

Short communication

Effects of home-based exercise on fatigue in postpartum depressed women: Who is more likely to benefit and why?

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Abstract

Objectives: (1) To explore moderators of the effects of home-based exercise on reductions in physical and mental fatigue scores in postpartum depressed women and (2) to explore mediators of the intervention on changes in physical fatigue. **Method:** Eighty-eight women in the postpartum period (4–38 weeks) obtaining a score ≥ 10 on the Edinburgh Postnatal Depression Scale were randomly assigned to a 12-week individualized home-based exercise intervention ($n=46$) or a no-treatment control group ($n=42$). The present analyses include the 35 women who adhered to the intervention and the no-treatment control group. Participants completed a cardiovascular fitness test, and a battery of questionnaires assessing the outcomes (Physical and Mental Fatigue) as well as potential moderators and

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mediators at baseline and posttreatment. **Results:** Hierarchical linear regressions evaluating moderators of changes in mental fatigue with exercise showed that the intervention was effective for women entering the study later in the postpartum period ($P=.001$) and women with higher depression scores ($P=.014$). Reductions in physical fatigue with exercise were partially mediated by reductions in perceived stress and increased exercise-related energy expenditure. **Conclusion:** Identification of moderators allows for the tailoring of exercise interventions to particular subgroups of women that are most likely to benefit. The identified mediators may be enhanced and directly tested in future trials.

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Introduction

We recently demonstrated that exercise is effective in alleviating physical fatigue in postpartum depressed women [1]. The intervention was also effective in alleviating mental fatigue for women with lower physical fatigue and greater mental fatigue at study entry.

Given the paucity of randomized trials evaluating exercise interventions in this patient population, much more can be learned from this trial that can help guide application of findings and generate future hypotheses.

The focus of the present analyses was to identify potential moderators and mechanisms of the effects of the home-based exercise on changes in fatigue levels.

Specifically, the objectives were to explore the following questions:

1. Do clinical factors (delivery mode, parity, time elapsed since delivery), depression levels at study entry, cardiovascular fitness levels, and social support moderate the effects of home-based exercise on mental and physical fatigue in postpartum depressed women?
2. Are changes in depressed mood, sleep quality, perceived stress, physical fitness, and exercise-related energy expenditure mechanisms through which exercise alleviates physical fatigue in postpartum depressed women?

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Method

Participants

Women in the postpartum period (4–38 weeks) experiencing symptoms of postpartum depression were recruited. Interested participants were screened over the telephone and those obtaining a score ≥ 10 on the Edinburgh Postnatal Depression Scale (EPDS) [2] were invited to participate.

Outcome measure

The Multidimensional Fatigue Inventory (MFI-20) [3] is a self-report instrument developed to assess the following dimensions of fatigue: general fatigue, physical fatigue, reduced activity, reduced motivation, and mental fatigue. Scores on each subscale range from 4 to 20, with higher scores indicating a higher degree of fatigue [3,4]. Changes on the Physical and Mental Fatigue subscales were used as outcome measures.

Potential mediators and moderators

Major complications experienced during pregnancy and labor/delivery, demographic information, and medical history were assessed via a semistructured interview.

The EPDS measures depressive symptomology in new mothers over the past 7 days [2]. A cutoff point of 10 has been shown to have a sensitivity of 84% to 100% and a specificity of 76% to 88% when compared to a diagnosis of depression using structured psychiatric interviews [5–7]. Baseline scores were evaluated as potential moderators, while change scores from baseline to posttreatment were evaluated as potential mediators.

Sleep quality was assessed with the Pittsburgh Sleep Quality Index (PSQI), a self-report measure assessing sleep quality and disturbances over a 1-month time interval. A global score of greater than 5 yields a diagnostic sensitivity of 89.6% and specificity of 86.5% in differentiating good and poor sleepers [8]. Change in global PSQI scores from baseline to posttreatment were evaluated as potential mediators.

Stress was evaluated with the Perceived Stress Scale (PSS) which measures the extent to which situations in one's life are appraised as stressful in the past month [9]. Score range from 0 to 40 with higher scores indicating greater perceived stress. The mediating effects of changes in PSS from baseline to posttreatment were evaluated.

MOS social support survey [10] measures perceived availability of social support. Higher scores indicate greater perceived support. The moderating effect of social support at study entry was evaluated.

The Aerobic Centre Longitudinal Study Physical Activity Questionnaire (ACLS-PAQ) was used to track exercise participation [11]. Participants provide information about

activities performed regularly in the last 3 months. Scores are estimates of weekly energy expenditure expressed as metabolic equivalent (MET)-hours per week. ACLS-PAQ scores excluding household activities [weekly exercise-related energy expenditure (ACLEX)] at posttreatment were evaluated as potential mediators.

Cardiovascular fitness was measured using a maximal graded exercise stress test on a treadmill using a Bruce protocol [12,13]. Fitness was then evaluated by time on test and maximal METs capacity. Baseline fitness was examined as a potential moderator of the effects of exercise on mental and physical fatigue, while change in fitness levels with exercise was evaluated as a potential mediator.

Procedures

Following the initial telephone interview, consenting participants were mailed the questionnaire battery along with a preaddressed stamped envelope.

Participants then underwent a physician supervised cardiovascular fitness test and were randomly assigned to either the exercise or the no-treatment control group. Information from the baseline fitness test was used to individualize exercise programs for women assigned to the exercise group. Following the 12-week intervention, all participants completed a second cardiovascular fitness test. All follow-up questionnaires were mailed to participants.

Exercise intervention

Participants assigned to the exercise group met four times with the same exercise physiologist during a 12-week training phase. The first visit included a review of the cardiovascular fitness test results, an overview on the benefits of exercise, an individualized exercise prescription, and a supervised exercise session. Follow-ups were scheduled at 1, 3, and 9 weeks following the initial visit.

The exercise prescription was individualized and followed ACSM guidelines for developing and maintaining cardiorespiratory fitness [14]. These guidelines suggest individuals perform 60–120 min/week of aerobic exercise within their target heart rate zone (60–85% of maximal heart rate).

Heart rate monitors were provided to assure proper intensity of training. All subjects maintained an exercise log for the duration of the 12-week training phase.

Results and discussion

Flow of participants has been previously described [1]. Eighty-eight women were successfully randomized, 46 were assigned to the exercise group and 42 to the control group. During the 12-week training phase, adherence to the aerobic exercise component of the program was 76.1% (based on 60 min/week of cardiovascular exercise), with an average of 124.09 min/week (S.D.=96.33). Thirty-five out of the 46

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