Complex Interactions Between Obesity and White Matter: UK Biobank study

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X	No, nothing to disclose
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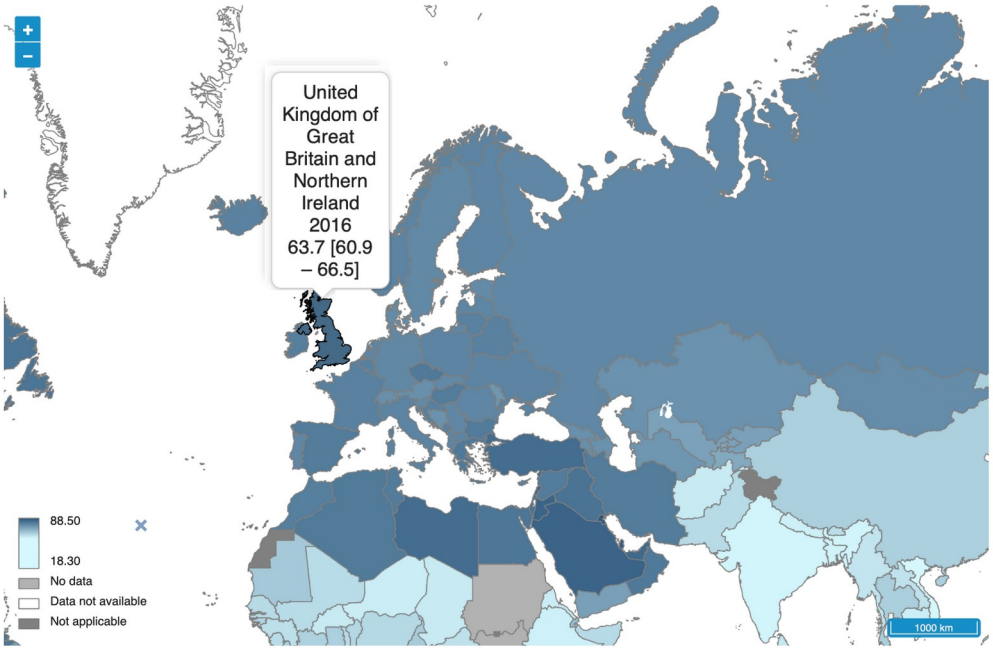
Background

- White matter injury related to **small vessel disease** is evident on structural magnetic resonance imaging (MRI) as **white matter hyperintensities (WMHs).**

- WMHs are strongly associated with advancing **age** and **hypertension**, both the pulsatile and steady component of blood pressure, and also with **smoking, diabetes, and obesity.**

Background



Over two-thirds (64%) of adults in the UK are overweight and about half of them (26.9%) are obese.

This is slightly higher but comparable with other European countries.

Aims

The aim of this study was to investigate the effect of being overweight, as estimated using **BMI**, on the extent of **white matter hyperintensities of vascular origin (WMH)** and the interaction between BMI and blood pressure.

Methods

UK Biobank is a prospective cohort of 502,484 community-based

40–69-year-old people, with brain magnetic resonance imaging data available for 45,877 participants.

Methods

WMH load was calculated by logit-transforming the volume of WMHs normalised by the total volume of cerebral white matter.

BMI cut-offs: **<25** – 'normal weight'

≥ 25 but < 30 – 'overweight'

≥ 30 'obese'

