The effectiveness of physical activity as an intervention in the treatment of depression: A systematic review

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Abstract

Depression is a debilitating mental health condition affecting an estimated 350 million people worldwide (Agudelo et al., 2014; Mutrie, 2000; WHO, 2012). A diagnosis of major depressive disorder is made when symptoms persist to impair everyday functioning for a period of more than two weeks (American Psychiatric Association, DSM-5, 2013). There exists a considerable body of literature in support of physical activity programmes as a first-line treatment for sub-threshold and mild depression, and the relevant clinical guidelines reflect this (Biddle, Fox & Boutcher, 2000; Davidson, 2010; NICE, 2009a). For the current review, MEDLINE, CINAHL, PsycINFO, Science Direct and Cochrane Library databases were consulted from 2000-2014 with criteria for inclusion and exclusion. Thirteen papers were included in total from those concerning the effectiveness of physical activity in treating depression among adults. Studies included in the current review indicate physical activity to have a positive effect on reducing depressive symptoms among adults with mild depression either as mono-therapy, or when used as an adjunct to conventional treatment. Lawlor and Hopker (2001) highlight considerable methodological flaws among many trials. In future, researchers are advised to standardise their methods and practitioners to offer tailored exercise interventions for mild depression in accordance with NICE guidelines.

Key words: Depression, Physical activity, Exercise, Treatment, Systematic review

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Introduction

Depression is widely considered one of the most common and debilitating mental health problems an individual can experience (Agudelo et al., 2014; Mutrie, 2000). As a serious public health concern, it affects an estimated 350 million people worldwide (National Institute for Health and Care Excellence [NICE], 2009a; World Health Organisation [WHO], 2012). A diagnosis of Major Depressive Disorder (MDD) according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5, American Psychiatric Association, 2013) represents a clear distinction from the feelings of sadness or 'blue' we get from time to time which usually dissipate quickly (American Psychological Association, 2010; Mutrie, 2000). Individuals with depression tend to withdraw from family and friends, experience loss of appetite and energy, sleep disturbances, and become irritable and restless (American Psychological Association, 2010; NICE, 2009b; WHO, 2012). Some may even have suicidal thoughts (NICE, 2009b).

The prognosis for recovery is good however when in receipt of appropriate, well-informed professional care (American Psychological Association, 2010). Approved first-line treatment for cases of moderate and severe depression includes anti-depressant medication, psychotherapy, or a combination of the both (American Psychological Association, 2010; Davidson, 2010; Mutrie, 2000; NICE, 2009a; WHO, 2012). There is, however, a greater variance in opinion regarding treatment recommendations for mild depression. Interventions ranging from self-help programs, guided imagery, computerised cognitive behavioural therapy and even watchful waiting have been proposed (Davidson, 2010; NICE, 2009a; WHO, 2012).

Despite such variance, physical activity interventions have emerged as a common intervention recommended in major treatment guidelines, with a substantial body of corroborating literature present (e.g. Biddle et al., 2000; Davidson, 2010; Mutrie, 2000; North, McCullagh & Tran, 1990). Group physical activity programmes are provided with the support of a competent practitioner and typically consist of three weekly one-hour sessions for a period of 12 weeks (NICE, 2009a, 2009b). Concerns are growing regarding the overprescribing of antidepressants (Gunnell & Ashby, 2004 - as cited in Searle et al., 2011). Exercise programmes are cost-effective alternatives with few adverse effects. Patients believe they provide more autonomy in managing their depression in the longer-term (Mutrie,

2000; Searle et al., 2011, 2012). The many benefits of exercise for both mental health and physical health suggest the promotion of physical activity in the management of depression would be favourable (NHS Choices, 2014; Searle et al., 2011).

Ultimately, the acceptance of physical activity programmes within mental health practice requires a sound evidence base (Faulkner & Taylor, 2005; Fox, 1999, 2000). Randomised controlled trials have had a vital role in demonstrating the worth of physical activity as a means of treating depression (Faulkner & Taylor, 2005). They, along with meta-analyses and previous reviews were to be analysed in the current review, with the aim being to assess the effectiveness of physical activity in the treatment of clinically diagnosed mild depression. In accordance with the coverage of the NICE treatment guideline in question (NICE, 2009a), the current review concerns depression among the adult population, when occurring as the primary diagnosis.

Method

Search strategy

MEDLINE, CINAHL, PsycINFO, Science Direct and the Cochrane Library databases were searched, along with Google Scholar. Search terms used were: 'depression', 'mild depression', 'major depressive disorder', 'exercise', 'physical activity', 'treatment', 'adult', 'review', 'trial' - employed in different combinations to yield the optimal number of relevant studies covering the years 2000 to 2014. An initial search resulted in the identification of 8,968 studies that were potentially relevant. Of these, it was possible to exclude all but 24 papers on the basis of the title or after reviewing the abstract. From these 24 papers, 13 were selected for the current review. Reference lists from the selected papers were checked for any additional relevant publications.

