CUSSH
Complex Urban Systems for Sustainability and Health

Is there a link between apparent temperature and emergency visits for mental and behavioural disorders?

IN BRIEF

- **Psychiatric disorders are generally characterised by a combination of abnormal thoughts, perceptions, emotions, behavioural and relationships with others, including neurodevelopmental, bipolar, depressive and anxiety disorders and schizophrenia and have a significant impact on the global burden of mental illness.**
- **The mechanism by which temperature affects health is complex and may be mediated by other factors. Apparent temperature (AT) combines meteorological indicators and has been proven to characterise the physiological impact better than temperature alone.**

Researchers on the CUSSH Project aimed to assess the short-term effect of apparent temperature (AT) on daily emergency visits of mental and behavioural disorders (MDs) in Beijing, China.

Methods:

- Data on daily hospital emergency admissions in 30 hospitals across Beijing was gathered where the primary cause of visit related to MDs (including: psychoactive substance use, schizophrenia, mood and neurotic disorders).
- Daily meteorological data including mean temperature, maximum and minimum temperature, relative humidity, duration of sunshine, barometric pressure, precipitation and average wind velocity was obtained.
- Using this data the lag-exposure-response relationship between AT and emergency admissions related to MDs was analysed.

Results:

- There were 16,606 daily emergency visits for MDs during the study period and the mean AT was 10.3°C.
- There was a significantly positive association between AT and MD emergency visits with both low and high AT having lag effects.
- No significant cumulative effect of low AT was observed.
- There was a significant effect of high AT on emergency visits for MDs due to psychoactive substance use in male patients.
- Patients with MDs aged 18-79 years were more sensitive to high AT.

Niu, Y., Gao, Y., Yang, J., Qi, L., Xue, T., Guo, M., Zheng, J., Lu, F., Wang, J. and Liu, Q., 2020. Short-term effect of apparent temperature on daily emergency visits for mental and behavioral disorders in Beijing, China: A time-series study. *Science of The Total Environment*, p.139040. https://doi.org/10.1016/j.scitotenv.2020.139040

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Both low and high apparent temperatures may be risk factors for psychiatric disorder emergency visits

IMPLICATIONS

This study demonstrates the significant positive lag effects of both low and high apparent temperature (AT) on daily emergency visits for mental and behavioural disorders (MDs).

- **Biological explanations of the relationship between AT and MDs emergency visits may vary for specific diseases and are multifactorial.**
- **Temperature stress can have a direct effect on physio-psychological functions through chemical processes within the body.**
- **Heat stress has a negative association with cognitive function and it may increase plasma serotonin with the function of inhibiting the production of dopamine, a neurotransmitter that is responsible for complex task performance.**
- **Mental illness can increase an individual's physiological vulnerability to temperature by impairing dopamine transmission when specific neurotransmitters are involved in both thermoregulation and disease process.**

Local and National Policy Makers and Health Organisations:

- Make more data available by disease class, socioeconomic status, disease history and clinical medication to allow for future analysis and wider implications.
- Provide an early warning system for vulnerable populations to allocate appropriate medical resources to protect against surge in hospital admissions.

Researchers:

- Explore the biological mechanism for the effect of temperature on specific diseases in MDs.
- Investigate age difference and AT effect on hospital admission for MDs.
- Deepen the understanding of various temperature-related indicators to further determine the relationship with mental health.
- Conduct further research using personal exposure monitoring for more accurate results.
- Conduct further research adjusting for noise as a confounder (particularly traffic).

Individuals:

- Take preventative measures in advance of potential high or low AT to reduce risk.

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