towards client’s needs, maybe the second client would not have dropped out.

**Organization Level**

The challenge at the organization level was that the agency was a large agency with multiple branches, which made communication more complex. It took over two weeks to get clients referred to this study. If the researcher had more facilities to communicate the study to other branches, maybe there would have been more than just three referrals.

**Society Level**

The challenge at the society level was that there is stigma attached to mental health, and many clients do not seek treatment due to it. Society is still very narrow minded about getting help, which is why clients may not come forward to participate in studies even related to physical activities. They are afraid to leave home and come to mental health agencies where they could actually get the necessary help.
**Contributions to the Field of Behavioural Psychology**

This research will be a great addition to both the field of mental health and behavioural psychology. Given that depression presents a significant concern and not everyone has access to the necessary therapy or treatment while physical activities provide a cost-effective, widely accessible alternative. Also, the field of behavioural psychology consists of many courses that focus mainly on the behavioural aspect of individuals and by using basic principles of Applied Behaviour Analysis like reinforcement, modelling, and prompting might have been helpful in motivating the client to take part in physical activity, which might have helped in the decrease of her depressive symptoms.

**Future Recommendations**

Future studies of similar kind could include a control group to evaluate for spontaneous recovery or remission. Also, follow-up could be carried out to evaluate maintenance of treatment gains. Another recommendation is that future studies could gather a more diverse sample that consists of different ethnicities, background, sexes, ages, and from a variety of different rehabilitation centres and locations. Lastly, exercises could be made more available to the clients by arranging transportation for the clients, so that the intervention is more accessible. Also, clients with depression have motivational issues; by making the intervention more readily available, could decrease the issue with compliance and attendance. Additionally, further research should look at the neurochemicals aspects alone and in combination with physical activities.
References


Donaghy, M. E. (2007). Exercise can seriously improve your mental health: Fact or fiction?. *Advances in Physiotherapy, 9*(2), 76-88. doi: 10.1080/14038190701395838


APPENDIX A : REGISTRATION FORM

Use of Physical Activity to Decrease Depressive Symptoms in Persons with Depression

➢ To be able to participate in this group, the participants must be diagnosed with depression by their doctor or psychiatrist.

➢ The number of participants needed in this group is 10-15, age ranges from 18 – 70 years.

➢ This group activity will be carried out over a six-week period three times a week and each session will be 30 – 60 minutes long.

➢ The physical activities performed in this group will be walking, jogging, running, and yoga.

➢ Walking, jogging, or running will take place in a local park near the agency on Monday and Thursday afternoons. Whereas yoga will take place on Tuesdays at 552 Princess St. at Frontenac C.M.H.S. Yoga will be lead by a yoga instructor provided by the agency.

➢ Physical activity may not only help you stay physically fit, may decrease depressive symptoms, and may also improve global health.

➢ Punctuality and regular attendance is necessary to benefit from this group therapy.

The group will begin on October 31st, 2011, Monday afternoons, from 1:00-2:00pm.

Location: Frontenac C.M.H.S. at 385 Princess Street. Call as at 613-544-1356 ext. 2279

Nazo Obeidi, 4th year student of BPSYC at St. Lawrence College, will be leading the group.

* To participate in this group, please fill out the form below and give it to your FCMHS contact person.

Registration Form

Name_________________________________________________________________________
FCMHS worker/program__________________________________________________________
Phone #______________________________ Email, if available__________________________
Any comments or requests________________________________________________________
_______________________________________________________________________________
_______________________________________________________________________________

29
APPENDIX B : CONSENT FORM

CONSENT FORM

TITLE: Use of Physical Activities to Decrease Depressive Symptoms in Adults Diagnosed With Depression

STUDENT: NAZO OBEIDI

COLLEGE SUPERVISOR: FIONA GORDON

INVITATION

I am a student in my 4th year in the Behavioural Psychology at St. Lawrence College and I am currently on placement at the Frontenac C.M.H.S., Case Management team. As part of this placement, I am completing a special project called an applied thesis and I am asking for your assistance to complete this project. The information in this form is intended to help you understand my project so that you can decide whether or not you want to participate. Please read the information below carefully and ask all the questions you might have before deciding whether or not to participate.