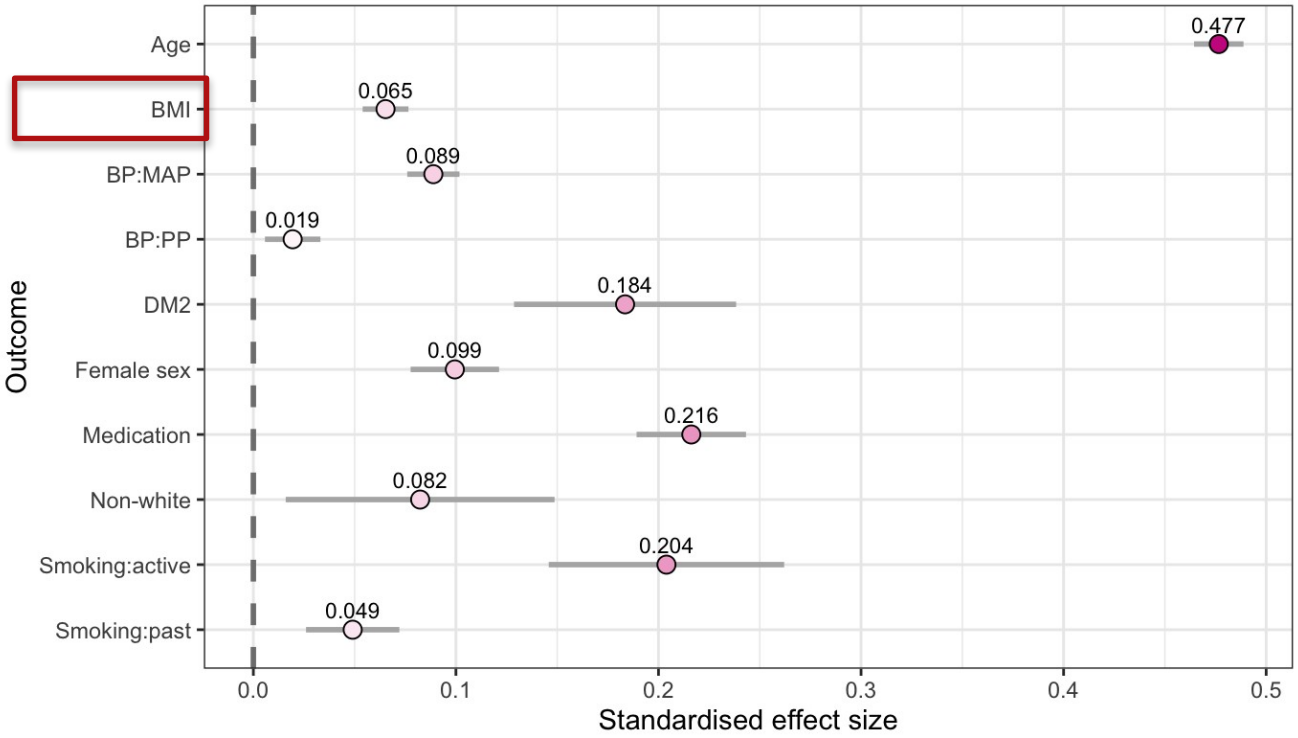
Participants were classified as **hypertensive** if their blood pressure was above **130/80 mmHg** or they were on antihypertensive medication.

Methods

Linear models were used to investigate the associations between WMH load and BMI, adjusted for concurrent mean blood pressure (MAP), pulse pressure (PP), age, sex, ethnicity, diabetes, smoking status, and antihypertensive medication.

Continuous variables were standardised to allow comparisons between measures with different units.

