The Role of Physical Activities in the Management of Depression

Chinelo Helen Ene OGWUCHE1* & Uchenna Gerald EZE2
Department of Psychology,
Benue State University, Makurdi, Nigeria
*Email: chineloogwuche@gmail.com

ABSTRACT
The review seeks to examine the role of physical activities in the management of depression. A systematic review of past findings as it relates to physical activities and depression has shown some positive effect. Reduced incidence rates of depression among physically active persons suggest that exercise can be used in the treatment of depression. Meanwhile, physical activities had to be used as an adjunct to conventional treatment of psychotherapy and pharmacotherapy. Therefore, the review recommends that both normal and depressed persons should constantly be involved in physical activities to help in either prevention or treatment of depression. Meanwhile hospitals should be provided with recreational materials to enable them mix physical activities with other forms of treatment.

Key words: Depression, physical activities, management, cross-sectional, prospective and experimental studies.

INTRODUCTION
It is well established that physical activity and exercise is associated with a range of health benefits, and its absence can have harmful effects on health and wellbeing, increasing the risk for coronary heart disease, diabetes, certain cancers, obesity, hypertension and all cause mortality. Physical inactivity may be associated with the development of mental disorders. Some clinical and epidemiological studies have shown association between physical activity and symptoms of depression and anxiety in cross sectional and prospective longitudinal studies (Abu-Omar, Ruthen, Dannenberg & Lehtinen 2004; Farmer, Locke, Masciki, Larson & Radtoff, 1988; Dunn, Trived & O’Neal, 2001; Godwin, 2003; Bhui & Flecher 2000).

In the developed world, taking regular exercise is seen as a virtue; the depressed patients who take regular exercise may as a result get positive feedback from other people and an increased sense of self worth. Exercise may act as a diversion from negative thoughts and the mastery of a new skill may be important (Lepore, 1997; Mynors-Wallis, Gath & Baker, 2000). Social contact may be an important mechanism, and physical activity may have physiological effects such as changes in endorphin and monoamine concentration (Leth, 1994; Thornen, Floras, Hoffman & Seals, 1990).

Exercise may be a viable treatment because it can be recommended for most individuals, and does not carry a negative social stigma. However, exercise has not yet met established efficacy standards (Rush, Golden & Hall 1993), although some studies have demonstrated reduction in depressive symptoms with exercise (Martisen, 1987; Singh & Singh 2003, Mcneil, LeBlanc & Joynner, 1991).

Martisen, Medhus, and Sandvik (1985) in a randomized controlled trial of inpatient with major depressive disorder, assigned patients to an aerobic exercise or an occupational therapy through group designated as the control group. Significant post intervention improvements were reported in depression scores between the aerobic exercise and occupational therapy groups. However, both groups were also reported as receiving psychotherapy during the intervention period, which calls into question the validity of the control groups and thus, potentially the independent effect of aerobic exercise intervention.

Bosscher (1993) randomly assigned 24 women impatient matched for depression scores to either of three times per-week running group or a usual care group. The authors reported significant reduction in depression scores according to the Zung (1965) self-rating depression scale for the running versus the usual care group. However, the usual care group consisted of mixed activities such as field lackey, soccer, volleyball, and gymnastic activities.
In a Landmark review, Lawlor and Hopker (2001) conducted a Meta regression of randomized trials of aerobic exercise and depression among published, randomized trials conducted among adults. Their literature search yielded 14 studies for inclusion, incorporating data from approximately 850 individuals. Using the BDI as their outcome measure, the authors found that exercise reduced depressive symptoms by -7.3 point (95% CI) and that this effect was greater in trials with shorter follow-up periods. Despite the findings of improved depressive symptoms, the authors concluded that the effectiveness of exercise is treating depression could not be determined because of a good quality research and clinical population and a lack of appropriate follow-up assessments.

The relatively few studies conducted in clinically depressed patients all report beneficial effects of aerobic exercise, such as soccer, volleyball, running, trampling, gymnastic and so on, being either equally or more effective than alternative intervention, including medication, psychotherapy, group therapy, or meditation and relaxation.

Meanwhile, a small number of studies have also investigated the effect of anaerobic exercise, predominantly resistance training, on depression in clinically depressed (Doyne, Ossip-Klein, Bowman, Osborn, McDougall-Wilson & Neimeyer, 1987; Martinsen, Hoffart & Solberg, 1989; Pelham, Campagna, Ritvo & Birnie, 1993). Studies in clinically depressed and symptomatic patients have reported the positive effects of resistance training on depression, with no difference reported between resistance training and aerobic exercise (Doyne et al., 1987, Martinsen et al., 1989, Martinsen, Sandvick, & Kolbjornsrud, 1989). This suggests that reductions in depression scores may not be dependent on an increase in aerobic fitness only.

