

Title

Does hot weather affect physical activity and sleep: a retrospective cohort analysis of 90,434 individuals from the UK Biobank

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Background

In an increasingly warming world, the need for adaptation planning by health systems is more urgent than ever. Despite increasing incidence of extreme weather events globally, there is a lack of understanding on the impact of hot weather on everyday physical activity and sleep, two fundamental determinants of physical and mental health.

Methods To investigate the impact of temperature on physical activity and sleep, we conducted a population-based retrospective cohort study using the UK Biobank. Machine-learning derived physical activity and sleep duration were measured in 90,434 participants from June 2013 to December 2015 using wrist-mounted Axivity AX3 triaxial accelerometers. Same-day meteorological data for participant town was provided by the UK MET Office. The associations of temperature with daily aggregated median step count, daily minutes of moderate-to-vigorous physical activity (MVPA), overall acceleration (mg), light activity (min/day), sedentary time (min/day), and sleep (min/day) were assessed using multivariable generalised linear regression, adjusted for sociodemographic, clinical, and lifestyle factors, as well as season and precipitation.

Findings A total of 90,434 participants aged 43-78 were included (56% women). Moderate-vigorous physical activity increased by 10 min/day from 5 to 25 degrees but it did not increase between 25 and 30 degrees. Between 25 and 30 degrees time spent in sedentary activity increased by 10 (7-12) min/day and sleep reduced by 39 (38-40) min/day. Overall physical activity levels were lower for women, elderly, and those with high BMI.

Interpretation

Changes in outdoor temperature, especially hot weather, can impact physical activity and sleep even for those living in mild to moderate climates. These findings can contribute to climate-adaptation planning for health systems, such as physical activity guidelines.

Funding

NIHR Oxford Biomedical Research Centre Programme

Contributors

The study was conceived and designed by SK, NV, AD, and SS. Data curation and analysis was performed by SS and NV respectively, and interpreted by all co-authors. The abstract was written by SS and SK and revised by all co-authors. SK is responsible for the overall study.

Declaration of Interests

SK is supported by the Innovative Medicines initiative, Bill & Melinda Gates Foundation, Health Data Research UK, British Heart Foundation, and Medical Research Council and Natural Environment Research Council outside of this work. AD is supported by the Wellcome Trust [223100/Z/21/Z], Novo Nordisk, Swiss Re, and the British Heart Foundation Centre of Research Excellence (grant number RE/18/3/34214). NF acknowledges support of

H2020 MSCA Individual fellowship (Grant ID 846824) and OPEN Fellowship. KHC acknowledges support from the BHF Centre of Research Excellence, University of Oxford (RE/18/3/34214). SS is supported by the Wellcome Trust [223100/Z/21/Z].

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