WHAT IS THE PURPOSE OF THE STUDY?

The purpose of this study is to evaluate the effects of physical activities on adults with Depression. This project will consist of some physical activities like walking, jogging, and yoga. Also, we would like to know what physical activities you prefer so that we can make this project more interesting to you. Your opinions and thoughts are taken seriously and are highly important to us and our project. Please feel free to ask any questions, and provide any suggestions.

WHAT WILL YOU NEED TO DO IF YOU TAKE PART?

Initially, clients’ level of depression will be measured using Beck’s Depression Inventory (BDI) and Hamilton’s Depression Rating Scale (HDRS) before the physical activity sessions begin. This project is about physical activities, and it will be implemented for a duration of six weeks. You will be asked to participate in these activities three times a week, and each physical activity session will be 30-60 minutes long in duration. The participants will be asked to meet the student researcher, who is leading the group, at Frontenac C.M.H.S at 385 Princess St. on Monday and Thursday at 1:00 pm. From there they will go on walks or jogging in a nearby park. The yoga session will take place on Tuesday at the other branch of Frontenac C.M.H.S at 552 Princess St. The yoga sessions will be run by a yoga instructor provided by the agency. Those participants who prefer to work individually at their own pace will also be asked to perform physical activities for 30-60 minutes three times in a week. Moreover, the participants will record the time they start their activity and the days they perform the activities. Furthermore, the student researcher will record the duration and frequency of participants’ activities. For those who are not familiar with the activity will first be taught the physical activity before the session begins, and they will be assisted throughout the session, using verbal prompts in the
form of reminders, modelling the activity for the participants and using social reinforcement in the form of praise. Also, participants will be reminded through phone calls a day before the activity is taking place in the first few sessions and then these prompts will be faded so that participants can take responsibility to attend the groups. Participants should be cleared by their physician before participating in this project.

**WHAT ARE THE POTENTIAL BENEFITS TO ME OF TAKING PART?**

The potential benefits from this project may be getting physically fit, your brain releasing endorphins, which help persons in staying happy, and making new friends. Moreover, you might as well feel better by helping others during the exercise. Furthermore, you will get the satisfaction that you are contributing to this project.

**WHAT ARE THE POSSIBLE DISADVANTAGES AND RISKS OF TAKING PART?**

There are minimal risks associated with this project. One of the primary risks would be injury to self or others during the activity. Fatigue and exhaustion can be another risk.

**WHAT HAPPENS IF SOMETHING GOES WRONG?**

If something goes wrong, then you must come and inform me, Nazo Obeidi, and I might be able to help you with the situation at hand. If I was not able to help, then I will contact the agency and college supervisor via cell phone.

**WILL MY TAKING PART IN THIS PROJECT BE KEPT PRIVATE?**

All efforts will be made to keep your information confidential unless it is required by law. The consent forms will be kept in a locked cabinet at St. Lawrence College for ten years. Also, all the data will be kept at the agency in locked cabinets. The files will be kept with different names and code numbers for the confidentiality purposes. Information on computers will also be password protected and only my college supervisor, Fiona Gordon, will be able to access it. Fictional names will be used for the participants, and their actual names will not be used in any reports, presentations, or publications from this project. Also, the participants have the rights to ask for their data to be destroyed if they wished so.

**DO YOU HAVE TO TAKE PART?**

It is up to you to decide whether or not to take part. If you decided to take part, then you will be asked to sign this consent form. If you decided to withdraw, then you are still free to withdraw at any time, without giving any reason, and without affecting the services provided to you by the agency.

