

Understanding systematic reviews and their implications for evidence-based practice by examining aerobic exercise as a recreational therapy intervention for individuals with major depressive disorders

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Abstract

This article reviews the need for and the process of conducting a systematic review of the research literature to guide intervention development and implementation in recreation therapy practice. Descriptive information of the process that was undertaken and the outcome that resulted from reviewing the research evidence for the use of aerobic exercise as a treatment for individuals with major depressive diagnosis is provided, along with practice and research recommendations for evidence-based practice that resulted from the systematic review.

Key words: systematic reviews, evidence-based practice, depression, exercise, therapeutic recreation, recreational therapy

In today's healthcare environment, colleagues, administrators, and consumers often challenge recreational therapy (RT) practitioners about their practice and the interventions that they use to produce client outcomes. "Federal regulatory agencies [eg, Centers for Medicare and Medicaid Services (CMS)] and accreditation bodies [eg, the Joint Commission on Accreditation of Health Care Organizations (JCAHO)] expect that the best available evidence be the basis for healthcare services. This requires a commitment from all healthcare professional to develop and use evidence-based practices to guide their work."^{1(p1)} Stumbo² proposed that recreational therapists begin to develop evidence-based practice guidelines as one mechanism to respond to these challenges and instructively described the first step in this process—conducting systematic reviews of the research evidence for a particular practice. Although some recreational therapists have responded, most notably Buettner and Fitzsimmons,^{3,4} the majority of

practicing recreational therapists and educators have failed to heed Stumbo's² urgings.

This is not the case in many of our allied disciplines, which disseminate systematic reviews that support their practice via the Cochrane Collaboration. The Cochrane Collaboration maintains the Cochrane Library, which "contains high-quality, independent evidence to inform healthcare decision-making. It includes reliable evidence from Cochrane and other systematic reviews, clinical trials, and more. Cochrane reviews bring you the combined results of the world's best medical research studies and are recognized as the gold standard in evidence-based healthcare."⁵

The Cochrane Collaboration includes the systematic reviews of specific modalities/interventions. These reviews are independent of any particular discipline and are conducted primarily to ascertain whether sufficient evidence exists for a particular

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intervention. For instance, the Cochrane Library contains reviews that evaluate the evidence for using validation therapy with individuals with dementia. Additional “discipline-specific” systematic reviews are also found in the Cochrane Library. A quick search on the Cochrane web site using terms such as occupational therapy, physical therapy, or art/dance therapy clearly shows that these professionals are producing systematic reviews that inform and support their clinical practice. In January 2008, a search using the term “occupational therapy” yielded 63 systematic reviews, “physical therapy” yielded 260 systematic reviews, and “art/dance therapy” yielded 20 reviews. Unfortunately, the use of the terms “recreational therapy,” “recreation therapy,” or “therapeutic recreation” in the search field yielded zero reviews.

In the United States, the Agency for Healthcare Research and Quality (AHRQ) currently sponsors the National Guideline Clearinghouse (<http://www.guideline.gov>), whose mission is to provide health professionals a readily accessible mechanism for obtaining objective health information and clinical practice guidelines. Although this clearinghouse of evidence-based practice is structured somewhat differently than Cochrane’s site, the limited presence of any evidence-based reviews for RT interventions is not different—it is absent.

Perhaps the RT discipline’s failure to respond to Stumbo’s² call for systematic reviews of the research evidence results from lack of knowledge or familiarity with systematic reviews and the processes for conducting them. Systematic reviews are summaries of research findings that can guide healthcare practice. Systematic reviews involve the use of explicit methods to identify and evaluate research studies in a particular area. Although many systematic reviews are based on a quantitative meta-analysis of the research evidence and require familiarity with advanced statistical methods, there are also qualitative reviews that adhere to the standards for gathering, analyzing, and reporting evidence. This article reports the results of one such qualitative review conducted by students in an undergraduate RT research class. These students undertook a systematic review of the evidence for using aerobic exercise in the treatment of individuals

diagnosed with major depressive disorders (MDDs). The results of this effort are detailed later as an illustrative example that will, hopefully, encourage other recreational therapists to become involved in writing systematic reviews that can guide the practice of recreation therapists.

