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***Personal Heat Exposure as an Expression of Differential Behavioral Adaptation: Insights from Older Adults in a Hot-Arid City***

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Differences in adaptive capacity to extreme heat lead to distinct behavioral and physiological individual responses to stay safe and comfortable. Existing research often underrepresents vulnerable populations, such as older adults, and rarely examines how adaptive factors shape sub-daily exposures. This study assesses intra- and inter-individual variation in personal heat exposure (PHE) relative to regional heat. Our sample includes 39 adults aged 45–74 from diverse socioeconomic, occupational, and housing backgrounds in the Phoenix Metropolitan Area. Using the HeatSuite™ system and Kestrel Drop D2 sensors, we monitored 10-minute indoor and on-body ambient conditions over 21-day periods during summer 2024, reconstructing PHE based on participants' locations. We used Generalized Additive Models to explain inter-individual differences in PHE and deviation from regional weather, and Linear Mixed Models to examine associations with adaptive features. Heat stress was assessed using a physiology-based human heat balance model. Results reveal significant inter-individual differences in individually experienced temperatures (IET) and humidities (IEH). Median IET and IEH were approximately 25.9°C and 1.4 kPa, with maximums reaching 47.5°C and 5.1 kPa. Participants reduced their IET by 0.94°C for each 1°C increase in regional temperature, generally maintaining convective heat loss adequate for light activity without sweating. Three sub-daily exposure patterns emerged (highest overall exposures, strong diurnal amplitude, and day-long stable exposures), shaped by AC access/state and indoor-outdoor transitions. Significant differences in daily peak IET appeared only among participants with income <\$40k/year and higher social vulnerability. These findings demonstrate how high-resolution personal monitoring clarifies why and when heat interventions may be most effective, informing city-wide strategies with locally grounded evidence

**Citation**

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**CAPLTER themes**

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