

# Chronic inflammation and subsequent depressive symptoms: The mediating role of physical activity

Authors: Frank Philipp<sup>1</sup>, Aradhna Khaushal<sup>1</sup>, Dorina Cadar<sup>1</sup>

<sup>1</sup> Department of Behavioural Science and Health, University College London, UK

## Background

Chronic inflammation has been associated with the onset of depression, but the mechanisms underlying this relationship remain elusive. This study examined whether physical activity (PA) explained the association between elevated levels of inflammatory markers and subsequent depressive symptoms in an English nationally representative sample.

## Methods

The sample consisted of 2,953 men and women (aged 50+) recruited from the English Longitudinal Study of Ageing (ELSA) an ongoing, open, representative prospective cohort study. Four waves of data between 2008/09 (wave 4) and 2016/17 (wave 8) were analysed. Serum levels of inflammatory markers (C-reactive protein (CRP)) and covariates (age, sex, education, wealth, body mass index, smoking, cholesterol, triglyceride) were measured at wave 4 (considered here as the baseline). Self-reported weekly moderate/vigorous PA (versus no weekly moderate/vigorous PA) was examined at a four-year follow-up (wave 6, 2012/13). Depressive symptoms were assessed at baseline and six years later (wave 7, 2014/15) using the 8-item version of the Centre for Epidemiological Studies Depression Scale (CES-D). Binary mediation analysis was used to investigate whether PA mediated the relationship between systemic inflammation and depressive symptoms, adjusting for the full set of covariates.

## Results

No significant associations were found between elevated levels of CRP and subsequent depressive symptoms (Odds Ratio (OR)=1.28 (95% Confidence Intervals (CI) 0.98-1.68)). Participants with high CRP were significantly more likely to be physically inactive (OR)=1.29(95% CI) 1.07-1.56). Physical inactivity was associated with greater odds of subsequent depressive symptoms (OR)=2.17(95% CI) 1.65-2.84). Mediation analyses revealed that physical inactivity mediated the relationship between high CRP and depressive symptoms, explaining a total of 47.79% of this association.

## Conclusions:

In this nationally representative sample, we found that physical inactivity is a partial mediator of the relationship between high CRP and subsequent depressive symptoms. Interventions targeting physical inactivity may be effective in ameliorating inflammation-associated depressive symptoms.

Keywords: depressive symptoms, chronic inflammation, mediation analyses, physical activity

Word counts: 297 (maximum 400)