A systematic review of the research literature on the effectiveness of aerobic exercise in the treatment of major depressive disorders

One leisure activity, often incorporated in RT practice, which has been consistently linked with a variety of positive outcomes, is aerobic exercise. Aerobic exercise can help to improve health, reduce weight gain, increase energy, improve flexibility in joints and muscles, and decrease high blood pressure. In addition to these physical benefits, aerobic exercise also has emotional benefits as it has been shown to improve mood and self-esteem in the general population. Knowing these beneficial effects, it is not surprising that the promotion of physical activity has become a major public health goal for the general and disabled population.

Given the research evidence, aerobic exercise theoretically should be a useful modality to incorporate as a RT intervention for persons with MDDs. Individuals diagnosed with MDD experience symptoms of lethargy, decreased mood, and low self-esteem. Typically, the treatment of choice for such individuals is pharmacological treatment, which often involves the use of selective serotonin reuptake inhibitors (SSRIs) or other antidepressant medications. Many of these drugs take four to six weeks before reaching therapeutic levels that provide relief of depressive symptoms.

Because of the beneficial properties associated with aerobic exercise in the general population, especially the psychological benefits related to mood elevation, it may be a useful addition to the medical regimen used for treating MDD. Although physical fitness outcomes associated with physical activity may require consistent participation in the activity for weeks, psychological outcomes associated with mood elevation may occur more quickly than just

using the medications alone. However, before including such a modality in the intervention repertoire of recreational therapists working in behavioral health-care settings, a systematic review of the research evidence that examines the effectiveness of aerobic exercise for alleviating the symptoms of persons with MDD is needed.

Review objective

To determine if sufficient evidence exists to warrant the inclusion of aerobic exercise in the treatment regimen of persons with MDD.

Search strategy

The search engine EBSCOhost was used to identify possible research articles on this topic. Under this search engine, the user is allowed to select a number of different databases, which can locate articles from multiple databases at one time. Databases used for this systematic review included ACADEMIC SEARCH PREMIER, CINAHL, MEDLINE, PsycARTICLES, PsycINFO, and SPORTDiscus with full text. Only two keywords, ie, “aerobic exercise” and “major depression,” were used. The use of these terms was purposeful, given the intent of the systematic review—examining the research evidence for the use of aerobic exercise in decreasing the depressive symptoms of people diagnosed with MDD.

Selection criteria

The first criterion for including any article was based on the date of publication. In this review, we included only articles published after 2001 when Dunn et al.⁶ reported the results from their systematic review of the research evidence on this topic. The second criterion was that participants within each study included in this review had to meet the DSM-IV criteria for MDD and to be between the ages of 18 and 70 years old.

The third inclusion criteria involved the type of intervention used in the study. Only research articles that utilized aerobic exercise as an intervention were included in this review. Given the variety of recreation activities that can be used for aerobic exercise,

this inclusion criteria was not defined further; therefore, research using any form of aerobic exercise could be included, such as the use of treadmills, walking, jogging, swimming, or stationary bicycles.

The fourth inclusion criteria focused on the outcome measures used in the studies. Outcome measures had to meet the scientific criteria for measurement. They had to be valid and reliable as well as familiar to health professionals.

Additionally, the study had to be available in the English language. Studies published internationally were included provided an English translation was available. Dissertations were excluded. Lastly, and most importantly, the study had to incorporate the use of a control or comparison group in its design. Moreover, the participants had to be randomized to these groups as a way to decrease internal validity threats.

Evaluation criteria and procedures

The critical review form for quantitative studies developed by Law et al.⁷ was modified and used by the research team. For each study included in the review, the critical review form was first completed independently by two reviewers. The entire team then discussed these forms, along with the ratings and comments provided by the independent reviewers. Points of discrepancies between the two reviewers were discussed and clarified. These group discussions were constantly used to promote standardization and consistency in the review of each article.

