



Predictors of adherence to exercise interventions in patients with clinical depression – A pooled analysis from two clinical trials



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ARTICLE INFO

Article history:

Received 30 August 2013
Received in revised form
23 January 2014
Accepted 24 January 2014

Keywords:

Exercise
Depression
Adherence
Participation
Attrition
Predictors

ABSTRACT

Background: Physical activity is inversely associated with the risk of cardiovascular disease, diabetes and all-cause mortality. Patients with depression are less likely to be physically active, and thus more prone to developing these diseases. The aim of this study was to identify patient and study characteristics associated with adherence to exercise interventions.

Method: We pooled data from patients allocated to active exercise interventions from two previously conducted exercise trials ($n = 166$) offering two or three weekly sessions. We divided the patients into a high attendance or a low attendance group. We then compared patient characteristics, distance to training facilities, depression, anxiety, and satisfaction with the offered intervention between the two groups.

Results: High attendance was positively associated with age ($p = 0.05$) and satisfaction with the intervention ($p < 0.001$). We found no association between attendance and any other patient characteristics, severity of depression, severity of anxiety, or distance to training facilities. Patient satisfaction was positively associated with the patient's age ($p = 0.008$) and improvement in depression ($p = 0.04$). Median attendance did not differ between the two trials offering two or three sessions per week ($p = 0.44$).

Conclusion: Severity of depression or anxiety in mild to moderate depression did not predict attendance, but high attendance was associated with higher age and satisfaction with the intervention. These findings suggest that motivational focus on younger participants should be encouraged and ways to improve satisfaction with the intervention should be considered.

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1. Introduction

Patients with affective disorders have an excess mortality of all causes compared to the general population (Laursen, Munk-Olsen, Nordentoft, & Mortensen, 2007; Nordentoft et al., 2013). The mortality gap between patients with affective disorders and the general population have been estimated to decrease life expectancy with approximately 17 years (Nordentoft et al., 2013). The reduced life expectancy is not only comprised of excess death from suicide and accidents, but increased prevalence of medical co-morbidities. In this patient group, death due to cardiovascular disease, cancer and diabetes is increased by a OR of 1.5–2.6 compared to the general population (Nordentoft et al., 2013). A common denominator for these conditions is an unhealthy lifestyle in terms of diet, smoking and physical activity. Low levels of physical activity is associated

with increased risk of cardiovascular disease, diabetes and all-cause mortality (Kodama et al., 2009; Myers et al., 2002). Patients with depression are less likely to be physically active indicated by results from a large cross sectional study showing that 26% of patients with severe mental disorders did not engage in any leisure time physical activity compared to 17% of the general population (Daumit et al., 2005; Jerome et al., 2009) and these patients are therefore more prone to developing the aforementioned diseases.

While the antidepressant effect of exercise in patients with depression remains unclear (Cooney et al., 2013; Krogh, Nordentoft, Sterne, & Lawlor, 2010), exercise potentially reduces the risk of several medical co-morbidities. A number of trials consistently show that referring patients with depression to exercise interventions will improve their cardiovascular fitness (Blumenthal et al., 2007; Krogh, Saltin, Glud, & Nordentoft, 2009) or muscular strength (Krogh et al., 2009; Singh et al., 2005). A recent study by the authors also found a modest but significant effect of exercise on metabolism in terms of reduced plasma glucose levels and reduced waist circumference (Krogh, Videbech, Thomsen, Glud, & Nordentoft, 2012). However, adherence to behavioral

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interventions in both depressed and non-depressed populations is a major issue (Davis & Addis, 1999). Studies of adherence in exercise referral schemes suggest that older age and male sex is positively associated with adherence (Gidlow et al., 2007; Pavey et al., 2012), while depression and anxiety are associated with low attendance (Crone, Johnston, Gidlow, Henley, & James, 2008). Only one previous study has investigated adherence predictors in an exercise study for patients with major depression and found that baseline anxiety and life satisfaction were the best predictors of participation (Herman et al., 2002).

The purpose of this study was to identify the predictors of participation in training programs for patients with depression recruited from a clinical setting. Based on the literature and feedback received from our patients and staff during two previously conducted exercise trials, we hypothesized an inverse relationship between baseline depression, anxiety and exercise attendance. Furthermore, we hypothesized that exercise adherence would be influenced by the distance to training facilities, baseline cardiovascular fitness and participants' satisfaction with the offered intervention.

