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## Original Research

# Keeping active: maintenance of physical activity after exercise programmes for older adults



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## ABSTRACT

**Objectives:** To explore factors associated with maintenance of moderate-to-vigorous physical activity (MVPA) in community-dwelling adults aged  $\geq 65$  years after completing a 24-week exercise programme.

**Study design:** This is a cohort study nested within a randomised controlled trial evaluating group- and home-based exercise programmes for older people in England.

**Methods:** MVPA levels and factors potentially associated with physical activity (PA) were self-reported at recruitment, 6, 12, 18 and 24 months after exercise programme. Multilevel logistic regression estimated odds ratios (ORs) for achieving target MVPA level (150 min/week) 6–24 months after exercise programmes ended.

**Results:** Older people (OR per year increase: 0.89, 95% confidence interval [CI] 0.86, 0.93) and women (OR 0.47, 95% CI 0.33, 0.67) were less likely to achieve target MVPA. Those physically active at recruitment (OR 11.28, 95% CI 7.95, 16.01), with wider social networks (OR per unit increase in Lubben Social Network Scale: 1.06, 95% CI 1.03, 1.10) and performing more sit-to-stands in 30 s (OR for quartile 3 compared with quartile 1: 1.87, 95% CI 1.12, 3.10), were more likely to achieve target MVPA. Negative exercise expectations increased the odds of achieving target MVPA but only among the less active at recruitment (OR per unit increase in Outcome and Expectation for Exercise negative subscale: 1.90, 95% CI 1.39, 2.60). Associations did not differ significantly across the follow-up period.

**Conclusion:** A range of factors are associated with maintenance of PA 6–24 months after exercise programmes. Factors are not more strongly associated with shorter vs longer term PA maintenance. Commissioners and providers should consider targeting maintenance interventions to those least likely to maintain PA.

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## Introduction

Physical activity (PA) reduces the risk of cardiovascular disease, type 2 diabetes, osteoporosis, falls, hip fractures, certain cancers and all-cause mortality<sup>1–3</sup> and improves musculoskeletal pain.<sup>4</sup> Promoting PA in older people could prevent functional decline, frailty, falls and fractures.<sup>5</sup> Current PA recommendations are 150 min of moderate-to-vigorous physical activity (MVPA) per week, including activities that improve muscle strength and balance, and reduced sedentary behaviour.<sup>6</sup> However, physical inactivity among the older population is widespread<sup>7</sup> and although exercise programmes can be effective in increasing PA in older people,<sup>8</sup> many do not maintain PA levels at the end of such programmes.<sup>9</sup> Understanding which factors are associated with continuation of PA is important when designing, implementing and commissioning interventions that seek to foster long-term increases in PA.

There is some evidence about what works to maintain PA. A systematic review in 2008 reported that ‘booster’ interventions (e.g. including mailed reminders, phone calls, email, internet or group sessions) were effective, but which interventions were most effective was unclear.<sup>10</sup> A systematic review in 2009 recommended that interventions to maintain PA among older people should emphasise satisfaction with PA achievements, increase self-efficacy to maintain PA, encourage positive mood and intentions, remove barriers to PA maintenance, enhance the physical environment for PA and help older people develop coping plans.<sup>11</sup>

In terms of factors associated with PA maintenance, the 2009 review<sup>11</sup> found mixed evidence for the effect of age and gender, while a 2011 systematic review<sup>12</sup> found moderate evidence that younger age and male gender were positively associated with PA. However, many studies explored only a limited number of factors, and the evidence was of low quality. A third review from 2013<sup>13</sup> suggests beliefs about capabilities and motivation and goals are among factors with the strongest associations with PA maintenance. A randomised controlled trial of a 6-month PA intervention with older adults in the USA suggested that social support, affect and exercise frequency influenced self-efficacy at the end of the intervention, and self-efficacy was related to PA at 6- and 18-month follow-up.<sup>14</sup> Further follow-up of this cohort showed that older adults with higher levels of PA, more positive affect and higher self-efficacy at year 2 were more likely to continue to be active at year 5.<sup>15</sup> All three reviews called for further studies exploring factors associated with PA maintenance in older people because of inconsistent findings or low-quality evidence.<sup>11–13</sup> Two of the reviews defined PA maintenance as regular exercising or PA for  $\geq 6$  months after exercise programmes had ceased or in those who had increased their PA level on their own.<sup>11,13</sup> It was unclear in the third review the extent to which studies reported maintenance of PA beyond the end of exercise programmes.<sup>12</sup> Given this, it is important to explore factors associated with longer term maintenance of PA after the end of exercise programmes.

Our ProAct 65 + trial of PA promotion in people aged 65 and older showed that the 24-week Falls Management Exercise programme (FaME) increased self-reported PA for at least 12 months after the end of the programme and reduced falls.<sup>16</sup>

Unlike many trials, outcome data were collected for 24 months after the end of the exercise programme, and a large number of factors that may be associated with PA maintenance were measured. This article explores factors associated with maintenance of PA up to 24 months after the end of the exercise programmes and whether factors are associated with shorter or longer term PA maintenance. Such data can be used to inform the commissioning and provision of community exercise programmes aiming to secure sustained active lifestyles in older people.

## Methods

### Setting and participants

This article presents findings from a cohort study nested within a three-arm cluster-randomised controlled trial in which general practices in London, Nottingham and Derby were randomised to treatment arms. Full details of trial methods are given in the published protocol.<sup>17</sup> Briefly, the three arms were group exercise classes (24-week Falls Management Exercise Programme [FaME], home exercise [24-week Otago exercise programme {OEP}]) and usual care. The FaME programme comprised a 1-hour-long postural stability instructor-delivered group exercise class in a local community centre for  $\leq 15$  participants and two 30-min home exercise sessions (instruction booklet based on the OEP) per week for 24 weeks. Participants were advised to walk at least twice per week for up to 30 min at a moderate pace. The programme included leg muscle strengthening and balance retraining that progressed in difficulty, progressive trunk and arm muscle strengthening, bone loading, endurance (including walking) and flexibility training, functional floor skills and adapted Tai Chi. Group exercises included retraining of getting up from, and down to, the floor (using a backward chaining approach) and floor exercises to improve balance, trunk and lower body strength and flexibility and coping strategies to reduce the risk of complications resulting from a long lie. The exercise programmes provided information about local exercise opportunities to all participants at the end of the intervention period but did not include other interventions aimed at maintaining PA beyond the end of the programme. Participants were aged  $\geq 65$  years, independently mobile and physically able to take part in a group exercise class. Exclusion criteria included  $\geq 3$  falls in the previous year, unstable clinical conditions, unable to follow instructions about exercise safely, receiving palliative care or already exercising at or above the target level ( $\geq 150$  min of MVPA per week).

### Data collection

Participants completed questionnaires at recruitment, immediately after intervention and at 6, 12, 18 and 24 months after the end of the intervention. Questionnaires asked about the exposures such as sociodemographic details; comorbidities and medications and used validated tools to measure confidence in balance (ConfBal scale<sup>18</sup>); confidence in carrying out a range of basic activities of daily living without falling (Falls Efficacy Scale-International [Short-FES-I]<sup>19</sup>); positive and

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