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# Sex differences in the association between major risk factors and the risk of stroke in the UK Biobank cohort study

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## Study question

Does the association between risk factors and incident ischemic and hemorrhagic stroke differ by sex?

## What is known and what this paper adds

There are considerable differences between women and men in the clinical presentation, medical care, and prognosis and outcomes of stroke. This investigation's results provide further evidence that several risk factors are more strongly associated with the risk of any stroke or stroke subtypes in women compared with men.

## Methods

For this cohort study, the investigators analyzed data from the UK Biobank study, which recruited 40–69-year-old UK residents through 22 centers between 2006 and 2010. These analyses focused on 263,295 women and 208,676 men who had no history of cardiovascular disease at baseline. The UK Biobank participants underwent baseline clinical assessments that included measurements of various stroke risk factors, and national hospital admissions data and the national death register were used to identify cases of incident stroke occurring by February 1, 2018. Cox regression models were used to estimate hazard ratios (HRs) for various stroke risk factors, by sex. The primary outcomes were female-to-male HR ratios (RHRs) for selected risk factors.

## Results and study limitations

Over follow-up (median duration, 9 years), 4,662 cases of stroke occurred. The incidence of stroke per 10,000 person-years was 8.66 (95% CI, 8.29–9.04) for women and 13.96 (95% CI, 13.44–14.50) for men. Several stroke risk factors were stronger in women than in men, including stage 2 hypertension (RHR, 1.36; 95% CI, 1.26–1.47), current smoking (RHR, 1.18; 95% CI, 1.02–1.36), and low socioeconomic status (SES; RHR, 1.17; 95% CI, 1.03–1.33). However, the analyses revealed no such sex difference for diabetes, atrial fibrillation, or 1-SD changes in blood pressure, body anthropometry indices, or blood lipid levels. The present study's limitations include self-reported data, small event counts for stroke subtypes, and a reliance on a relatively healthy and predominantly white cohort, which may limit generalizability.

**Table** Selected RHRs for stroke subtypes (BP = blood pressure)

| Risk factor comparison | RHR (95% CI) for: Ischemic stroke | RHR (95% CI) for: Hemorrhagic stroke |
|---|---|---|
| Stage 2 hypertension v normal BP | 1.32 (1.20–1.44) | 1.27 (1.05–1.53) |
| Current smoking v not smoking | 1.05 (0.89–1.24) | 1.31 (0.87–1.97) |
| Low SES v high | 1.22 (1.06–1.41) | 0.97 (0.69–1.35) |

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