Data collection and results

Table 1 details the results of our literature search. We retrieved a total of 35 articles that had been published by January 2008; however, only four of these articles met the inclusion criteria that were established for this review. The number of articles excluded, based on the application of our predetermined inclusion/exclusion criteria, are identified in Table 1, whereas Table 2 contains the complete reference citation for excluded article.

Description of included studies

The four articles included in this evidence-based

Table 1. Application of inclusion/exclusion criteria to search results (N = 35)

Inclusion/exclusion criteria	Number of articles excluded (n = 31)	Number of articles remaining (n = 4)
Dissertations	7	28
Chapters, commentaries, brief reports	5	23
Sample involved children/adolescents	3	20
Sample involved diagnostic group other than major depressive disorder	6	14
Intervention involved multi-elements/multi-treatments	3	11
Change in depression not identified as outcome variable	6	5
No control/comparison group or no random assignment	1	4
Note: 35 articles published after 2001 were originally identified by search engines using key words “aerobic exercise” and “major depression.”		

report are summarized in Table 3. The most recent work on this topic suggests that while aerobic exercise may be as efficacious as antidepressant medication in reducing depressive symptoms, patients' expectations and other nonspecific factors may mediate some of the therapeutic response. Blumenthal et al.⁸ reported this conclusion based on their analysis of data collected from 202 adult diagnosed with MDD and being treated at a tertiary care teaching hospital. In this study, volunteer participants, aged 40 or older who were not actively exercising, were recruited via television, radio, and newspaper advertisements. Potential participants went through an eligibility screening and were excluded for any of the following reasons: (1) they had any medical condition that precluded them from engaging in an exercise program; (2) they had a primary psychiatric diagnosis other than MDD; (3) they were currently taking antidepressant or other psychotropic medication; or (4) they did not meet the DSM-IV criteria for MDD. Upon inclusion in the study, participants underwent a grade exercise test to document their fitness level. They also completed the Hamilton Depression Rating Scale (HDRS) to assess

severity of depressive symptoms. Participants were then randomly assigned to one of four conditions (supervised group exercise, at-home exercise, antidepressant medication, pill placebo) by a computer, which allowed for stratification to condition based on age, gender, and depression severity. Participants assigned to the supervised group exercise condition attended 45-minute exercise sessions three times a week. During these sessions, they walked on a treadmill for a 10-minute warm-up and they walked/ran on the treadmill at speed that allowed them to work within 70 to 85 percent of their maximum heart rate based on their initial pretest fitness assessment. Participants assigned to the at-home condition received the same exercise prescription. The primary difference was the limited contact of study staff when engaging in the exercise at their homes. Heart rate and perceived exertion measures were self-monitored three times during all exercise sessions, and this data were recorded and forwarded to the research team for analyses. After 16 weeks, participants again engaged in a graded exercise test and completed the HDRS. Research assistants collecting this data were

unaware of which condition the individual they were assessing was assigned. Results indicated that participants in all conditions showed improvements in their HDRS scores at post-testing; however, participants in the at-home exercise, supervised group exercise, and antidepressant medication conditions achieved higher depression remission rates than did participants in the placebo condition, and the remission rates were 40, 45, 47, and 31 percent, respectively.

The second study included in this review by Dunn et al.⁹ examined the efficacy of aerobic exercise in reducing depressive symptoms with a specific focus on identifying (a) the dose of aerobic exercise (ie, three days/week vs five days/week) needed to achieve reduction in depressive symptoms and (b) the intensity of aerobic exercise (ie, low-energy expenditure versus high-energy expenditure) needed for a response. Participants in this study were randomly assigned to one of the four aerobic exercise conditions (ie, three days/week low-energy, three days/week high-energy, five day/week low-energy, five days/week high energy) or the placebo control group which received three days/week of stretching and flexibility exercises for 15 to 20 minutes. Participants engaged in the study for 12 weeks and completed the HDRS pre-intervention and post-intervention. Although all participants showed a reduction in their scores on the HDRS, the reduction was greatest among those individuals who exercised at the high-energy level. It did not make a difference if individuals exercised three or five days/week, the determining factor in reducing depressive symptoms was the total energy expended during a week. Of additional importance is the fact that the rate of reduction in depressive symptoms among individuals engaging in the high-energy expenditure condition was similar to the reduction rates reported in trials for cognitive-behavioral therapy or antidepressant medication. Based on the findings, the authors conclude that “There is scientific evidence to suggest that exercise alleviates symptoms of depression and may be useful in the treatment of mild to moderate MDD.”^{9(p7)}

