Supplementary Materials

We used the Multilayer Mean Radiant Temperature (MMRT) model to calculate the variation in pedestrian MRT under the investigated Representative Concentration Pathway (RCP) scenarios and adaptation strategies. To verify the model, we compared the measured MRT at the site and the simulation results. To verify the effect of adaptation strategies using the MMRT model, we performed sensitivity tests of four strategies: reduced-albedo sidewalk (SA), greenway (GS), green wall (GW), and street tree (ST).

First, we measured MRT at 14 points along the street used as the study site (Figure S1) at 1300–1600 LST on 10 June 2019; the temperature was 27.2–29.9 °C. The measurement was performed using a six-direction radiometer (CNR4; Keipp & Zonen), a thermometer, and an anemometer. We obtained the measured MRT by integral radiation measurements using the six direction radiation [60].

Figure S1. Measurement sites (red dots) at the study site used for the MMRT validation.

For the MMRT model simulation, we used four meteorological variables. Among them, air temperature and wind speed were taken from our measured data, whereas downward solar radiation and dew point temperature data were collected by the Automated Synoptic Observing System of the Korea Metrological Administration. We compared the measured (M) and simulated (S) MRT using R^2 and the root mean square error (RMSE), as follows.

$$R^2 = 1 - \frac{\sum(S_i - M_i)^2}{\sum(S_i - M_{mean})^2}$$

$$\mathrm{RMSE} = \left(\frac{1}{n}\sum(S_i - M_i)^2\right)^{1/2}$$

The results of the comparison were $R^2 = 0.82$ and RMSE = 4.79 °C, indicating that MMRT can be used to calculate MRT at the study site. Compared with other models (e.g., RayMan Pro 2.0, SOLWEIG 1.0), this accuracy was quite high. Supporting our findings, when performing MMRT model validation, Park et al. [39] showed $R^2 = 0.9$ and RMSE = 11.9 °C. However, model validation should be expanded to other conditions.

Second, we identified the variation in MRT depending on adaptation strategies in the MMRT model to address the effect of the adaptation strategies (i.e., sensitivity test). The controlled variables were greenway grass density (for GS), green wall grass density (for GW), sidewalk albedo (for SA), and the number of street trees (for ST) (Table S1). The maximum values in the range were used in the analysis of the effect of the adaptation strategies.

Table S1. Controlled variables and sensitivity test range of adaptation strategies.

Adaptation Strategy	Controlled Variable	Range
GS	Grass density (%)	0–100
GW	Grass density (%)	0–100
SA	Sidewalk albedo	0.65–0.3
ST	Number of trees on one side	0–10

When we controlled these variables, we found out that there were definite adaptation effects in the four strategies (Figure S2), and the MRT was reduced by increasing the intensity of each strategy. Among the strategies, the decrease in MRT was highest for ST (6.7 °C for ten trees) and lowest for GS (0.5 °C for 100%).

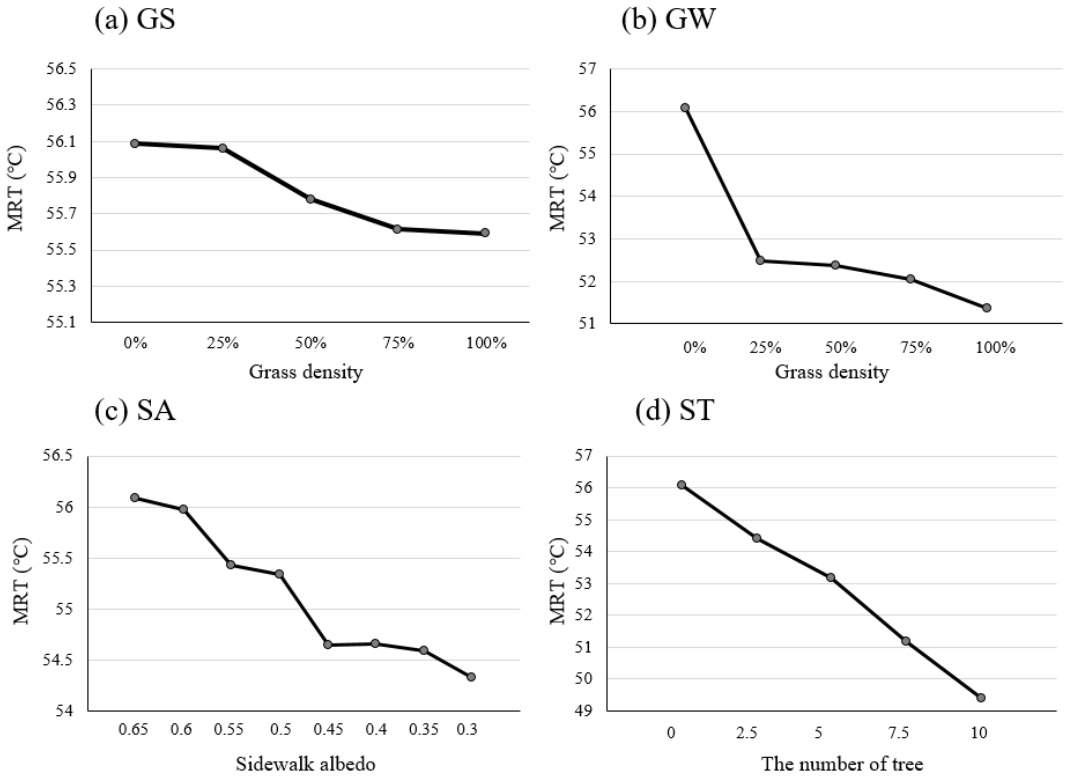

Figure S2. Results of the sensitivity test of the investigated adaptation strategies.