Supplementary Information 4: Bayesian linear regression analysis

The basic structure of the regression models estimated for this article is as follows: Let y_i be the response variable, i.e., the score for perceived benefits of GF (cf. Section 4) for each observation *i*. The predictor x_i denotes the Quarter (A or B) from which the observation stems. As control variables, we include Z_d, representing a vector of socio-demographic control variables such as age, gender, income and education levels. Z_a refers to a vector of attitudinal control variables such as perceptions of heat, noise and pollution and climate change impacts, but also connection to nature. The models follow the basic structure:

$$y_i \sim \mathcal{N}(\mu_i, \sigma^2) \tag{1}$$

$$\mu_i = \beta_0 + \beta_1 x_i + Z_{d,i}^{\top}\gamma_d + Z_{a,i}^{\top}\gamma_a \tag{2}$$

We specify a number of models, for which results are presented in Table A4.2. Detailed descriptions of the control variables can be found in Table A4.1. We conduct Markov Chain Monte Carlo (MCMC) sampling using weakly informative priors, running four chains with 2,000 iterations each, discarding the initial 1,000 iterations as *burn-in*. Algorithm convergence was assessed through visual checks ("traceplots") and the Rhat-statistic. Posterior predictive checks demonstrated satisfactory performance and residual plots indicated well-behaved residuals. These visual model diagnostic checks are provided below for Model 1 in Figures A4.1 and A4.2.

Across all models, the variable measuring whether a resident lives in Quarter B proves significant at 95% or 90% credible intervals, with estimates for the coefficient β_1 ranging from 0.23-0.26. In addition, two attitudinal control variables are significant across all model specifications: Perceived heat outside the building and the general connection to nature. Other control variables, such as perceived noise or air pollution, as well as perceived impacts of climate change did not prove significant.

The models established no significant differences in perceived benefits of GF due to socio-demographic control variables. Due to some data gaps, particularly with respect to income and gender, we estimated models without these controls. As the results for Models 1 & 2 in Table A4.2 indicate, we can drop these controls without a loss of explained variance. However, by excluding these we can use up to 42 more observations from our sample, thus potentially increasing statistical power and robustness. Therefore, in Section 4, we report the estimates from Model 1, which we consider most robust.

Table A4.1: Socio-demographic and attitudinal control variables

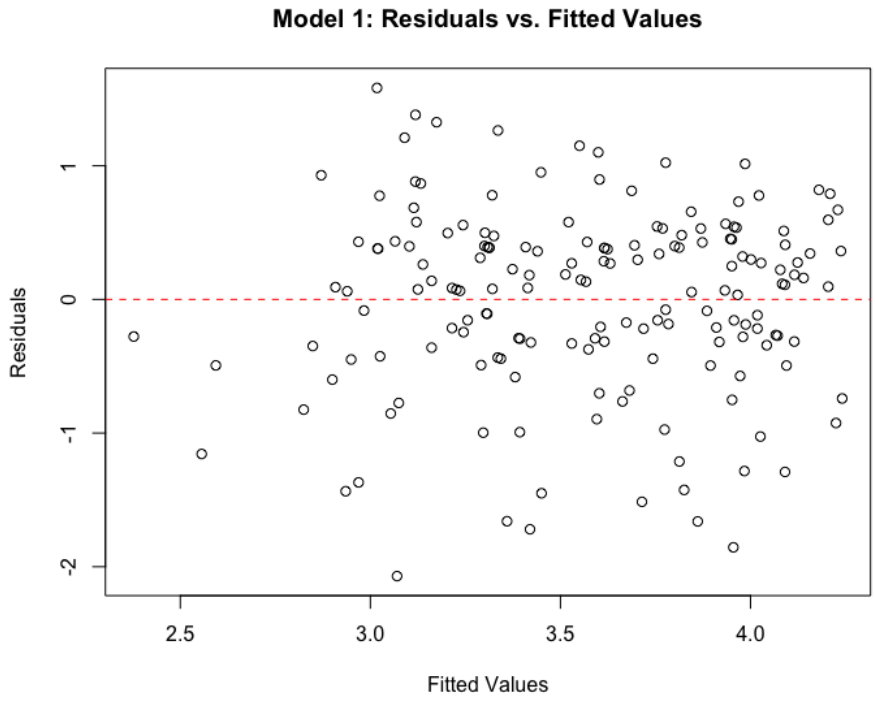
Variable name	Description	Specification
	Socio-demographic control variables Z_d	
gen	Gender	1: male 2: female 3: diverse
age	Age	Numeric
edu $^{+*}$	Highest completed level of education	0: No school diploma 1: School diploma 2: Completed job training 3: University education
equ_inc	Household net equivalent income	Calculated using the income bracket and household size according to the methodology of [1]
	Attitudinal control variables Z_a	
imp_climate	In your opinion, is climate change having an impact on your living environment?	0: no 1: yes 2: Don't know
per_heat $^{+}$	How strongly do you perceive the heat outside your building in summer?	1- not at all 2- less strong 3- partly/partly 4- rather strong 5- very strong
per_noise $^{+}$	How strongly do you perceive noise outside your building?	1- not at all 2- less strong 3- partly/partly 4- rather strong 5- very strong
per_poll $^{+}$	How strongly do you perceive air pollution outside your building?	1- not at all 2- less strong 3- partly/partly 4- rather strong 5- very strong
con_nature $^{+}$	How important is, generally speaking, connection to nature to you?	1- not important 2- rather not important 3- partly/partly 4- rather important 5- very important
wellbeing $^{+}$	How much do you feel restricted in your well-being by midsummer heat?	1- not at all 2- less strong 3- partly/partly 4- rather strong 5- very strong

