



## Feasibility and acceptability of a home-based physical activity program for postnatal women with depressive symptoms: A pilot study

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### ABSTRACT

**Background:** Most postnatal women are inactive. Since new mothers, particularly those with heightened depressive symptoms experience several challenges to being active such as lack of time and childcare, home-based programs using hired exercise equipment may help overcome these barriers. This study tested the feasibility and acceptability of a home based treadmill intervention among postpartum women with heightened depressive symptoms.

**Methods:** Participants were 11 new mothers (3–9 months postpartum) who at baseline were insufficiently active and experiencing heightened depressive symptoms (based on the Edinburgh Postnatal Depression Scale). Following participation in a 12-week physical activity support program (which included free treadmill hire and access to a purposely designed smartphone web-app), semi-structured interviews were conducted with participants. Depressive symptoms were assessed at weeks 4 and 8 and change in depressive symptoms was analysed using repeated-measures analysis of variance (ANOVA). Thematic analyses were used to identify key themes in qualitative data.

**Results:** Quantitative data showed that there was a significant change over time with depressive symptoms decreasing from weeks 0–4 (mean difference =  $-5.9$ , 95% CI =  $-8.7, -5.5$ ) and overall from weeks 0–8 (mean difference =  $-7.6$ , 95% CI =  $-9.8, -3.1$ ). Postpartum women perceived the program to be convenient, flexible and acceptable. Women suggested that the program was useful in overcoming key barriers to physical activity and perceived that the program increased their physical activity and improved psychological health.

**Conclusion:** A home-based physical activity program involving cost-free exercise equipment hire was feasible and well accepted by postpartum women. The effectiveness of this program for increasing physical activity and improving mental health in this population should be further tested.

### 1. Background

Postnatal depression affects between 10 and 19% of new mothers worldwide (Woody, Ferrari, Siskind, Whiteford, & Harris, 2017), with a large proportion of women undiagnosed. It is associated with decreased enjoyment in life, social withdrawal, insomnia, self-harm, and in some instances infant-harm (Lee & Chung, 2007). Maternal postnatal depression also impacts on infants' cognitive, behavioural and social development (Murray, 1992) and can have damaging effects on close family members (including impacting their other children and partners' mental health) (Boath, Pryce, & Cox, 1998). Thus, it is important to identify strategies to reduce new mothers' risk of developing this illness. Physical activity, particularly that which is undertaken during leisure-

time, has been linked to lower risk of postnatal depressive symptoms (Pritchett, Daley, & Jolly, 2017; Teychenne & York, 2013). Whilst current empirically supported treatments for postnatal depression include psychological therapy (e.g., cognitive behavioural therapy) and anti-depressant medication, such treatments may be limited by several factors. Barriers to psychological therapy can include access (difficulties to getting to therapy with a new baby), expense (particularly while not working), and stigma. Further, possible side effects associated with use of some medications, as well as low acceptability particularly in breastfeeding mothers, may limit anti-depressant medication effectiveness (Berle & Spigset, 2011; Bet, Hugtenburg, Penninx, & Hoogendijk, 2013; Chabrol, Teissedre, Armitage, Danel, & Walburg, 2004). Therefore, physical activity may offer an adjunct or alternate

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treatment for depressive symptoms in new mothers.

According to the US Department of Health and Human Services (USDHHS), postnatal women (i.e. within 12-months following child-birth) are recommended to undertake at least 150 min of moderate-intensity physical activity per week for health benefits (Evenson, Mottola, Owe, Rousham, & Brown, 2014), however most (68%) do not achieve these guidelines (Albright, Maddock, & Nigg, 2006). This may be due to postnatal women facing many challenges to being physically active including barriers to leaving the house, childcare, working around baby feeding and nap times/routines, and being able to make time for themselves (Evenson, Aytur, & Borodulin, 2009; Saligheh, McNamara, & Rooney, 2016). These barriers to being active are likely to be heightened amongst those experiencing heightened levels of depressive symptoms. Therefore, it is imperative that physical activity programs are targeted and designed to address these challenges.

Few successful strategies for increasing physical activity in postnatal women with depressive symptoms have been identified. Although limited in number, walking interventions show some promise in reducing postnatal depressive symptoms (Armstrong & Edwards, 2003, 2004). However, these interventions often require women to attend on certain days and times for group-based exercise sessions. Given that new mothers (and particularly those with heightened postnatal depressive symptoms) often are challenged to leave the house due to exhaustion and baby routines, feeding and nap times, structured, group-based or other external programs are not always suitable for this population group.

Physical activity interventions using home exercise equipment such as treadmills to reduce depressive symptoms have shown success in promoting physical activity and treating/managing depression in adults (Dimeo, Bauer, Varahram, Proest, & Halter, 2001). However, no such interventions have been tested in postnatal women. Given that providing exercise equipment such as treadmills to postnatal women to use in the home would overcome many of the barriers to physical activity faced by this group (Carter-Edwards et al., 2009), this represents a simple, potentially feasible and convenient strategy to increase physical activity and potentially treat and/or manage postnatal depressive symptoms. Therefore, the proposed study aimed to investigate the perceived feasibility and acceptability of the “Mums on the Run” program, a multi-component home-based physical activity program, delivered to new mothers with heightened postnatal depressive symptoms.