The strongest evidence on the beneficial effects of non-aerobic exercise was reported by Singh, Clements and Fiatarone (1997). Thirty-two community-living men and women participants ages 60 to 84 years and diagnosed with major or minor depressive disorder using the DSM-IV (American Psychiatric Association, 1994) were randomly assigned to either a progressive resistance training or an attention-control group. The progressive resistance group trained three times a week for 10 weeks at 80% of a “one-repetition maximum,” the maximum amount of weight they lift in a single effort. The control group consisted of an interactive health education program of lectures and videos, followed by discussion. Depression was measured by the Beck Depression Inventory (Beck et al., 1961) and the Hamilton Rating Scale for Depression (Hamilton, 1960). Following the 10 week intervention program, depression was significantly reduced in the resistance training group compared to the control group.

The results of non-aerobic studies predominantly resistance training typically report beneficial effects on depression in clinical and symptomatic patients as do the aerobic exercise studies.

Exercise helps prevent and improve a number of health problems, including high blood pressure, diabetes and arthritis. Research on depression and exercise shows that the psychological and physical benefits of exercise can also help improve mood. A great number of studies suggest that exercise training may reduce depressive symptoms in non-clinical and clinical population Blumenthal; Emry & Madden, 1989; Dilorenzo, Bargman and Stucky-Ropp, 1999; Roth & Holmes 1987; King, Talor & Haskell, 1993).

Carek, Laibstain and Carek (2011) noticed that depression and anxiety are the most common Psychiatric conditions seen in the general medical setting, affecting millions of individual in the United States. The treatment for depression and anxiety are multiple and having varying degrees of effectiveness. Physical activity has been shown to be associated with decreased symptoms of depression and anxiety. Physical activity has been consistently shown to be associated with improved physical health, life satisfaction, cognitive functioning and psychological wellbeing. Several studies have shown the effect of physical exercise on depression.

**Cross Sectional Studies**

Most cross-sectional studies have reported an inverse association between physical activity and depressive symptoms. Hassmen, Kavula, and Uutela (2000) in a random sample of 1, 547 male (46 ± 10.9 years) and 1, 856 females (45.5 ± 11.3 years), reported significant inverse association between depressive symptoms as measured by the Beck Depression Inventory (Beck, Ward, Mendeleon, Mock & Erbaugh,
In this study, those who exercised at least twice per week reported significantly less depression compared to those who either less frequently or not at all.

Bhui and Fletcher (2000) in a case control sample from the health and lifestyle survey, a national population survey in the United Kingdom (Cox, 1993) examined the protective effect of physical activity on anxiety and depression. An initial total of 5, 352 men and women were assessed at baseline. Depression states were assessed via the general health questionnaire (Goldberg & Williams, 1988). Activity levels were categorized by self report as one of four intensity. Levels; no activity, low intensity (gardening, walking, etc), medium intensity (keep fit, golf, cricket, etc), high intensity (mainly sports). Number of minutes per day was also reported. After adjusting for potential confounders such as mobility, medication use, and smoking, the authors found that for men, physical activity appeared to be protective against depression and anxiety states in those who reported exercising at least 92 minutes per day compared to those who reported exercising less than 44 minutes per day. Such protective effects did not appear to vary according to intensity. No relationship between physical activity and depression was found for women, which made the authors suggest that the higher prevalence of depressive states in women, may have a hormone or psychological basis making women less amenable to the protective effect afforded by exercise. However, in this study, women had lower incomes, were less available for work and were involved in less exercise of lower intensity than men. Their data predicted that those not working were commonly less healthy, with the implication being that the women sampled in this study would include those who were more available to be sampled but were more vulnerable and/or engaged in less healthy lifestyles. Based on these data, the authors alternative explanation for their findings were that men had more transient and hence more recent-onset disorders, which were more likely to be alleviated by physical activity.