**CONTACT FOR FURTHER INFORMATION.**

This project has been approved by the Research Ethics Board at St. Lawrence College. The project will be developed under the supervision of Fiona Gordon, my supervisor from St. Lawrence College. I really appreciate your cooperation. If you have any additional questions or concerns, feel free to ask
me, Nazo Obeidi, nobeidi29@sl.on.ca or you can contact my College Supervisor, Fiona Gordon at fgordon@sl.on.ca; you may also contact the Research Ethics Board at appliedresearch@sl.on.ca.

CONSENT

If you agree to participate in the project, please complete the following form and return it to me as soon as possible. A copy of this signed document will be given to you for your own records. An additional copy of your consent will be retained at the agency and in a secure location with the Behavioural psychology program at St. Lawrence College.
CONSENT

By signing this form, I agree that:

- The research project has been explained to me.
- All my questions were answered.
- Possible harm and discomforts and possible benefits (if any) of this project have been explained to me.
- I understand that I have the right not to participate and the right to stop at any time.
- I am free now, and in the future, to ask any questions about the research project.
- I have been told that my personal information will be kept confidential.
- I understand that the results of this project may be published or presented in a professional forum.
- I understand that no information that would identify me will be released or printed without asking me first.
- I understand that I will receive a signed copy of this consent form.

I hereby consent to participate

Participant’s Printed Name: ____________________________

Signature: __________________

I do not give my consent to participate.

Participant’s Printed Name: ____________________________

Signature: __________________ Date: ________

SLC Student Signature: __________________ Date: ________

Printed Name: ____________________________

Witness: ____________________________ Date: ________

Printed Name: ____________________________
APPENDIX C: Beck Depression Inventory-II During Baseline

Name: Gracie Smith  Marital Status: Married  Age: 61  Sex: F
Occupation: Unemployed  Education: Some College Courses

BDI-II Score = 44

SEVERITY OF DEPRESSION

11/21/2012

<table>
<thead>
<tr>
<th>minimal</th>
<th>mild</th>
<th>moderate</th>
<th>severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>14</td>
<td>20</td>
<td>29</td>
</tr>
</tbody>
</table>

BDI-II Scoring

The BDI-II is scored by summing the ratings for the 21 items. Each item is rated on a 4-point scale ranging from 0 to 3. The maximum total score is 63.

Special attention must be paid to the correct scoring of the Changes in Sleeping Pattern (Item 16) and Changes in Appetite (Item 18) items. Each of these items contains seven options rated, in order, 0, 1a, 1b, 2a, 2b, 3a, 3b, to differentiate between increases and decreases in behavior or motivation. If a higher rated option is chosen by the respondent, the presence of an increase or decrease in either symptom should be clinically noted for diagnostic purposes.

For further information about BDI-II scoring, and interpretation of scores, see:

