Supplementary Material: Using Google Street View photographs to assess long-term outdoor thermal perception and thermal comfort in urban environment during heatwaves

**Supplementary Table S1.** Descriptive statistics for independent variables in Study 1 (České Budějovice).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Independent variables | Mean | SD | Min | Max |
| Surface temp. | 46.4 | 3.9 | 31.8 | 67.5 |
| Trees | 0.174 | 0.147 | 0.000 | 0.926 |
| Bushes | 0.338 | 0.183 | 0.000 | 0.971 |
| Water | 0.006 | 0.041 | 0.000 | 0.489 |
| Sky-view factor | 0.785 | 0.095 | 0.413 | 0.991 |

*Note. Surface temp.* is the average land surface temperature (deg C) inside a 30 m buffer. The following land cover classes were measured as the proportion of respective land cover classes within a 30 m buffer around the sampled locations: *trees* (vegetation higher than 1 m), *bushes* (vegetation smaller than 1m), *water* (any water elements such as rivers, streams, ponds). *Sky-view factor* is the average sky-view factor within the 30 m buffer around each sampled location.

**Supplementary Table S2.** Models of thermal perception and thermal comfort (mixed ordinal logit Model, city of České Budějovice, Study 1, sub-sample of participants with small or no experience with target locations)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Thermal perception | | | | Thermal comfort | | | |
|  | Reduced model | | Full model | | Reduced model | | Full model | |
|  | β | *p* | β | *p* | β | *p* | β | *p* |
| *Effects of remotely sensed variables* |  |  |  |  |  |  |  |  |
| Surface temp. | 0.07 | < .001 | 0.03 | .226 | -0.10 | .< .001 | -0.03 | .174 |
| Trees |  |  | -0.17 | .020 |  |  | 0.26 | < .001 |
| Bushes |  |  | -0.11 | .101 |  |  | 0.14 | .032 |
| Water |  |  | -0.04 | .430 |  |  | 0.10 | .037 |
| Sky-view factor |  |  | 0.17 | .005 |  |  | -0.22 | < .001 |
| *Model properties* |  |  |  |  |  |  |  |  |
| Nobs | 3920 |  | 3920 |  | 3920 |  | 3920 |  |
| Log likelihood | -6161 |  | -6136 |  | -5986 |  | -5938 |  |
| Conditional R2 | .364 |  | .370 |  | .363 |  | .373 |  |
| Marginal R2 | .014 |  | .026 |  | .028 |  | .049 |  |

Note. *DV*s are thermal perception (higher scores indicate higher level of perceived heat) and thermal comfort (higher scores indicate a higher level of thermal comfort) at the place during a hot day. *Surface temp.* is the average land surface temperature (deg C) inside a 30 m buffer. The following independent variables were measured as the proportion of pixels within a 30 m buffer around the sampled locations that were classified into the following land cover types: *trees* (vegetation higher than 1 m), *bushes* (vegetation smaller than 1m), water (any water elements such as rivers, streams, ponds). To avoid singularity of the model, we have not included watertight surfaces (including building roofs) in the model. *Sky-view factor* is the estimated sky-view factor at each sampled location. *Nobs* is the number of observations across participants and trials (334 x 15), minus 57 observations that cannot be matched against complete remotely sensed data, minus 1033 observations from participants who had visited the target locations in the last year. *Log likelihood* is the log-likelihood value of the model. *Conditional R2* is the variance explained by fixed and random effects, *marginal R2* is the variance explained by the fixed effects. Six ordinal thresholds and two random intercepts were omitted.

**Supplementary Table S3.** Descriptive statistics for independent variables in Study 2 (Brno).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Independent variables | Mean | SD | Min | Max |
| Surface temp. | 35.7 | 3.5 | 25.0 | 45.2 |
| Trees | 0.212 | 0.183 | 0.000 | 0.944 |
| Bushes | 0.195 | 0.150 | 0.000 | 0.970 |
| Water | 0.003 | 0.023 | 0.000 | 0.332 |
| Sky-view factor | 0.693 | 0.113 | 0.341 | 0.977 |

*Note. Surface temp.* is the average land surface temperature (deg C) inside a 30 m buffer. The following land cover classes were measured as the proportion of respective land cover classes within a 30 m buffer around the sampled locations: *trees* (vegetation higher than 1 m), *bushes* (vegetation smaller than 1m), *water* (any water elements such as rivers, streams, ponds). *Sky-view factor* is the average sky-view factor within the 30 m buffer around each sampled location.

**Supplementary Table S4.** Models of thermal perception and thermal comfort (mixed ordinal logit Model, city of Brno, Study 2, sub-sample of participants with small or no experience with target locations)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Thermal perception | | | | Thermal comfort | | | |
|  | Reduced model | | Full model | | Reduced model | | Full model | |
|  | β | *p* | β | *p* | β | *p* | β | *p* |
| *Effects of remotely sensed variables* |  |  |  |  |  |  |  |  |
| Surface temp. | 0.10 | < .001 | 0.03 | .006 | -0.13 | < .001 | -0.03 | .023 |
| Trees |  |  | -0.36 | < .001 |  |  | 0.41 | < .001 |
| Bushes |  |  | -0.18 | < .001 |  |  | 0.26 | < .001 |
| Water |  |  | -0.12 | .004 |  |  | 0.17 | < .001 |
| Sky-view factor |  |  | 0.47 | < .001 |  |  | -0.60 | < .001 |
| *Model properties* |  |  |  |  |  |  |  |  |
| Nobs | 7884 |  | 7884 |  | 7884 |  | 7884 |  |
| Log likelihood | -11737 |  | -11456 |  | -12937 |  | -11406 |  |
| Conditional R2 | .478 |  | .593 |  | .221 |  | .547 |  |
| Marginal R2 | .022 |  | .075 |  | .047 |  | .116 |  |

Note. *DV*s are thermal perception (higher scores indicate higher level of perceived heat) and thermal comfort (higher scores indicate a higher level of thermal comfort) at the place during a hot day. *Surface temp.* is the average land surface temperature (deg C) inside a 30 m buffer. The following independent variables were measured as the proportion of pixels within a 30 m buffer around the sampled locations that were classified into the following land cover types: *trees* (vegetation higher than 1 m), *bushes* (vegetation smaller than 1m), water (any water elements such as rivers, streams, ponds). To avoid singularity of the model, we have not included watertight surfaces (including building roofs) in the model. *Sky-view factor* is the estimated sky-view factor at each sampled location. *Nobs* is the number of observations across participants and trials (572 x 15) minus 1,341 observations from participants who had visited the target locations within the previous year. *Log likelihood* is the log-likelihood value of the model. *Conditional R2* is the variance explained by fixed and random effects, *marginal R2* is the variance explained by the fixed effects. Six ordinal thresholds and two random intercepts were omitted.