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Advocating Human Thermal Perception Assessment Codes for Bio-Meteorological Research

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Since the early 2000's, urban outdoor thermal conditions for city inhabitants have received increased attention and become a new field of research. The objective is to provide a better understanding of human thermal adaption in different climatic zones. In this field of research, the examination of thermal indices by subjective perception has become a methodical tool. Thus defining human thermal perception according to unified bioclimatic criteria and standards has become increasingly important. From 2001 to 2019 over 130 studies have assessed human thermal perception by investigating in-situ thermal conditions as compared to subjective thermal perception. A brief review of these studies shows a variety of data collection techniques (differences in tool set up, place, time and duration of measurements), field survey strategies (a diversity of questionnaire design, different ASHRAE scales and sampling methods), the use of an assortment of indices (over 160), different methods for neutral temperature range determination (probit analysis, ordinal logistic regression, 0 in regression fit between MTSV and chosen index, $-0.5 \leq TSV \leq +0.5$ in the adjusted PPD curve etc.) and differences in indices scale calibration methods (ordinal regression, linear regression, probit analysis, frequency analysis, thermal acceptable range, and discriminant analysis). Hence, deducing consistent conclusions about human thermal perception in different climatic environments has become challenging.
The aims of this study are to review the different techniques, strategies and methods for human biometeorological research, to examine the accuracy of the different techniques and methods and to suggest general human thermal perception assessment codes for bio-meteorological research.
Results show that different methods of data analysis for the same raw human bioclimatic data demonstrate different outcomes. It also shows that better accuracy can be obtained by: using 24-hour consecutive data collection, measuring extremes of thermal conditions within the research unit, and preferring TSV data collected by convenience sampling and measuring thermal perception during all seasons. On the basis of our findings, we advocate uniform human thermal perception assessment codes for bio-meteorological research.