APPENDIX D: Hamilton Depression Rating Scale During Baseline

<table>
<thead>
<tr>
<th>Activity</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Depressed mood</strong></td>
<td></td>
</tr>
<tr>
<td>Sad, hopeless, helpless, worthless</td>
<td>1</td>
</tr>
<tr>
<td>0 = Absent</td>
<td></td>
</tr>
<tr>
<td>1 = Gloomy attitude, pessimism, hopelessness</td>
<td></td>
</tr>
<tr>
<td>2 = Occasional weeping</td>
<td></td>
</tr>
<tr>
<td>3 = Frequent weeping</td>
<td></td>
</tr>
<tr>
<td>4 = Patient reports highlight these feelings states in his/her spontaneous verbal and non-verbal communication.</td>
<td></td>
</tr>
<tr>
<td><strong>Feelings of guilt</strong></td>
<td>3</td>
</tr>
<tr>
<td>0 = Absent</td>
<td></td>
</tr>
<tr>
<td>1 = Self-reproach, feels he/she has let people down</td>
<td></td>
</tr>
<tr>
<td>2 = Ideas of guilt or rumination over past errors or sinful deeds</td>
<td></td>
</tr>
<tr>
<td>3 = Present illness is punishment</td>
<td></td>
</tr>
<tr>
<td>4 = Hears accusatory or denunciatory voices and/or experiences threatening visual hallucinations. Delusions of guilt.</td>
<td></td>
</tr>
<tr>
<td><strong>Suicide</strong></td>
<td>2</td>
</tr>
<tr>
<td>0 = Absent</td>
<td></td>
</tr>
<tr>
<td>1 = Feels life is not worth living</td>
<td></td>
</tr>
<tr>
<td>2 = Wishes he/she were dead, or any thoughts of possible death to self</td>
<td></td>
</tr>
<tr>
<td>3 = Suicide, ideas or half-hearted attempt</td>
<td></td>
</tr>
<tr>
<td>4 = Attempts at suicide (any serious attempt rates 4)</td>
<td></td>
</tr>
<tr>
<td><strong>Insomnia, early</strong></td>
<td>2</td>
</tr>
<tr>
<td>0 = No difficulty falling asleep</td>
<td></td>
</tr>
<tr>
<td>1 = Complaints of occasional difficulty in falling asleep i.e. more than half-hour</td>
<td></td>
</tr>
<tr>
<td>2 = Complaints of nightly difficulty falling asleep</td>
<td></td>
</tr>
<tr>
<td><strong>Insomnia, middle</strong></td>
<td>1</td>
</tr>
<tr>
<td>0 = No difficulty</td>
<td></td>
</tr>
<tr>
<td>1 = Patient complains of being restless and disturbed during the night</td>
<td></td>
</tr>
<tr>
<td>2 = Walking during the night – any getting out of bed rates 2 (except voiding bladder)</td>
<td></td>
</tr>
<tr>
<td><strong>Insomnia, late</strong></td>
<td>2</td>
</tr>
<tr>
<td>0 = No difficulty</td>
<td></td>
</tr>
<tr>
<td>1 = Waking in the early hours of the morning but goes back to sleep</td>
<td></td>
</tr>
<tr>
<td>2 = Unable to fall asleep again if he/she gets out of bed</td>
<td></td>
</tr>
</tbody>
</table>

Page 1 Score 11
Work and activities

0 = No difficulty
1 = Thoughts and feelings of incapacity related to activities: work or hobbies
2 = Loss of interest in activity – hobbies or work – either directly reported by patient or indirectly seen in listlessness, in decisions and vacillation (feels he/she has to push self to work or activities)
3 = Decrease in actual time spent in activities or decrease in productivity. In hospital, rate 3 if patient does not spend at least three hours a day in activities
4 = Stopped working because of present illness. In hospital rate 4 if patient engages in no activities except supervised ward chores

Retardation

0 = Normal speech and thought
1 = Slight retardation at interview
2 = Obvious retardation at interview
3 = Interview difficult
4 = Interview impossible

Agitation

0 = None
1 = Fidgetiness
2 = Playing with hands, hair, obvious restlessness
3 = Moving about; can’t sit still
4 = Hand wringing, nail biting, hair pulling, biting of lips, patient is on the run

Anxiety, psychic

0 = Absent
1 = Mild
2 = Moderate
3 = Severe
4 = Incapacitating

Demonstrated by:

- subjective tension and irritability, loss of concentration
- worrying about minor matters
- apprehension
- fears expressed without questioning
- feelings of panic
- feeling jumpy

Page 2 Score  8
Anxiety, somatic

Physiological concomitants of anxiety such as:
- gastrointestinal: dry mouth, wind, indigestion, diarrhea, cramps, belching
- cardiovascular: palpations, headaches
- respiratory: hyperventilation, sighing
- urinary frequency
- sweating
- giddiness, blurred vision
- tinnitus
  0 = Absent
  1 = Mild
  2 = Moderate
  3 = Severe
  4 = Incapacitating

