Effectiveness of a Community Group and Home Based Exercise intervention on the maintenance of vertebral body height and prevention of vertebral compression fractures in Older Adults: the ProAct65+ Bone Study

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Introduction
Vertebral compression fractures (VCFs) are the most common type of osteoporotic fracture causing significant physical limitations, pain and morbidity and yet two thirds of fractures go undiagnosed. Targeted exercise may provide an effective non-pharmacological intervention against age-associated declines in vertebral bone architecture, helping to prevent VCFs. This study investigated the effectiveness of a 6-month community-based group (FAME) and home-based (OEP) exercise intervention to maintain vertebra (T8-L4) height and prevent VCFs.

Methods
Participants were 319 men and women, aged (mean $\pm$ SD) 72 $\pm$ 5 years were recruited through primary care and randomised by practice to FaME, OEP or a usual care group. Lateral Vertebral Morphometry was assessed using Dual-energy X-ray absorptiometry (DXA) (GE-Lunar Prodigy) prior to randomisation and following the 24 week intervention. Dual-energy Vertebral Assessment (DVA) was used to calculate the anterior, middle and posterior heights of T8-L4 vertebral bodies, and detect the type (wedge, biconcave or crush) and severity (mild, moderate or severe) of vertebral deformities. Repeated measures general linear model (GLM), adjusted for gender and age was used to assess anterior, middle and posterior dimensions of T8-L4 vertebrae over time. Alpha level was set at $P < 0.05$.

Results
A total of 268 participants (FaME n=95; OEP n=74; usual care n=99) with sufficient vertebral morphometry data were included in the final analysis. Four new deformities (OEP: 1, FAME: 2 and Usual care: 1) were detected over the 6-month intervention. Changes in mean vertebral heights were small (ranging from -0.1 to 0.2 mm) , , there was no significant main effect of time (p=0.69) and changes over time did not differ between groups (time x group interaction p=0.49).

Conclusion
Exercise interventions, including strength exercise specifically targeted at preventing falls did not result in clinically significant changes in vertebral height or prevent VCFs. The number of incident vertebral deformities was not enough to detect differences in incidence and a trial period of six months seemed insufficient to detect changes in vertebral height. There is a need for longer term studies to examine the potential role of exercise in preventing vertebral deformity.