Whiles, Hease, Lawlor, Ness and Lewis (2012) who determined whether there is an association between objective measures of physical activity and time spent in moderate and vigorous physical activity and adolescent depression symptoms. 2951 adolescents participating in ALSPAC were used. Depressive symptoms were measured using the self-report mood and feelings Questionnaire (MFQ) short version. Measures of Physical Activity (PA) were based on accelerometry. The association between PA and MFQ scores was modeled using ordinal regression. The result shows that adolescents who were more physically active had a reduced odds of depressive symptoms [OR (adj) total PA tertiles: medium 0.82 (95% C1:0.83)]; OR (adj Per 15 min MVP:0.92 (95% C1:0.86,.0.98). In a multivariate model including both total PA and the percentage of time spent in MVPA, total PA was associated with depressive symptoms. [OR (adj) total PA tertiles: medium 0.82 (95%C1:0.70, 0.98); high 0.70 (95%C1:0.58,0.85) but the percentage of time spent in MVPA was independently associated with depressive symptoms [OR (adj) MVPA (tertiles) medium 1.05 (95%C1:0.88, 1.24), high 0.91 (95%C1:0 .77, 1.09). It therefore implies that physical activity plays a role in the reduction of depressive symptoms.

Kaori and Shibata (2011) examined the association between recommended physical activity criteria and depression score, differences between physical activity groups and socio-demographic variables among Japanese adults. Socio-demographic data (gender, age, educational level, employment status, marital status, living conditions and household income), the Japanese short version of the International Physical Activity Questionnaire (IPAQ), and the centre for Epidemiologic studies Depression Scale were used to estimate the participants physical activity and depression levels, respectively via an internet based survey. A representative sample of 3000 Japanese adults answered the survey, stratified by gender and age. The study followed the current Japanese exercise guidelines to categorize respondents as “meeting” or “not meeting” the recommended criteria. Analysis of covariance, logistic regression, and two-way univariate analysis of covariance were performed. Respondents not meeting the recommendations for physical activity had significantly higher depression scores than those meeting the recommendations. Individuals not meeting the recommended criteria had significantly higher depression scores than those meeting the criteria across the following variables: age, marital status, living conditions, and households’ income in men; and marital status, educational level, employment status and household income in women. Men who
were unmarried and had low household income levels and women who were young, unmarried and had lower household income level, had higher depression scores.

**Prospective Studies**

Lampinen, Heikenen and Ruoppila (2000) in an 8-year follow up of a large prospective study of older Finish Men and women, reported that age related decrease in the intensity of physical exercise increased the risk of depressive symptoms as measured by a modified version of the Beck Depression Inventory (Beck et al 199:). Types and levels of exercise/physical activity were assessed using a questionnaire (Hirvesalo, Lainpinen, & Ramtanen, 1998) with six categories ranging from necessary household chores to participation in competitive sports. Intensity was assessed for each activity using a 7 point likert type scale but was subsumed into three categories for statistical analysis; necessary chores, regular walking (at least weekly) and strenuous physical exercise (leading to perspiring and heavy breathing). At follow-up change in levels of physical activity was assessed via three categories increased, maintained, or decreased. Over the period of study, in each of the three intensity levels, the authors found that those individuals who had reduced intensity during the 8 years follow-up period reported more depressive symptoms than those who remained active. The relationship remained after controlling for socio-economic factors, health status and physical functioning. This implies decreased response relationship between physical activity and depression.

Lampinen et al (2000) also found evidence of gender difference in the predictive value of physical exercise in relations to depressive symptoms over an 8 years period among a sample of men and women age 65 years and above. Those who reported a reduction in the intensity of their daily physical activity over the follow-up period reported more depressive symptoms than those who remained active or increased physical activity. Women in the strenuous exercise reported more depressive symptoms than men, although the authors suggest this may have been a function of the lack of numbers in this group, combined with the greater number of women recruited for the whole sample. Because almost twice as many women as men were recruited, the authors suggest that the result for the whole sample may have skewed the data somewhat toward the physical and mental life of women more than men.

Paffenbarger, Lee and Leung (1994) in a 23 to 27 year follow-up study, found lower depression rates among physically active and sports-playing individuals in a cohort of 21,596 Harvard alumni men ages 35-74 years, recruited in 1962 or 1966. Cases of physical depression were represented by alumni self-report and physician diagnosis. Physical activity was assessed by assigning Kilocalorie values to self-reported physical activity (walking, stair climbing) or sports play. When these three latter activities were combined in a single physical activity index, the authors found that the physical activity index in 1962 or 1968 predicted depressive symptoms at follow (<1,000 kcals/week, RR 1.00; 1,000-2,400kcals/week, RR = 0.83; 2500 + kcals/week, RR = 0.72).