The last two studies included in this evidence-based review were conducted by the same research

team. The first study¹¹ was reported in 1999. The second study¹⁰ is a report of the results from a six-month follow-up to the original study.

Blumenthal et al.¹¹ randomly assigned 156 adults age 50 or older with a diagnosis of MDD to one of the three conditions: aerobic exercise, antidepressant treatment, or antidepressant plus aerobic exercise to compare the effectiveness of exercise with standard medication treatment for individuals with MDD. They found no change in the level of depressive symptoms among the three groups after 16 weeks of treatment. All groups showed a clinically and statistically significant decline in depressive symptoms; however, participants receiving medication alone showed a more rapid reduction in symptoms. The authors concluded that group exercise may be considered an alternative to antidepressant medication for the treatment of MDD in older adults. The follow-up study¹⁰ conducted provided further support for the use of aerobic exercise in the treatment of MDD. Although participants in all three conditions (medication alone, exercise alone, medication plus exercise) had similar relapse rates for MDD at four months postintervention, at six months, individuals in the exercise group were more likely to be rated as partially or fully recovered than individuals in the other two groups. The authors speculate that the better recovery found in individuals assigned to the exercise-only condition may be partly explained by psychological factors related to internal attribution for recovery as opposed to external (medications) attributions.

Methodological quality of included studies

All four of the included studies reported on the results of randomized control trials (RCTs). Although randomization controls for many internal validity threats, the fact that each of these studies solicited participants based on convenience (eg, volunteers and patients at a tertiary care teaching hospital) creates concerns about selection bias and generalizability of the findings. The use of volunteers is particularly problematic in terms of validity as people who would be willing to volunteer may have a generally more positive disposition toward exercise as treatment and

Table 2. Articles excluded from systematic review by reason for exclusion

Dissertations
Bonnet LH: Effects of aerobic exercise in combination with Cognitive Therapy on self-reported depression. Dissertation Abstracts International: Section B: The Sciences and Engineering 2006; 66(11): 6262.
Landaas JA: The effect of aerobic exercise on self-efficacy perceptions body-esteem, anxiety and depression. Dissertation Abstracts International: Section B: The Sciences and Engineering 2006; 66(11): 6278.
Newman CL: The effects of aerobic exercise on childhood PTSD, anxiety, and depression. Dissertation Abstracts International: Section B: The Sciences and Engineering 2007; 67(10): 6070.
Wainscott MC: The relationship of depression in middle school adolescents and their school extracurricular activities: A perspective for family therapy. Dissertation Abstracts International: Section B: The Sciences and Engineering 2006; 66(11): 6317.
Lancer R: The effect of aerobic exercise on obsessive compulsive disorder, anxiety, and depression. Dissertation Abstracts International: Section B: The Sciences and Engineering 2005; 66(1): 599.
Silverman MA: Aerobic exercise effects on anxiety, depression, and life satisfaction in Crohn's disease patients. Dissertation Abstracts International: Section B: The Sciences and Engineering 2007; 68(4): 2704.
Rosenberg BR: Cognitive behavioral treatment of juvenile primary fibromyalgia syndrome. Dissertation Abstracts International: Section B: The Sciences and Engineering 2005; 66(2): 1184.
Commentary/research review/chapter in text
Berk M: Should we be targeting exercise as a routine mental health intervention? <i>Acta Neuropsychiatr.</i> 2007; 19(3): 217-218.
S. Y.: Fix your mood, fast. <i>Prevention.</i> 2006; 58(6): 48-48.
Babyak M, Blumenthal JA, Herman S: Exercise treatment for major depression: Maintenance of therapeutic benefit. In: Monat A, Lazarus RS, Reevy G, et al. <i>The Praeger Handbook on Stress and Coping</i> , Vol. 2. Westport: Praeger Publishers/Greenwood Publishing Group, 2007: 529-540.
Stein MB: Sweating away the blues: Can exercise treat depression? <i>Am J Prev Med.</i> 2005; 28(1): 140-141.
Phillips WT, Kiernan M, King AC: Physical activity as a nonpharmacological treatment for depression: A review. <i>Complementary Health Pract Rev.</i> 2003; 8(2): 139-152.
Sample involved children/adolescents
Newman CL, Motta RW: The effects of aerobic exercise on childhood PTSD, anxiety, and depression. <i>Int J Emerg Mental Health.</i> 2007; 9(2): 133-158.
Stella SG, Vilar AP, Lacroix C: Effects of type of physical exercise and leisure activities on the depression scores of obese Brazilian adolescent girls. <i>Brazilian J Med Biol Res.</i> 2005; 38(11): 1683-1689.
Allison KR, Adlaf EM, Irving HM: Relationship of vigorous physical activity to psychologic distress among adolescents. <i>J Adolescent Health.</i> 2005; 37(2): 164-166.
Sample involved other diagnostic groups other than major depressive disorder
Lancer R, Motta R, Lancer D: The effect of aerobic exercise on obsessive-compulsive disorder, anxiety, and depression: A preliminary investigation. <i>Behav Therapist.</i> 2007; 30(3): 53,57-62.
Manger TA, Motta RW: The impact of an exercise program on posttraumatic stress disorder, anxiety, and depression. <i>Int J Emerg Mental Health.</i> 2005; 7(1): 49-57.