Somatic symptoms: gastrointestinal
  0 = None
  1 = Loss of appetite but eating without encouragement
  2 = Difficulty eating without urging. Requests or requires laxatives or medication for GI symptoms

Somatic symptoms: general
  0 = None
  1 = Heaviness in limbs, back or head; backaches, headaches, muscle aches, loss of energy, fatigability
  2 = Any clear-cut symptom rates 2

General Symptoms
Symptoms such as: loss of libido, menstrual disturbances
  0 = Absent
  1 = Mild
  2 = Severe

Hypochondriasis
  0 = Not present
  1 = Self-absorption (bodily)
  2 = Preoccupation with health
  3 = Strong conviction of some bodily illness
  4 = Hypochondrial delusions

Page 3 Score 5
Loss of Weight

either ‘A’ or ‘B’:

A When rating by history:
   0 = No weight loss
   1 = Probable weight loss associated with present illness
   2 = Definite (according to patient) weight loss

B Actual weight changes (weekly):
   0 = Less than 1 lb (0.5 kg) weight loss in one week
   1 = 1-2 lb (0.5 kg-1.0 kg) weight loss in week
   2 = Greater than 2 lb (1 kg) weight loss in week
   3 = Not assessed

Insight

   0 = Acknowledges being depressed and ill
   1 = Acknowledges illness but attributes cause to bad food, overwork, virus, need for rest, etc.
   2 = Denies being ill at all

Page 4 Score  0

TOTAL Score  24
APPENDIX E: Beck Depression Inventory-II Post-Intervention

Name: Gracie Smith  Marital Status: Married  Age: 61  Sex: F
Occupation: Unemployed  Education: Some College Courses

BDI-II Score = 26

<table>
<thead>
<tr>
<th>ITEM</th>
<th>RESPONSE</th>
<th>RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sadness</td>
<td>I feel sad much of the time.</td>
<td>1</td>
</tr>
<tr>
<td>2. Pessimism</td>
<td>I feel discouraged about the future.</td>
<td>1</td>
</tr>
<tr>
<td>3. Past Failure</td>
<td>I have failed more than I should have.</td>
<td>1</td>
</tr>
<tr>
<td>4. Less Pleasure</td>
<td>I don’t enjoy things the way I used to.</td>
<td>1</td>
</tr>
<tr>
<td>5. Guilty Feelings</td>
<td>I feel guilty over many things I have done or should have done.</td>
<td>1</td>
</tr>
<tr>
<td>6. Punishment Feelings</td>
<td>I feel I am being punished.</td>
<td>3</td>
</tr>
<tr>
<td>7. Self-Dislike</td>
<td>I am disappointment in myself</td>
<td>2</td>
</tr>
<tr>
<td>8. Self-Criticalness</td>
<td>I am more critical of myself than I used to be.</td>
<td>1</td>
</tr>
<tr>
<td>9. Suicidal Thoughts or Wishes</td>
<td>I have thoughts of killing myself, but I would not carry them out.</td>
<td>1</td>
</tr>
<tr>
<td>10. Crying</td>
<td>I feel like crying, but I can’t.</td>
<td>3</td>
</tr>
<tr>
<td>11. Agitation</td>
<td>I am no more restless or wound up than usual.</td>
<td>0</td>
</tr>
<tr>
<td>12. Loss of Interest</td>
<td>I am less interested in other people than I used to be.</td>
<td>1</td>
</tr>
<tr>
<td>13. Indecisiveness</td>
<td>I put off making decisions more than I used to.</td>
<td>1</td>
</tr>
<tr>
<td>14. Worthlessness</td>
<td>I don’t consider myself as worthwhile and useful as I used to.</td>
<td>1</td>
</tr>
<tr>
<td>15. Loss of Energy</td>
<td>I have less energy than I used to have.</td>
<td>1</td>
</tr>
<tr>
<td>16. Changes in Sleeping Pattern</td>
<td>I sleep somewhat more than usual.</td>
<td>1</td>
</tr>
<tr>
<td>17. Irritability</td>
<td>I am slightly more irritated now than usual.</td>
<td>1</td>
</tr>
<tr>
<td>18. Changes in Appetite</td>
<td>My appetite is somewhat greater than usual.</td>
<td>1</td>
</tr>
<tr>
<td>19. Concentration Difficulty</td>
<td>I can’t concentrate as well as usual.</td>
<td>1</td>
</tr>
<tr>
<td>20. Tiredness or fatigue</td>
<td>I get more tired or fatigued more easily than usual.</td>
<td>1</td>
</tr>
<tr>
<td>21. Loss of Interest in Sex</td>
<td>I have almost no interest in sex.</td>
<td>2</td>
</tr>
</tbody>
</table>