Catherine, Phil, Kamaldeep, Russel, Stephanie and Stephen (2010), examined the relationship between depression and physical activity using Research with East London Adolescents Community Health Survey (RELACHS). Participants were recruited from three local Education Authority boroughs in East London in 2001 from 7 (aged 11-12) and year 9 (aged 13-14) and were followed up in 20003. All pupils in the 28 schools that took part were eligible for the survey the overall response rate was 84% (2789) pupils. A total of 2,093 (75%) pupils were also followed-up in 2013. The sample was multiethnic (75% of respondents were non-white) and deprived. Just under half of the sample was male (49%). Depressive symptoms were measured using the short moods and feelings Questionnaire (SMFQ). Logistic regression analyses were used to examine the association between physical activity and depressive symptoms both cross-sectionally and longitudinally. After adjustments, there was evidence for a cross-sectional association between physical activity and depressive symptoms for both boys and girls at baseline, with a decrease in odds of depressive symptoms of about 8% for each additional hour of exercise undertaken per week (boys: odds ratio (OR) = 0.92, 95%C1:0.85 to 0.99; girls:OR = 0.92, 95%C1:0.88 to 1.00). There was no evidence for association between a change in physical activity from baseline to follow-up and depressive symptoms at follow-up. The study provides some evidenced for an association between level of physical activity and decreased symptoms in adolescents.
George and Guy (2013) conducted a review to examine whether Physical activity (PA) is protective against the onset of depression. A comprehensive search was conducted until December 2012 in the following database; MEDLine, Embase, Pubmed, PsycINFO, SPORTDiscus, and Cochrane Database of systematic Reviews. Data were analysed between July 2012 and February 2013. Articles were chosen for the review. The study used a prospective-based, longitudinal design and examined relationships between PA and depression over at least two time intervals. A formal quality assessment for each study also was conducted independently by the two reviewers. The initial search yielded a total of 6363 citations. After a thorough selection process, 30 studies were included, for analyses. Among there, 25 studies demonstrated that baseline PA was negatively associated with a risk of subsequent depression. The majority of the studies were of high methodologic quality, providing consistent evidence that PA may prevent future depression.

Experimental Studies
Dimeo, Bauer, Vahram, Proest and Halter (2001) suggests that in treatment-resistant patients with major depression, 30 mm of treadmill walking for ten consecutive days may be sufficient to produce a clinically relevant and statistically significant reduction in depression, as measured with the Hamilton Depression Rating Scale. These findings are substantiated by a more recent study involving a placebo exercise group (low-intensity stretching and relaxation exercises) in patients receiving a standard antidepressant treatment, the reduction of depression scores and the response rates were larger in the exercise training group (Knubben, Reischies & Adli, 2007).

Some studies (Dunn, Garcia & Marcus, 1998; Kodis, Smith, Arthur, Daniels, Suskin & Mckelvie, 2001) have reported that supervised exercise training results in larger improvements in functional capacity compared with home based exercise and that greater energy expenditure is associated with larger reductions in depressive symptoms (Dunne et al. 2005).

While most studies employed walking or jogging programs, the efficacy of nonaerobic exercise has also been studied. In depressed elderly, a resistance training programme was effective than control condition (Singh, Clements & Fiattarone, 1997). Comparing random assignment to running or weight lifting, Doyne, Ossip-Klein and Bowman (1987) reported that both the activities reduced depressive symptoms, and that there were no statistically significant differences at the end of the active treatment phase or at follow-up after one year.

Blumenthal, Babyak & Moore (1999) could show that 16 weeks of group exercise training in older patients with major depression was as effective as antidepressant treatment with sertraline. Most remarkable is that, the 10-month relapse rate was significantly lower in the exercise group (8%) when compared to the sertraline (38%) or the combination group (31%) (Babyak, Blumenthal & Herman, 2000). Blumanthal et al. (2007) reported that also in adults with major depression, the efficacy of exercise seems generally comparable to antidepressant medication and both tend to be better than placebo.

Andrea, Madhukar, James, Gamillia & Heather (2005) who randomized participants to one of four aerobic exercise treatment groups that varied total energy expenditure (7.0 kcal/kg/week or 17.5 kcal/kg/week) and frequency (3 days/week or 5 days/week) or to exercise placebo control (3 day/week flexibility exercise). The 17.5 kcal/kg/week dose was consistent with public health recommendations for physical activity in order to find out whether exercise is an efficacious treatment for mild to moderate major depressive disorder and the dose response relation of exercise and reduction in depressive symptoms. The main effect of energy expenditure is reducing HRSD17 scores at 12 weeks was significant. Adjusted mean HRSD17 scores at 12 weeks were reduced 47% from baseline for public health dose, compared with 30% for low dose and 29% for control.

