

Ageing in the Warming World

Danica Du, Centre for Global Health, Usher Institute
Supervisors: Liz Grant, Clara Calia, Ewelina Rydzewska



THE UNIVERSITY OF EDINBURGH

Usher Institute

Facts



1.07-degree
rise in temperature in the past was due to humanity.^[1]



2-degree
rise in average temperature in this century is predicted, as well as more extreme temperature events, such as heat waves.^{[2], [3]}



1.5-degree
warming goal set in the the Paris Agreement, to avoid the worst consequences of global warming.^[1]



1 in every 8 people
in the world live with a mental disorder.^[4]



55.2 million people
living with dementia worldwide.^[5]



Around 2 billion people
will be aged 60 years or over by 2050 globally.^[6]

Challenges

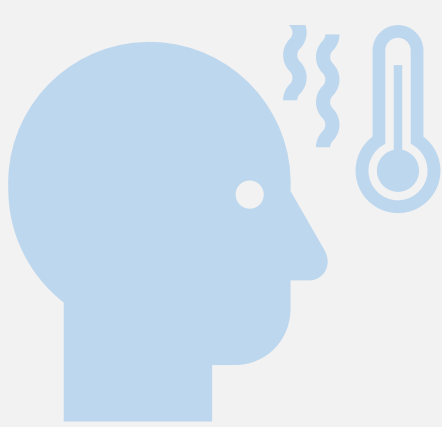


Both climate change and care for an ageing population are major global health challenges for this century.^{[7], [8]} We are confronting long-lasting warming event and unprecedentedly severe heatwaves, which threaten both physical and mental health of individuals.^[9] Heat stress raises the prevalence of mood disorders, exacerbate the conditions of patients with organic mental disorders and lead to higher rate of hospital admissions for all-cause mental disorders.^{[10]-[12]}



Exposure to hot temperatures can negatively affect cognitive performance, especially in older people as the age-related changes can reduce the ability of regulating internal temperature.^{[13]-[15]} Heat leads to additional adverse outcomes for people who already have dementia, including increased emergency hospital admissions and increased hospitalisations.^{[16]-[18]} Heat stress exacerbates the symptoms of Alzheimer's disease and put Alzheimer's disease patients at a higher risk of death compared to people without it.^[19]

Research questions



What do we understand about the relationships between heat and mental disorders?

What is the relationship between heat stress caused by climate change and the progression of dementia?

What are the interventions that could help avert or dilute future threats brought by rising temperature?

What are the current and anticipated barriers to implementing these interventions and how can we overcome?

Heat and Mental Disorders: a Scoping Review



A systematic scoping review will be conducted focusing on the relationships between heat and mental health disorders. This scoping review will be aimed at understanding the scope of existing literature demonstrating the relationships between heat and mental disorders, providing a comprehensive overview of the measurement of heat adopted by past studies, categorising findings from existing literatures and summarising in a thematic manner, as well as identifying the research gaps and providing suggestions for future studies.

The Relationship Between Heat and the Progression of Dementia: a Mixed-Method Study



Quantitative methodologies will be adopted to examine the possible relationships between heat and cognitive function. True population data will be used to examine the association between heat and cognitive function as well as the progression of dementia.



Qualitative methodologies will be aiming at getting an insight into how heat can affect people with dementia and what can be done to protect them. Focused group discussions and in-depth interviews will be carried out with participants including health workers and leaders.

[1] IPCC, *Climate Change 2022: Impacts, Adaptation, and Vulnerability*. Cambridge University Press, 2022.

[2] Collins, M., et al., *Long-term climate change: projections, commitments and irreversibility*, in *Climate Change 2013: The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, 2013, Cambridge University Press, p. 1029-1136.

[3] Heldén, D., et al., *Climate change and child health: a scoping review and an expanded conceptual framework*. *The Lancet Planetary Health*, 2021, 5(3): p. e164-e175.

[4] Institute of Health Metrics and Evaluation. Global Health Data Exchange (GHDx), (<https://vizhub.healthdata.org/gbd-results/>), accessed 14 May 2022).

[5] Global status report on the public health response to dementia. Geneva: World Health Organization; 2021. Licence: CC BY-NC-SA 3.0 IGO.

[6] <https://www.who.int/news-room/facts-sheets/detail/ageing-and-health>

[7] Watts, N., et al., *The 2019 report of the Lancet Countdown on health and climate change: ensuring that the health of a child born today is not defined by a changing climate*. *The Lancet*, 2019, 394(10211): p. 1836-1878.

[8] Livingston, G., et al., *Dementia prevention, intervention, and care: 2020 report of the Lancet Commission*. *The Lancet*, 2020, 396(10248): p. 413-446.

[9] Myers, S. and H. Frumkin, *Planetary Health: Protecting Nature to Protect Ourselves*. 2020.

[10] Hansen, A., et al., *The effect of heat waves on mental health in a temperate Australian city*. *Environ Health Perspect*, 2008, 116(10): p. 1369-75.

[11] Khan, A.M., et al., *Association between temperature exposure and cognition: a cross-sectional analysis of 20,687 aging adults in the United States*. *BMC Public Health*, 2021, 21(1): p. 1484.

[12] Trang, P.M., et al., *Heatwaves and Hospital Admissions for Mental Disorders in Northern Vietnam*. *PLoS One*, 2016, 11(5): p. e0155609.

[13] Balmaitz, S.N., et al., *Ageing and Thermoregulatory Control: The Clinical Implications of Exercising under Heat Stress in Older Individuals*. *BioMed Research International*, 2018, 2018: p. 1-12.

[14] Hancock, P.A. and I. Vasmatazidis, *Effects of heat stress on cognitive performance: the current state of knowledge*. *International Journal of Hyperthermia*, 2003, 19(3): p. 355-372.

[15] Pill, J.F., et al., *Direct exposure of the head to solar heat radiation impairs motor-cognitive performance*. *Scientific Reports*, 2020, 10(1).

[16] Zanobetti, A., et al., *Susceptibility to Mortality in Weather Extremes*. *Epidemiology*, 2013, 24(6): p. 809-819.

[17] Wei, Y., et al., *Associations between seasonal temperature and dementia-associated hospitalizations in New England*. *Environ Int*, 2019, 126: p. 228-233.

[18] Linares, C., et al., *Short-term association between environmental factors and hospital admissions due to dementia in Madrid*. *Environ Res*, 2017, 152: p. 214-220.

[19] Xu, Z., et al., *Heatwaves, hospitalizations for Alzheimer's disease, and postdischarge deaths: A population-based cohort study*. *Environmental Research*, 2019, 178: p. 108714.