## 2. Methods

This study involved both qualitative and quantitative methods. Ethics approval was obtained from the Deakin University Human Research Ethics Committee (DU-HREC-2016-178).

### 2.1. Participants

During August–September 2016, a flyer with information regarding the study was posted on researchers personal *Facebook* accounts, which was shared (via snowball techniques) by other *Facebook* users including one *Facebook* page related to parenting. Interested participants contacted the researchers and were screened via telephone to ensure they met the following inclusion criteria: 1) Mother 3–9 months postpartum (since 3-months is a substantive amount of time for many postpartum women to safely resume physical activity (including higher-impact activities such as brisk walking and running), and would likely include women who experienced both vaginal and C-section births, as well as difficult births/those with complications (Evenson et al., 2014); 2) Living in Melbourne, Australia; 3) Currently experiencing heightened postnatal depressive symptoms (i.e. score  $\geq 10$  on the Edinburgh postnatal depression scale (EPDS) (Cox, Holden, & Sagovsky, 1987), which has been shown to have high sensitivity and specificity for detecting moderate likelihood of postnatal depression (Figueira, Correa,

Malloy-Diniz, & Romano-Silva, 2009; Santos et al., 2007)); 4) Do not own a treadmill; 5) Do not meet the physical activity recommendations of 150 min of moderate-vigorous physical activity per week (using the single question “Do you currently undertake less than 150 min a week of physical activity that makes you breathe a little heavier (moderate intensity)?”); 5) Aged over 18 years. A total of 37 women were screened and 19 of those were excluded due to scoring less than 10 on the EPDS. Thus, 18 women were eligible for inclusion, providing contact information to complete the study. Eligible participants were required to obtain medical clearance from their general practitioner and written consent prior to being recruited. Within 6 weeks of recruitment efforts, a total of 14 participants provided both clearance and consent and were recruited to the study. Two participants withdrew from the study (one citing unrelated medical problems; one citing that they only wanted a brand new treadmill, which was not available) and one participant was unable to be contacted for the follow-up interview. Thus the final sample consisted of 11 women, which was adequate in terms of scope (i.e. data provided comprehensive information and themes), replication (i.e. data from many participants shared common characteristics), and appropriate in terms of proficiency to answer the research question (Morse, 2015; Varpio, Ajjawi, Monrouxe, O'Brien, & Rees, 2017).

### 2.2. Intervention

The ‘Mums on the Run’ program aimed to increase physical activity and improve mental health (i.e. reduce depressive symptoms) amongst women with postnatal depressive symptoms. The program was a multi-component home-based treadmill intervention, based on theoretically underpinned behaviour change strategies (including goal setting/self-monitoring, education/knowledge, access to equipment), derived from principles of the social cognitive theory (SCT) [which suggests that personal factors (e.g. self-efficacy, knowledge) and environmental factors (e.g. access to equipment) predict behavior change (Bandura, 1986)]. The intervention also included aspects of the transtheoretical model (processes of change, e.g. providing information regarding consciousness raising for initiation, and reinforcement management for maintenance) (Prochaska & Velicer, 1997). Previous research suggests that women (including mothers) with depressive symptoms believe time management, childcare, knowledge of health benefits of physical activity, access to facilities, and women's-ONLY facilities, are important strategies to increase physical activity/reduce sedentary behaviour (Teychenne, Ball, & Salmon, 2011). Therefore the intervention addressed these factors within the design by: 1) Providing free treadmill hire to each participant for 12 weeks, and 2) Providing access to a purposely designed smartphone web-app which included educational material (e.g. how, why and when to exercise during the postpartum period, overcoming common barriers to physical activity) and motivational material using goal setting and self-monitoring techniques, and music playlists to enhance psychological health and motivation (Karageorghis & Priest, 2012). Theoretical constructs and corresponding strategies are outlined in Table 1.

### 2.3. Measures

#### 2.3.1. Postnatal depressive symptoms

For the purposes of initial screening and monitoring for ethical purposes throughout the program, depressive symptoms were assessed via telephone in weeks 0, 4, and 8, using the EPDS (Cox et al., 1987), a valid and reliable 10-item self-report tool (Cox et al., 1987; Kernot, Olds, Lewis, & Maher, 2015). Participants were asked to report how often they had experienced various feelings or behaviours (related to postnatal depressive symptoms) in the past week, rating their responses on a 4-point Likert scale (e.g. 0 = no, not at all; 4 = Yes, Quite a lot). Scores for each of the 10 items were then summed, with a total score of  $\geq 10$  indicating presence of heightened depressive symptoms. Following ethical protocol, if women scored 10 or more on the EPDS, or

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