BDI-II Scoring

The BDI-II is scored by summing the ratings for the 21 items. Each item is rated on a 4-point scale ranging from 0 to 3. The maximum total score is 63.

Special attention must be paid to the correct scoring of the Changes in Sleeping Pattern (Item 16) and Changes in Appetite (Item 18) items. Each of these items contains seven options rated, in order, 0, 1a, 1b, 2a, 2b, 3a, 3b, to differentiate between increases and decreases in behavior or motivation. If a higher rated option is chosen by the respondent, the presence of an increase or decrease in either symptom should be clinically noted for diagnostic purposes.

For further information about BDI-II scoring, and interpretation of scores, see:

APPENDIX F: Pre-and-Post Scores for Beck Depression Inventory-II
### APPENDIX G: Hamilton Depression Rating Scale Post-Intervention

**Patient Name:** Gracie Smith

**Rater Name:** Nazo Obeidi

**Date:** December 16, 2012

<table>
<thead>
<tr>
<th>Activity</th>
<th>Score</th>
</tr>
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<tbody>
<tr>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Feelings of guilt</th>
<th>3</th>
</tr>
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<tbody>
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<table>
<thead>
<tr>
<th>Suicide</th>
<th>2</th>
</tr>
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<tbody>
<tr>
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<td></td>
</tr>
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<table>
<thead>
<tr>
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<tbody>
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3 = Decrease in actual time spent in activities or decrease in productivity. In hospital, rate 3 if patient does not spend at least three hours a day in activities
4 = Stopped working because of present illness. In hospital rate 4 if patient engages in no activities except supervised ward chores

Retardation

Slowness of thought and speech; impaired ability to concentrate; decreased motor activity
0 = Normal speech and thought
1 = Slight retardation at interview
2 = Obvious retardation at interview
3 = Interview difficult
4 = Interview impossible

Agitation

0 = None
1 = Fidgetiness
2 = Playing with hands, hair, obvious restlessness
3 = Moving about; can’t sit still
4 = Hand wringing, nail biting, hair pulling, biting of lips, patient is on the run

Anxiety, psychic

Demonstrated by:
• subjective tension and irritability, loss of concentration
• worrying about minor matters
• apprehension
• fears expressed without questioning
• feelings of panic
• feeling jumpy
0 = Absent
1 = Mild
2 = Moderate
3 = Severe
4 = Incapacitating

Page 1 Score 8
Page 2 Score 4
Anxiety, somatic  
Physiological concomitants of anxiety such as:
• gastrointestinal: dry mouth, wind, indigestion, diarrhea, cramps, belching
• cardiovascular: palpations, headaches
• respiratory: hyperventilation, sighing
• urinary frequency
• sweating
• giddiness, blurred vision
• tinnitus
  0 = Absent  
  1 = Mild  
  2 = Moderate  
  3 = Severe  
  4 = Incapacitating

Somatic symptoms: gastrointestinal  
0 = None  
1 = Loss of appetite but eating without encouragement  
2 = Difficulty eating without urging. Requests or requires laxatives or medication for GI symptoms