Table 2. Articles excluded from systematic review by reason for exclusion (continued)

Sample involved other diagnostic groups other than major depressive disorder (continued)

Lett HS, Davidson J, Blumenthal JA: Nonpharmacologic treatments for depression in patients with coronary heart disease. *Psychosom Med.* 2005; 67(Suppl 1): S58-S62.

Warnock JK, Clayton AH: Chronic episodic disorders in women. *Psychiatric Clin North Am.* 2003; 26(3): 725-740.

Rapkin A: A review of treatment of premenstrual syndrome and premenstrual dysphoric disorder. *Psychoneuroendocrinology.* 2003; Vol 28 (Suppl 3): 39-53. Special Issue: New advances in premenstrual syndromes (PMS/PMDD).

Neidig JL, Smith BA, Brashers DE: Aerobic exercise training for depressive symptom management in adults living with HIV infection. *J Assoc Nurses AIDS Care.* 2003; 14(2): 30-40.

Intervention involved multi-elements/multi-treatments

Leppämäki SJ, Partonen TT, Hurme J: Randomized trial of the efficacy of bright-light exposure and aerobic exercise on depressive symptoms and serum lipids. *J Clin Psychiatry.* 2002; 63(4): 316-321.

Legrand F, Heuze JP: Antidepressant effects associated with different exercise conditions in participants with depression: A pilot study. *J Sport Exerc Psychol.* 2007; 29(3): 348-364.

Knapen J, Van de Vliet P, Van Coppenolle H: Comparison of changes in physical self-concept, global self-esteem, depression and anxiety following two different psychomotor therapy programs in nonpsychotic psychiatric inpatients. *Psychotherapy Psychosom.* 2005; 74(6): 353-361.

Change in depression not identified as primary outcome variable

Herman S, Blumenthal JA, Babyak M: Exercise therapy for depression in middle-aged and older adults: Predictors of early dropout and treatment failure. *Health Psychol.* 2002; 21(6): 553-563.

Marin H, Menza MA: The management of fatigue in depressed patients. *Essential Psychopharmacol.* 2005; 6(4): 185-192.

Kubesch S, Bretschneider V, Freudenmann R: Aerobic endurance exercise improves executive functions in depressed patients. *J Clin Psychiatry.* 2003; 64(9): 1005-1012.