2. Methods

2.1. Design

The current study was performed using data from two previously conducted trials (DEMO-I and DEMO-II) (Krogh et al., 2009; Krogh, Videbech, Thomsen, Gluud, & Nordentoft, 2012) allocating patients with clinical depression to either an exercise intervention or an active control intervention. Both trials were parallel-group, observer-blinded randomized clinical superiority trials. The total number of participants referred in both trials was 617 and a total of 280 participants was included and randomized. 166 of 280 participants were allocated to active exercise intervention and the remaining to active control groups. Details of patient flow and reasons for exclusion has been described in detail elsewhere (Krogh et al., 2009; Krogh et al., 2012).

2.2. Participants

For this study we exclusively analyzed data from the exercise intervention groups. In both studies, participants had to be referred by a physician or psychologist from a clinical setting. Both studies were advertised in the local media. Eligible patients aged 18 to 55 (18–60 in DEMO-II), fulfilling the ICD-10 or DSM-IV criteria for depression and living in the Greater Copenhagen area were included. In both studies, current drug or alcohol abuse, contraindications to physical exercise, more than 1 h of recreational exercise per week, suicidal behavior (a score >2, on item 3, Hamilton Depression Scale; HAM-D17), or current/previous psychotic or manic symptoms were exclusion criteria. The DEMO-I trial included patients taking antidepressant medication, while those with use of antidepressant medication within the last two months were excluded in the DEMO-II trial.

2.3. Interventions

DEMO I: In this trial the participants would be randomized to either strength training or aerobic training or an attention control. Both exercise groups were offered supervised sessions twice per week for four months, choosing between sessions starting at 2 pm or 5 pm. The strength-training group undertook a circuit program using exercise machines plus small weights and sand bags, initially with 12 repetitions of 50% of one repetition maximum, increasing to 75%. The aerobic exercise group used machines for cycling,

running, stepping, rowing etc. starting at 70% of maximal heart rate increasing to 89%.

To increase power for the current study we pooled data from the strength and aerobic training program. As previously reported there was no difference on baseline characteristics or the effect on psychometric outcomes (Krogh et al., 2009).

DEMO II: In this trial the participants would be randomized to either an aerobic exercise intervention or attention control. The exercise intervention was supervised afternoon sessions three times weekly for three months. Each exercise session was 45 min of cycling on a stationary bike. Initially, the exercise was conducted at 65% of the maximal heart rate, increasing to 80% during the last month of the intervention. Throughout the study, participants were encouraged to do one or two exercise sessions of brisk walking, biking or running at home.

In both trials the exercise interventions were compared to attention-control groups doing stretching exercise. These groups were preferred to waitlist control groups due to the potential unspecific positive effect of socializing with other patients and health care professionals (McCann & Holmes, 1984; McNeil, LeBlanc, & Joyner, 1991). These groups were scheduled to meet as often as the intervention groups. These participants were not included in the present analysis.

Physiotherapists experienced in supervising participants with mental health issues conducted the intervention in both trials. In case a participant did not show for a scheduled session, the physiotherapists were instructed to contact participants by phone or using text messages. This contact was used to evaluate the need for acute psychiatric assistance and to facilitate adherence to the intervention. This procedure was maintained throughout the study regardless of participant adherence. In the DEMO-II trial, participants' expenses for transportation to training facilities (i.e. bus tickets, gasoline etc.) were covered.

2.4. Outcomes

2.4.1. Exercise attendance

Participation was registered as 'present' or 'not present' by the physiotherapists during the exercise intervention. For the current study we report the average attendance per week.

2.4.2. Psychometrics

Depression was diagnosed using the Major Depression Inventory (ICD-10) in the DEMO-I trial (Bech, Rasmussen, Olsen, Noerholm, & Abildgaard, 2001) and the Mini International Neuropsychiatric Interview in the DEMO-II trial (Bech, Bech-Andersen, & Schütze, 1999). In both studies we used the HAM-D₁₇ for assessment of severity of depression and the Hamilton Anxiety Scale (HAM-A₁₄) for assessment of anxiety symptoms.

2.4.3. Patient satisfaction

In the DEMO-I trial we measured the global participant satisfaction with the intervention using the 8-item self-reported Client Satisfaction Questionnaire (CSQ-8) (Attkisson & Zwick, 1982). This questionnaire uses a scaled response comprising options from 1 to 4, with a total range of 8–32. A high score indicates high satisfaction.

2.4.4. Distance to training facilities

Using Google Maps, the distance between the training facilities and the participants' homes was quantified, including the minimum amount of time necessary for traveling by car and by public transportation, and the number of changes between measures of public transportation necessary to reach the training facilities. These variables do not take into consideration variations in traffic, but are all noted as the minimum amount of travel time in car, and by public transportation departing Monday morning at 8 am.

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