Inclusion/Exclusion criteria

Studies published between 2000 and 2014 that measured the effects of any type of physical activity on depression were eligible. In terms of study design, meta-analyses, randomised controlled trials and previous systematic reviews fulfilled the inclusion criteria. All papers involved a comparison of physical activity with either another intervention or

comparable control conditions defined as ‘no treatment’ or ‘treatment as usual’. Gender-specific studies and those with a focus on children, young people or older adults were ineligible. Some papers were excluded due to being inaccessible. All studies measuring depression secondary to other co-morbid disorders or medical conditions were excluded.

Analytic strategy

A coding procedure was utilised to record the important substantive and methodological features of studies: participant age, recruitment method, sample size, diagnostic procedure, type and intensity of physical activity, type of control condition, and outcome measures were all recorded. This strategy was expected to be ideal for analysing study effectiveness.

Results

Study inclusion

Thirteen articles were reviewed having met the specified inclusion criteria. Of these 13 papers, four were randomised controlled trials (Dunn et al., 2002, 2005; Mota-Pereira et al., 2011; Schuch et al., 2011), four were combined systematic reviews and meta-analyses (Krogh et al., 2011; Lawlor & Hopker, 2001; Robertson et al., 2012; Stathopoulou et al., 2006), two were previous systematic reviews (Cooney et al., 2013; Eriksson & Gard, 2011), another two were follow-up studies (Babyak et al., 2000; Mota-Pereira et al., 2013), and one was a meta-analysis (Rethorst et al., 2009).

Participants

The included studies contained a variety of different age groups. Some recruited patients between the ages of 20-45 or 50 years and older. Overall, however, studies assessed adults from the ages of 18 and above, with no upper age limit (e.g. Cooney et al., 2013; Lawlor & Hopker, 2001). Participants were recruited from a variety of different settings such as community settings, primary care, and inpatient or outpatient hospital care.

Measurement characteristics

There were a number of means by which participants within each study were given a diagnosis of mild depressive disorder (MDD). Most studies included the use of clinical interviews, DSM-IV criteria, and scores on the self-report Beck Depression Inventory (BDI) and clinician-rated Hamilton Rating Scale of Depression (HRSD). Regarding outcome measures, trials assessed scores on the HRSD at baseline and after the intervention period, or weekly over the course of the 12 week program (e.g. Dunn et al., 2002). Mirroring the method used for initial diagnosis, studies also tested scores on the BDI and conducted a clinical interview upon completion to test for perseverance of a clinical diagnosis. Among the meta-analyses, outcome measures were the standardised mean difference in effect sizes.

Intervention characteristics

In all but one paper, where walking was the measured intervention (Robertson et al., 2012), there was no specified type of physical activity assessed. In terms of exercise intensity, most studies assessed exercise at moderate to vigorous levels for duration of 20-45 minutes, three to five times per week, and for a period of 12 weeks.

Comparator groups

Control groups varied in the activities in which they engaged. Two trials used stretching and flexibility exercises as a control (Dunn et al., 2002, 2005). The remainder of studies utilised a wait-list or placebo intervention, measured exercise as adjunct to another established treatment, or had patients receive usual care in the form of antidepressants or psychotherapy.

Discussion

Studies included in this review measured the effectiveness of physical activity in one of two ways - in comparison to existing treatment methods, or a 'no treatment', wait-list or placebo control. Comparing physical activity to control condition, Krogh et al.'s (2011) meta-analysis outlined a small anti-depressant effect of exercise in terms of reduction in depressive symptoms. Alternatively, the Cochrane review conducted by Cooney et al. (2013) found that exercise was moderately more effective than a control intervention. Though Lawlor and Hopker (2001) found that physical activity was superior to no treatment and

similar to psychotherapy in symptom reduction, there are considerable methodological weaknesses of the available trials: the majority used small sample sizes within non-clinical populations, which could hinder the significance of any findings. This conclusion was further supported by Cooney et al. (2013) in their subsequent review and in Rethorst's (2009) meta-analysis, where neither comparison to medication or psychotherapy treatment was significant, but these findings were based on only a few studies.

Dunn et al. (2002, 2005) found response and remission rates among patients in an exercise group comparable to other treatments, such as pharmacotherapy and psychotherapy, when physical activity is carried out according to a public health recommended dose (three to five times per week for duration of 45 minutes). The Cochrane review reported similar: exercise appears no more effective than medication and psychotherapy, though again this conclusion was based on a small number of trials (Cooney et al., 2013).