Oman RF, Oman KK: A case-control study of psychosocial and aerobic exercise factors in women with symptoms of depression. *J Psychol: Interdisciplinary Appl.* 2003; 137(4): 338-350.

Antunes Hanna KM, Stella SG, Santos RF: Depression, anxiety and quality of life scores in seniors after an endurance exercise program. Escores de depressão, ansiedade e qualidade de vida em idosos após um programa de exercícios aeróbicos. *Revista Brasileira de Psiquiatria.* 2005; 27(4): 266-271.

García MÁ, Gómez L: Efectos de los talleres de ocio sobre el bienestar subjetivo y la soledad en las personas mayores. Psychosocial effects of leisure workshops on the subjective well-being and loneliness in the elderly. *Revista de Psicología Social.* 2003; 18(1): 35-47.

No comparison/control group or randomization

Dimeo F, Baurer M, Varahram I, et al.: Benefits from aerobic exercise in patients with major depression: A pilot study. *Brit J Sports Med.* 2001; 35: 114-117.

a tendency to search for alternatives to medication as the primary treatment for depression. "It was apparent that there may have been some 'antimedication' sentiment among some study participants, as evidenced by expressions of disappointment when notified of their assignment to a group in which they would receive medication in addition to exercise."^{10(p636)} In all four studies, participants knew the study's purpose and to which condition they were assigned, creating additional validity concerns. With participants being aware of their treatment groups, they can either be satisfied or dissatisfied with their assignment. Those who are dissatisfied with their group are less inclined to adhere to the experiment, creating differential attrition rates. However, the consistency in the findings across studies, as well as the randomization and follow-up conducted minimizes these validity concerns.

Conclusion and discussion

Our evidence-based practice review demonstrates that there is a strong research base documenting aerobic exercise as an effective option that can be utilized by patients with MDD to aid in the decrease of depressive symptoms. All of the included studies produced evidence of positive outcomes from aerobic exercise programs with decreases in relapse rates as well as a reduction in HRSD scores.

Recommendations for practice based on the systematic review

Recreational therapists should use aerobic exercise as an intervention when working with patients with MDD as there is sufficient evidence documenting the decline of depressive symptoms when using aerobic exercise in this population. However, participants in each of these studies were involved with their aerobic exercise program for upward of 12 weeks. Working with clients for such a long period of time is a rare luxury in RT practice; therefore, recreational therapists must include and incorporate educational information about aerobic exercise as well as opportunities to begin an aerobic exercise program in short-term treatment settings. Because of the short length of stay, it is

unlikely that participation in an aerobic exercise would be internalized and yield the positive results found from involvement in these studies that lasted for 12 or more weeks. For this reason, it would be important for recreational therapists to develop patient education groups that assist clients with understanding the potential value of this type of behavior change and to design transition services that allow recreational therapists to work with clients on out-patient basis to implement aerobic exercise programs.

Future research foci for aerobic exercise interventions

Future researchers may want to explore the mechanisms by which aerobic exercise affects recovery from MDD with a particular focus on internal attributions. In Blumenthal et al's.¹¹ research, clients receiving both exercise and medication did not experience greater or faster reduction in depressive symptoms when compared with clients receiving medication only; however, clients receiving exercise only maintained more positive outcomes for a longer period. These differences may illustrate the influence of personal attributions in illness management. The group that took the medication, with and without exercise, may have attributed their success to the medication (external attribution), whereas the exercise group may have attributed their success to themselves (eg, internal attribution) thus aiding in their recovery. This would be an interesting focus for further research in this area. Also, the decrease in depressive symptoms could possibly have been because the exercise was done in a social setting; therefore, future researchers should have a comparison group of aerobic exercise with socialization to aerobic exercise without socialization. This could help to control all rival hypotheses. Finally, future research should examine whether involvement in aerobic exercise results in immediate mood elevations for clients with MDD receiving in-patient treatment. None of the studies identified in this systematic review assessed this potential outcome, which would be an important outcome to document for recreation therapist working in in-patient behavioral healthcare settings.

