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Exposure to high humidity and temperature in pregnancy could influence blood pressure changes in childhood

[Video available: see notes to editors]

Outdoor humidity and temperature levels during pregnancy could affect the future blood pressure of the unborn child, according to new research by the University of Bristol, published in *JACC: Advances*.

The study, part of the [LongITools project](#), has shown that exposure to relative humidity and temperature levels during pregnancy was related to blood pressure changes in the children. Higher relative humidity in pregnancy was associated with a steeper increase in blood pressure, and prenatal exposure to higher temperature with a slower increase in blood pressure, especially in childhood from age 3 to 10 years. Although an increase in blood pressure is normal during this age range, these weather-related factors were associated with a different rate of increase, especially in childhood.

Previous studies have mostly measured blood pressure at a single time point, predominantly focusing on single exposures, particularly air pollution. In this study, using repeated measures of blood pressure, researchers aimed to assess the association of a range of prenatal urban environmental exposures with changes in systolic and diastolic blood pressure from childhood to early adulthood.

The study analysed repeated blood pressure measurements in over 7,000 participants aged between 3 and 24 years from Bristol's [Children of the 90s](#) study, a world-leading longitudinal study, to assess the relationship of various characteristics of the urban environment in pregnancy with blood pressure from childhood to early adulthood. Analyses were repeated in four independent European cohorts in over 9,000 individuals in Finland, France and the Netherlands.

The research team explored 43 different measures of noise, air pollution, built environment, natural spaces, traffic, meteorology, and unhealthy food environment, and found that prenatal outdoor temperature and humidity could influence changes in blood pressure, especially in childhood.

Overall, the study showed:

- Higher humidity was associated with a faster increase and higher temperature with a slower increase in systolic blood pressure in childhood.

- Higher humidity was associated with a faster increase in diastolic blood pressure in childhood.

In the UK cohort, higher levels of air pollution were associated with a faster increase in diastolic blood pressure in childhood and a slower increase in adolescence, but this association was not replicated in other cohorts.

There was little evidence of an association of other urban environmental exposures with changes in systolic or diastolic blood pressure.

[Dr Ana Gonçalves Soares](#), Research Fellow in Epidemiology in the [Bristol Medical School: Population Health Studies](#) and [MRC IEU](#) and lead researcher, said: “Children with higher blood pressure are more likely to have higher blood pressure as adults, which can increase the risk of heart disease and stroke as well as kidney disease and vascular dementia.

“Previous studies have already shown that some urban environmental exposures during pregnancy are associated with blood pressure in childhood. We were able to expand that further and explore whether these environmental exposures are also associated with trajectories (changes) of blood pressure from childhood to early adulthood.

“The findings suggest that humidity and temperature during pregnancy could change the child’s blood pressure. Further work is needed to be carried out to understand how weather-related conditions during pregnancy can affect the child’s blood pressure to inform strategies to prevent cardiovascular disease in later adulthood related to prenatal environmental exposures.”

Paper

[‘Prenatal urban environment and blood pressure trajectories from childhood to early adulthood’](#) by Ana Gonçalves Soares et al. in *JACC: Advances* [open access]

... ENDS

Further information

About blood pressure

Blood pressure is recorded with two numbers. The force at which your heart pumps blood around your body is the higher number, known as systolic pressure. The resistance to the blood flow in the blood vessels between heartbeats when blood is pumped around your heart is the lower number, known as diastolic pressure.

Notes to editors:

A video explaining the exposome and exposures being studied in the LongITools project is available on YouTube, see: <https://www.youtube.com/watch?v=jQaWPOQuINg>

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About LongITools

[LongITools](#) is a five-year research project, which commenced on 1 January 2020, with a total grant of €11,997,448 from Horizon 2020. It is also one of nine projects in the [European Human Exposome Network](#).

To keep up to date with the project's progress please follow @longitools on X or LongITools on LinkedIn.

Partners:

University of Oulu, Finland (Project Coordinator); Ab.Acus, Italy; Academic Medical Center, Netherlands; Beta Technology Ltd, UK; Chalmers University of Technology, Sweden; CyNexo, Italy; Erasmus Medical Center, Netherlands; Imperial College London, UK; National Institute for Health and Medical Research (INSERM), France; University College London, UK; University Medical Center Groningen, Netherlands; University of Barcelona, Spain; University of Bristol, UK; University of Eastern Finland, Finland; University of Oslo, Norway; University of Rome Tor Vergata, Italy; University of Surrey, UK; University of Utrecht, Netherlands.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 874739.

About Horizon 2020

[Horizon 2020](#) was the EU's research and innovation funding programme from 2014-2020 with a budget of nearly €80 billion.

The programme has been succeeded by [Horizon Europe](#)

About Children of the 90s

Based at the University of Bristol, Children of the 90s, also known as the Avon Longitudinal Study of Parents and Children (ALSPAC), is a long-term health research project that enrolled more than 15,000 pregnant women in 1991 and 1992. It has been following the health and development of the parents, their children and now their grandchildren in detail ever since. It receives core funding from the Medical Research Council, the Wellcome Trust and the University of Bristol.

Find out more at www.childrenofthe90s.ac.uk.

About the MRC Integrative Epidemiology Unit (IEU)

The MRC Integrative Epidemiology Unit (IEU) at the University of Bristol conducts some of the UK's most advanced population health science research. It uses genetics, population data and experimental interventions to look for the underlying causes of chronic disease. The unit exploits the latest advances in genetic and epigenetic technologies. They develop new analytic methods to improve our understanding of how our family background behaviours and genes interact to influence health outcomes.

Find out more at www.bristol.ac.uk/integrative-epidemiology/

Issued by the University of Bristol media team