The effectiveness of physical activity as an adjunct to other empirically supported treatments was explicitly measured in two controlled trials, and findings were positive in its favour. Mota-Pereira and colleagues (2011) established exercise to be a feasible and effective intervention, bringing therapeutic benefits in the form of reduced depressive symptomatology. Similarly, Schuch et al.'s trial (2011) and Eriksson and Gard's review (2011) found exercise effective in diminishing depressive symptoms and improving mood and quality of life. Evidence accumulated by Stathopoulou et al. (2006) in their meta-analysis convinced them of the benefits of exercise treatments. As a result, they were keen to use their findings to encourage clinicians to consider adjunctive exercise interventions as part of clinical practice for depression.

Though the studies presented in this review indicate significant improvements in mood and reduced depression as a result of physical activity, the particular type of exercise was never specified. Robertson et al. (2012) found that walking had a statistically significant, large effect on symptoms of depression, yet this conclusion was not based on a comparison among different exercise types, some of which could have been found to have a more beneficial effect.

Despite little evidence of a long-term effectiveness of physical activity in clinically depressed patients in Krogh and colleagues' meta-analysis (2011), a number of other

controlled follow-up trials have been conducted to assess this relationship further. Firstly, in a follow-up study by Babyak et al. (2000) measured response and remission rates among participants in either an exercise or medication group. After 10 months, remitted patients in the exercise group had only an 8% relapse rate, significantly lower than the 38% reported in the medication group. Likewise, Mota-Pereira et al. (2013) found that patients in an exercise group maintained the same depression and functional parameter improvements they showed after completion of a 12 week program. However, both these follow-up studies emphasise positive effects of physical activity on depression only persist if exercise is continued over time.

Implications for research

A major concern here is the significant methodological flaws that often occur within these clinical trials (Blake, 2012; Schuch & Fleck, 2013). To rectify this, researchers in this area ought to investigate the adequate prescription of exercise (type, duration, frequency and intensity) for the intervention to be effective. This should be examined among patients recruited and assessed in a standardised format, diagnosed via the clinical interview and appropriately followed-up. Essentially in such studies, diagnostic criteria and outcome measures ought to be standardised. This research should be done in a health-care setting where physical activity is likely to be plausibly prescribed to individuals with MDD (Cooney et al., 2013).

Ultimately, policy change in mental health interventions is reliant, in-part, on a sound evidence base, which could be achieved by following such recommended actions (Faulkner & Taylor, 2005). There are though other factors such as cost-effectiveness, resources and time demands which have the power to impact such policies. Nonetheless, evidence has one of the strongest influences - it could identify a treatment that is cost-effective, needs relatively few resources and is time-effective with long-term results.

The inclusion of a comparator group in research of this nature is essential (Morgan, 1997). Some trials such as that of Dunn et al. (2002, 2005) include an exercise control group where low-level stretching and flexibility exercises were performed, which allowed for the monitoring of depression levels for patient safety. Others consider such studies as part of exclusionary criteria when conducting reviews (Rethorst et al. 2009). Consistency in

definition of control groups is needed. Attention has also been drawn to the matter of 'grey literature', the potential discrepancy between the number of clinical trials completed and those published. However, relevant analyses indicate findings to date to be robust - over 360 current or future unpublished studies with effect sizes of 0 would be needed to reduce the overall effect size for depression into the range of non-significant (Stathopoulou et al., 2006).

Implications for practice

The current research does show promising evidence that exercise is appropriate and effective in treating depression with few adverse effects as opposed to those experienced with medication (Mammen & Faulkner, 2013; Stanton et al., 2014). In fact, there is considerable merit in the use of exercise as a way of improving well-being and offering treatment to those where conventional interventions are less acceptable or undesired (Salmon, 2001). Patients themselves believe physical activity to be an effective intervention, albeit one that is often neglected and underutilised (Searle et al., 2011). As a treatment method, it empowers individuals with autonomy in the long-term management of their depression. Empowerment is key in promoting recognition of the power and capabilities individuals already possess, acknowledging the partnership as collaborative in allowing the patient to establish personally meaningful goals in order to overcome their depression (Anderson & Funnell, 2010; Fitzsimons & Fuller, 2002). This suggests an imperative need for practitioners to elicit patients' views on this, offering physical activity interventions that are tailored to both the needs and expectations of each patient individually, in accordance with the NICE guidelines (Department of Health, 2001; Searle et al., 2011).

Conclusion

Overall, the findings are very positive and impact both mental health practitioners and individuals with depression alike. Studies indicate exercise to be an effective treatment for mild depression when used mono-therapeutically or adjunct to medication or psychotherapy (e.g. Cooney et al., 2013, Dunn et al., 2002, 2005; Mota-Pereira et al., 2011). The inclusion of physical activity as a first-line treatment for depression in the NICE guidelines (NICE, 2009a) is a sign of its potential. Though many trials thus far have had methodological flaws, if methods are refined, as advised, significant findings could emerge that impact mental health policy. Finally, there is considerable merit in encouraging practitioners to offer

physical activity as an intervention for adults with mild depression, with therapeutic benefits for both physical and mental health (Searle et al., 2011).

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