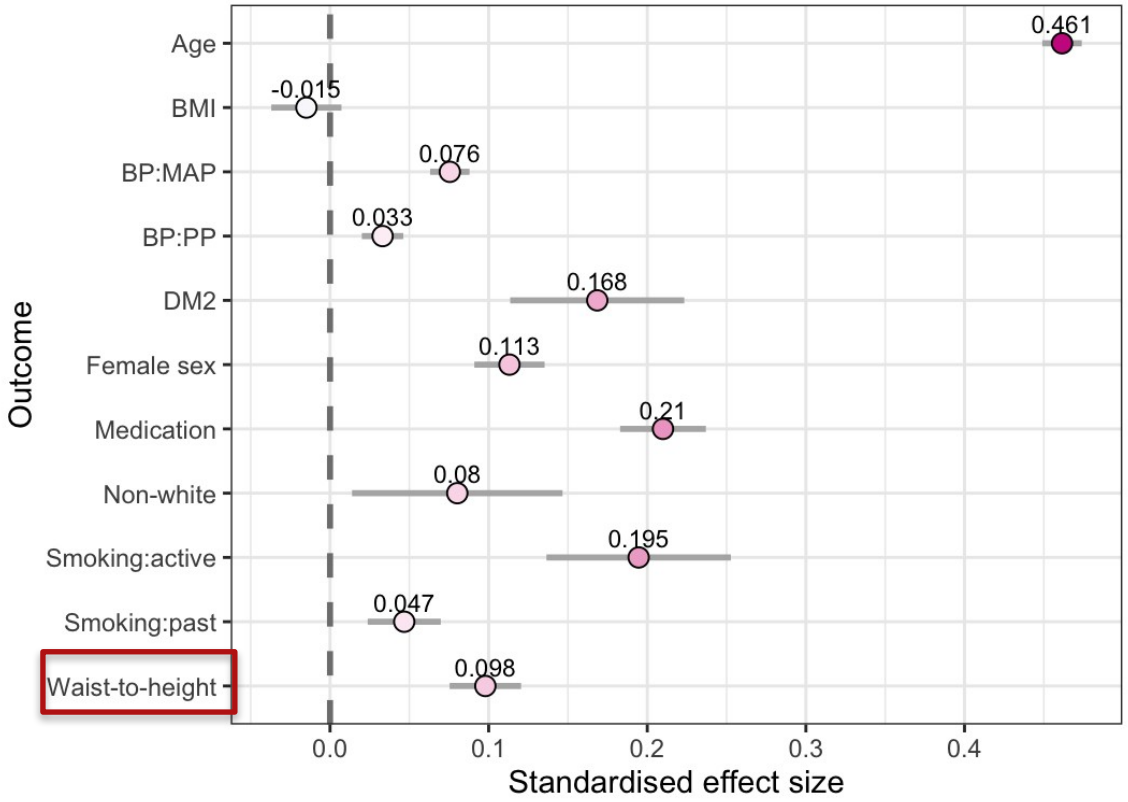
Results



Standardised coefficients in a cross-sectional analysis with WMH load as an outcome variable.

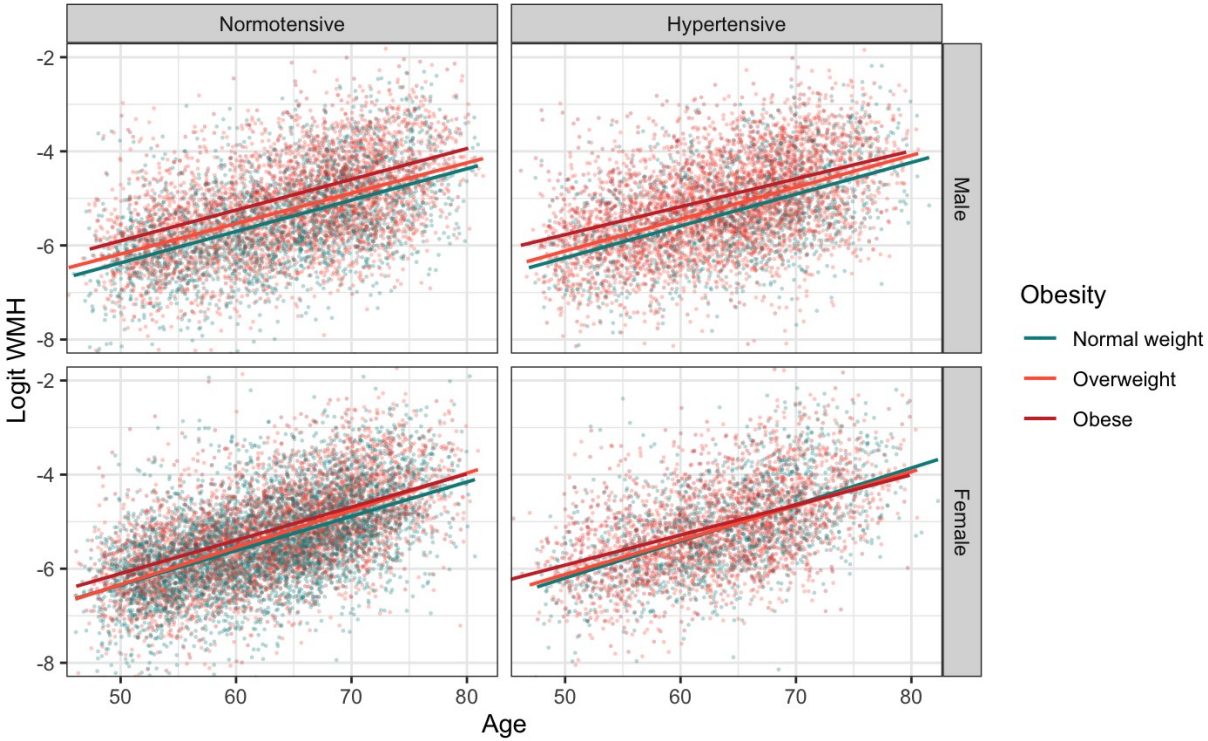
In fully-adjusted models, BMI was associated with higher WMH load independently of age, blood pressure, and other cardiovascular risk factors.

Results



Standardised coefficients in a cross-sectional analysis with WMH load as an outcome variable.

Measures reflecting visceral obesity, for example waist to height ratio, may be a better measure of obesity than BMI.



White matter hyperintensities load (logit WMH) versus age split by sex and hypertensive status, i.e. normotensive (<130/80 mmHg) and pre-hypertensive + hypertensive people (≥130/80 mmHg).

The negative effect of weight on WMH was larger in men, particularly in mid-life.

In the interaction analyses, when both BMI and PP increased, there was an attenuating effect on WMH.

For women, there was a reduced effect of BMI on WMH.

Conclusions

Obesity is an independent risk factor for the development of white matter hyperintensities.

The relationships between obesity, blood pressure, and WMH are complex.

Weight control may be just as important as good blood pressure control; especially in men in midlife.

Acknowledgements