Melanie, Nicola, John, Sandra, Anne, Adrian, Kenneth, Ceire, Aidan, Helen, Rachael, Christine, Katrina, Michael, Deborah, Tim, Deborah, Alan and Glyn (2012) who investigated the effectiveness of facilitated physical activity as an adjunctive treatment for adults with depression presenting in primary care. Pragmatic, multicentre, two arm parallel randomized controlled trial was in a General practice in Bristol and Exeter. 361 adults aged 18-69 who had recently consulted their general practitioner with symptoms of depression. All those randomized had a diagnosis of an episode of depression as assessed by the clinical
interview schedule-revised and a Beck depression inventory score of 14 or more. In addition to usual care intervention, participants were offered up to three face to face sessions and ten telephone calls with a trained physical activity facilitator over eight months. The intervention was based on theory and aimed to provide individually tailored support and encouragement to engage in physical activity. The primary outcome was self reported symptoms of depression assessed with the Beck Depression Inventory at four months post-randomization. Secondary outcomes included use of antidepressants and physical activity at the four, eight and 12 months follow-up points and symptoms of depression at eight and twelve months follow-up. There was no evidence that participant offered the physical activity intervention reported improvement in mood by the four months follow-up point compared with those in the usual care group; adjusted between group difference in mean Beck Depression inventory score-0.54(95%CI-3.06 to 1.99;P=0.68). Similarly, there was no evidence that the intervention group reported a change in mood by the eight and twelve month follow-up points, nor was there evidence that the intervention reduced antidepressant use compared with usual care. (Adjusted odds ratio 0.63, 95% CI:0.19 to 2.06; P=0.44) over the duration of the trial. However, participants allocated to the intervention group reported more physical activity during the follow-up period, than those allocated to the usual care group (adjusted odds ratio 2.27, 95% CI:1.32 to 3.89, P= 0.003). They concluded that physical activity can be an adjunct treatment for adults with depression symptoms.

Sarah, Lena, Ralf and Sonia (2013) investigated whether a computer passed self regulation intervention increases physical exercise in individuals with or without depressive symptoms. A total of 361 individuals in orthopedic rehabilitation, 36 of them with depressive symptoms, were recruited in Germany. In a quasi-experimental study, individual were allocated to either a computer-based self regulation intervention or an online questionnaire. Exercise was measured at the beginning of rehabilitation and six weeks after rehabilitation. Depressive symptoms were assessed at the end of rehabilitation. An analysis of covariance was conducted, controlling for exercise baseline, sex, and phase of assessment. A main effect of depressive symptoms (P=0.005) and intervention group (P=0.11), as well as a marginal interaction of intervention x-on depressive symptoms were found (P=0.076). Results indicates that self regulation exercise intervention in an orthopedic rehabilitation setting seen to be only effective in non-depresses individuals.

CONCLUSION
Studies have been presented giving evidence that physical activity can also be used in the treatment of depression. The mechanisms responsible for exercise-related improvement in depression are not well known, and it is most likely to be a complex interaction of psychological and neurobiological mechanism underlyng, mediating and/or moderating these effects.

Unfortunately, no general concept for the therapeutic administration of physical activity for patients with depression has been developed so far (Meryer & Broocks 2000) usually 3-4 training session/week should be performed with duration of 20-30mins. Most studies have an overall programme duration of 8-14 weeks.

In summary, exercise seems to be an effective treatment for depression, improving depressive symptoms to a comparable extent as pharmacotherapy and psychotherapy. Observational studies suggest that active people are less likely to be depressed, and interventional studies suggest that exercise is beneficial in reducing depression. It seems that even modest levels of exercise are associated with improvements in depressions, and although most studies to date have focused on aerobic exercise, several studies also have found evidence that resistance training also may be effective. While the optimal ‘dose’ of exercise is unknown, clearly, any exercise is better than no exercise. Getting patients to initiate exercise and sustain it is very critical.
RECOMMENDATIONS
Having outlined the role of physical activity on depression the following recommendations are given:

- That both normal and depressed patients should be constantly involved in physical activities as this will either help prevent and reduce the risk of onset of depression or help decrease the rate of depression in patients.
- Health institutions should provide recreational facilities so that patients will be given in-house exercise treatment before leaving the hospital.
- Leisure time should be spent on physical activity that will help improve our health.

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