

# THE DIFFERENTIAL INFLUENCE OF HIGH LEVELS OF PHYSICAL ACTIVITY ON KNEE OA IN OVERWEIGHT AND OBESE MEN AND WOMEN

**Author** Block H. Soutakbar<sup>1</sup>, S. E. Lamb<sup>1</sup>, B. E. Scammell<sup>2</sup>, L. Hodgson<sup>2</sup>, K. L. Edwards<sup>2</sup>, A. J. Silman<sup>1</sup>; <sup>1</sup>Univ. of Oxford, Oxford, United Kingdom, <sup>2</sup>Univ. of Nottingham, Nottingham, United Kingdom

## *Abstract*

**Purpose:** There is no robust evidence base to inform choices and recommendations for optimal and safe levels of physical activity in people who are overweight and obese. The aim was to investigate the influence of physical activity on knee osteoarthritis (OA) in people who are overweight and obese by estimating the interaction between activity levels and Body Mass Index (BMI) on incidence of OA in men and women.

**Methods:** Data were extracted from Osteoarthritis Initiative cohort dataset on 1667 participants without symptomatic knee OA at baseline. The effect of baseline BMI, physical activity and their interaction on the development of knee OA at 96-month follow-up was analysed using logistic regression models. We estimated the total volume of physical activity, including leisure, occupational and other forms of activity using the Physical Activity Scale for the Elderly (PASE) questionnaire. The effects of gender and physical activity were estimated in three separate models that defined the development of OA as (i) new radiographic OA (Kellgren and Lawrence grade  $\geq 2$ ) (ii) symptomatic OA (co-occurrence of radiographic knee OA and frequent knee pain), or (iii) one grade worsening of joint space narrowing using Osteoarthritis Research Society International atlas. BMI was entered as a continuous variable. We categorised the PASE score into sex-specific quartile with the lowest quartile as the reference group to investigate the main effect of activity on knee OA. We classified the PASE score into below (low-moderate active) and above 200 (high active) where, based on previous research, the prevalence of cartilage and meniscal damages are seen to increase. All analyses were adjusted for the potential confounding effect of age and previous history of knee injury.

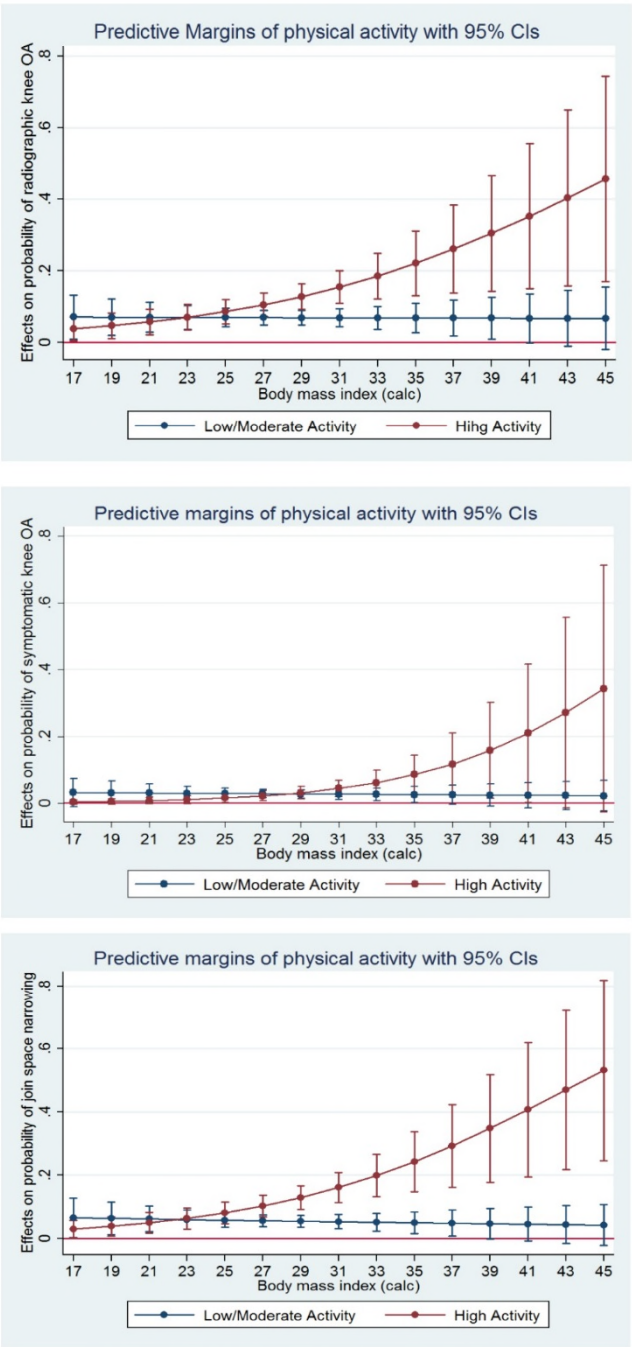
**Results:** There were substantive differences between the genders in the influence of physical activity on knee OA, independent of the OA definitions used. Firstly, in men, those who were more active had an almost doubling in risk of knee OA (e.g. aOR-4th quartile: 2.37, 95%CI: 1.23-4.54; aOR: 1.91, 95%CI: 1.20-3.04 for radiographic knee OA). Secondly, increasing BMI had a greater effect on developing of knee OA in higher rather than less active men. Interaction analyses showed statistically significant interactions between physical activity and BMI on developing the risk of radiographic knee OA (aOR-interaction: 1.12, 95%CI: 1.00-1.24), symptomatic knee OA (aOR-interaction: 1.20 95%CI: 1.02-1.42) and JSN (aOR-interaction: 1.16, 95%CI: 1.03- 1.31). The margin plots in men also demonstrated that the effect of physical activity on different measures of knee OA were modified by high levels of BMI (Figure 1). By contrast, in women, there was no substantive influence of quartile of physical activity on developing knee OA and no evidence of an interaction with BMI (Figure 2). Not unexpectedly, for both genders each unit increment in BMI significantly increased the risk of knee OA and this effect was greater in women.

**Conclusions:** At low levels of BMI, physical activity had virtually no effect on developing knee OA for both men and women. At higher levels of BMI, there appears to be a threshold above which increasing levels of physical activity are associated with higher risk of knee OA, but only in men. These data suggest that there may be a need for different advice between men and women on the risks and benefits of exercise in people with obesity.

**Category (Complete):** OA: Clinical Aspects & Outcomes

**Keyword (Complete):** Knee OA; Physical Activity; Obesity

**Figure 1:** The marginal effect of physical activity on the predicted probability of knee OA at different level of BMI in men



**Figure 2:** The marginal effect of physical activity on the predicted probability of knee OA at different level of BMI in women