Somatic symptoms: general  
0 = None  
1 = Heaviness in limbs, back or head; backaches, headaches, muscle aches, loss of energy, fatigability  
2 = Any clear-cut symptom rates 2

General Symptoms  
Symptoms such as: loss of libido, menstrual disturbances  
0 = Absent  
1 = Mild  
2 = Severe

Hypochondriasis  
0 = Not present  
1 = Self-absorption (bodily)  
2 = Preoccupation with health  
3 = Strong conviction of some bodily illness  
4 = Hypochondrial delusions

Page 3 Score  
1
Loss of Weight

either ‘A’ or ‘B’:

A When rating by history:
   0 = No weight loss
   1 = Probable weight loss associated with present illness
   2 = Definite (according to patient) weight loss

B Actual weight changes (weekly):
   0 = Less than 1 lb (0.5 kg) weight loss in one week
   1 = 1-2 lb (0.5 kg-1.0 kg) weight loss in week
   2 = Greater than 2 lb (1 kg) weight loss in week
   3 = Not assessed

Insight

0 = Acknowledges being depressed and ill
1 = Acknowledges illness but attributes cause to bad food, overwork, virus, need for rest, etc.
2 = Denies being ill at all

Page 4 Score  0

TOTAL Score  13
APPENDIX H: Pre-and-Post Scores for Hamilton Depression Rating Scale

Pre and Post Scores for Hamilton Depression Rating Scale

<table>
<thead>
<tr>
<th>Scores</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
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<tr>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Pre-Treatment
- Post-Treatment
APPENDIX I: Raw Data for Frequency Recording

FREQUENCY RECORDING FORMS

Client: Gracie Smith
Observers: Nazo Obeidi & Gracie Smith
Setting/Environment: Park or Mall
Target Behaviour: Walking or Yoga

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
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<tbody>
<tr>
<td>X 11/21/2012</td>
<td>X 11/22/2012</td>
<td></td>
<td>X 11/24/2012</td>
<td></td>
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<td>X 11/28/2012</td>
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<td>X 12/01/2012</td>
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<tr>
<td>X 12/05/2012</td>
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<td>X 12/08/2012</td>
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</tr>
<tr>
<td>X 12/12/2012</td>
<td></td>
<td></td>
<td>X 12/15/2012</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX J: Raw Data for Duration Recording

DURATION RECORDING FORMS

<table>
<thead>
<tr>
<th>DATE</th>
<th>DATE</th>
<th>DATE</th>
</tr>
</thead>
</table>
| Start: 1:30  
Stop: 2:15  
Duration: 45 min | Start: 9:30  
Stop: 10:15  
Duration: 45 min | Start: 9:30  
Stop: 10:25  
Duration: 55 min |
| Start: 1:30  
Stop: 2:30  
Duration: 60 min | Start: 8:30  
Stop: 9:05  
Duration: 35 min | Start: 8:30  
Stop: 9:20  
Duration: 50 min |
| Start: 1:30  
Stop: No show  
Duration: | Start: 8:35  
Stop: 9:35  
Duration: 60 min | Start: 8:30  
Stop: 9:27  
Duration: 57 min |
| Start: 1:30  
Stop: No show  
Duration: | Start: 8:30  
Stop: 9:30  
Duration: 60 min | Start: 10:00  
Stop: 10:58  
Duration: 58 min |
APPENDIX K: Gracie’s Frequency for Walking and Yoga

Gracie’s Frequency of Exercise

Baseline
Intervention

Time in Weeks

Frequency of Exercise

0 1 2 3 4 5
APPENDIX L: Gracie’s Duration of Walking and Yoga

Gracie’s Duration of Exercise

Baseline

Intervention

Number of Sessions

Duration in Minutes

0 1 2 3 4 5 6 7 8 9 10 11 12 13