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Too cold or too warm? A winter thermal comfort study in different climate zones in China

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Highlights:

- A comparative winter thermal comfort field study was conducted in 3 climate zones in China.
- Environment parameters were measured, meanwhile 740 valid questionnaires were collected.
- Shanghai occupants showed better adaptation to cold due to the lack of space heating, while Harbin people were used to warmth indoors. Beijing people had a status between Harbin and Shanghai.
- Further discussions on the increasing heating temperature in north China and the appropriate way to meet realistic heating demand were presented at last.

Abstract:

In China, winter thermal comfort is a complicated issue, due to the huge difference of outdoor temperatures between climate zones, along with the different space heating modes. The authors conducted a comparative winter thermal comfort field study in Harbin, Beijing and Shanghai, which represented the Severe Cold zone, Cold zone, and Hot Summer & Cold Winter zone respectively. Indoor and outdoor environment parameters were measured, meanwhile the occupants in classrooms were investigated about their clothing, thermal sensation, thermal preference and thermal acceptance by using questionnaires. Totally 740 valid subjective feedbacks were collected from the three cities for analysis. Although it was not as cold as in Harbin and Beijing outdoors, the indoor temperature in Shanghai was much lower, due to the lack of space heating. The clothing level of Shanghai occupants was similar to Harbin and lower than Beijing. When the indoor environment was colder than neutral, the mean TSV (Thermal Sensation Vote) values in Shanghai were higher than Beijing, revealing people in Shanghai had better adaptation to cold environment. Results show the indoor temperature in Harbin was sometimes overheated, and people in Harbin had been used to the warm environment during winter. The percentage of acceptance of Beijing people was lower than those of Harbin and Shanghai. It is suggested that the over relying on heating should be aroused vigilance to, and individual heating might be a proper way to meet realistic thermal demand in winter.

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