Table 3. Description of included studies

Author/year	Purpose	EBP level and research design	Outcome measures	Results	Conclusion and method concerns
Blumenthal et al., 2007 ⁸	To determine if individuals receiving aerobic exercise at home or in a supervised group showed decrease in depressive symptoms that was comparable to that achieved with standard antidepressant medication and greater reductions than that seen in a placebo control.	Randomized control trial with blinded allocation to condition and outcome assessment: Pre-post comparison with placebo control group	Change in symptoms of depression as measured by scores on the 17-item Hamilton Rating Scale for Depression (HDRS)	Reduction in depressive symptoms was observed in all conditions, with percentage of patients achieving remission in each condition as follows: supervised group 45 percent, at home 40 percent, medication 47 percent, and placebo 31 percent. Depression scores did not differ significantly between those in active conditions versus placebo condition.	Exercise is as effective as antidepressant medication in reducing depressive symptomatology in persons with MDD. However, an important variable effecting response is the clients' expectation as evidenced by the high percentage of individuals in the placebo group that achieved remission.
Dunn et al., 2005 ⁹	To measure whether exercise is an effective treatment for clients with mild to moderate major depressive disorder and to determine the dose-response relationship between exercise and reduction in depressive symptoms.	Randomized control trial: Pre-post comparison of frequency (three vs five days) and intensity (seven vs 17.5 kcal/kg/week) with nonaerobic exercise control group	Change in symptoms of depression as measured by scores on the HDRS	The HDRS scores were significantly lowered for all conditions across the 12-week intervention. Greatest symptom reductions occurred in higher intensity exercising conditions. Symptom reduction was not influenced by the frequency of exercising (three vs five days), only by energy expenditure	Aerobic exercise that meets the current public health recommendations (ie, 30 or more minutes of intense aerobic exercise on most days of the week) is an effective treatment for MDD. It does not matter if this amount of exercise is obtained in three or five days for it to be effective in reducing symptoms of depression.
Babyak et al., 2000 ¹⁰	Post-intervention evaluation (six months) of the effectiveness of a four-month aerobic exercise program on depressive symptoms in volunteers aged 50+ who met the DSM-IV criteria for MDD.	Follow-up assessment of individuals participating in earlier randomized control trial (see Blumenthal et al. ¹¹)	Severity of depression as measured by scores on the HDRS	Individuals reporting continued involvement in aerobic exercise during six-month follow-up period were less likely to be classified as depressed and participants in the exercise group were less likely to relapse during six-month follow-up period.	Exercise continued over an extended period of time has benefits for people with major depressive disorder.
Blumenthal et al., 1999 ¹¹	To see the effectiveness of a four-month course of either (1) aerobic exercise, (2) medication, or (3) aerobic exercise combined with medication on the treatment of major depressive disorder in older adults.	Randomized control trial: Pre-post comparison groups	Severity of depression as measured by scores on the Diagnostic Interview Schedule, the HDRS, and the Beck Depression Inventory.	All groups showed a reduction in symptoms on the HDRS at 16 weeks, with each condition being equally effective in reducing symptoms. The fastest response in symptom reduction was found in the medication only condition.	Exercise can be considered an alternative treatment for depression in older adults; however, if rapid symptom reduction is needed antidepressant medication is more effective.

Conclusion

While documenting the evidence for the use of aerobic exercise as an RT intervention for individuals with MDD, this article also clearly illustrates the need for and the value of additional systematic reviews for the RT discipline. Readily available and publically disseminated systematic reviews of interventions used within RT practice would hasten recreational therapists' ability to respond to queries and challenges from regulatory agencies, fiscal intermediaries, colleagues, and administrators. Additionally, systematic reviews that are read and absorbed by recreational therapists should increase the likelihood that the design and implementation of RT interventions lead to valued outcomes thereby increasing the quality of RT services provider to the consumer. Likewise, such reviews would be useful to RT educators in their efforts to standardize undergraduate RT curricular content and to facilitate the likelihood that future RT practitioners are primed to absorb evidenced-based data into their daily practice.

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