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Unfolding the Individual Adaptative Response: Insights from Summertime Personal Heat Exposure and Thermal Preferences in Older Adults in Phoenix, Arizona

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Adaptive responses to extreme heat involve conscious (behavioral) and unconscious (physiological) efforts to mitigate exposure, yet existing research often underrepresents vulnerable populations, such as older adults, and neglects adaptation measures. This study assessed intra- and inter-individual variations in personal heat exposure (PHE), thermal preferences, and adaptive responses among 39 individuals aged 45–74 from diverse socio-economic backgrounds and housing types (single-unit, multi-unit, and manufactured homes) in Phoenix Metropolitan Area, Arizona.

Using the HeatSuite™ system and Kestrel Drops D2, we monitored indoor (living room, bedroom) and outdoor exposures, combining these with health indicators (e.g., heart rate, temperature, blood pressure) and self-reported thermal perception over 21-day periods during the summer of 2024. Preliminary findings reveal significant heterogeneity in indoor temperatures, largely influenced by cooling methods, thermal preferences, and financial capacity to afford air conditioning. Manufactured homes were not always the hottest; single-unit homes relying on window units often exceeded comfortable thresholds. Notably, 70% of participants experienced nighttime bedroom temperatures above optimal sleep conditions, highlighting potential links to poor sleep or acclimatization.

Daytime wearable data revealed exposures often 11.7°C lower than airport weather station data, emphasizing the importance of accurately capturing PHE. These findings demonstrate that individual adaptive capacities, shaped by socio-economic and housing contexts, are critical to heat resilience. Future steps include integrating humidity and aging using liveability metrics, clustering analysis, and linking PHE to health outcomes, with planned expansion to fieldwork in Colombia. This study underscores PHE's value in informing mitigation strategies and enhancing urban heat adaptation.

Citation

Gisel Guzman-Echavarria, Ariane Middel, Nicholas Ravanelli, Jose-Benito Rosales Chavez, Carson Metzler, Kendra Rentz, Mary Munoz, Melissa Guardaro, Jennifer K. Vanos. Unfolding the Individual Adaptative Response: Insights from Summertime Personal Heat Exposure and Thermal Preferences in Older Adults in Phoenix, Arizona

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