Notes: Predictor variables marked with the superscript + are treated as monotonic ordered predictors [2].
**Note that we recoded the education variable from the original 6 levels included in the questionnaire [3] to a more simple structure.*

Table A4.2: Results of Bayesian linear regression analysis

	Model 1		***Model 2***		***Model 3***		***Model 4***	
Predictors	***Estimates***	***CI (95%)***	***Estimates***	***CI (95%)***	***Estimates***	***CI (95%)***	***Estimates***	***CI (95%)***
Intercept	1.92	0.98 – 2.83	1.96	0.92 – 2.87	2.50	1.35 – 4.07	2.00	0.85 – 3.97
Quarter: B	**0.24**	**0.03 – 0.47**	**0.25**	**0.00 – 0.49**	0.23*	-0.03 – 0.50	**0.26**	**0.01 – 0.51**
age	0.00	-0.00 – 0.01	0.00	-0.00 – 0.01	0.00	-0.00 – 0.01	0.00	-0.00 – 0.01
edu	-0.01	-0.28 – 0.19	-0.00	-0.25 – 0.22	-0.02	-0.61 – 0.36	-0.04	-0.77 – 0.27
gen: female			-0.12	-0.36 – 0.13	-0.11	-0.38 – 0.16	-0.10	-0.35 – 0.14
gen: diverse			-0.11	-1.18 – 0.96	-0.07	-1.17 – 1.00	-0.10	-1.13 – 0.95
equ_inc					0.00	0.00 – 0.00	0.00	0.00 – 0.00
imp_clim: yes	0.19	-0.12 – 0.52	0.22	-0.12 – 0.57	0.29	-0.07 – 0.66	0.31	-0.04 – 0.65
imp_clim: don't know	-0.16	-0.51 – 0.20	-0.11	-0.49 – 0.28	-0.16	-0.55 – 0.26	-0.06	-0.46 – 0.34
per_heat	**0.19**	**0.09 – 0.34**	**0.19**	**0.08 – 0.34**	**0.15**	**0.02 – 0.31**	**0.18**	**0.04 – 0.35**
per_noise					0.02	-0.13 – 0.19		
per_poll					0.05	-0.18 – 0.29		
con_nature	**0.20**	**0.06 – 0.38**	**0.19**	**0.05 – 0.38**			**0.21**	**0.06 – 0.40**
wellbeing							-0.06	-0.20 – 0.08
Observations	172		160		130		131	
R^2 Bayes	0.277		0.278		0.277		0.317	

Notes: Bold letters and numbers indicate significance at 95% credible intervals. Coefficients marked with * take a non-zero value at 90% credible intervals.



FigA4.1: Model residuals vs. actual values for Model 1.

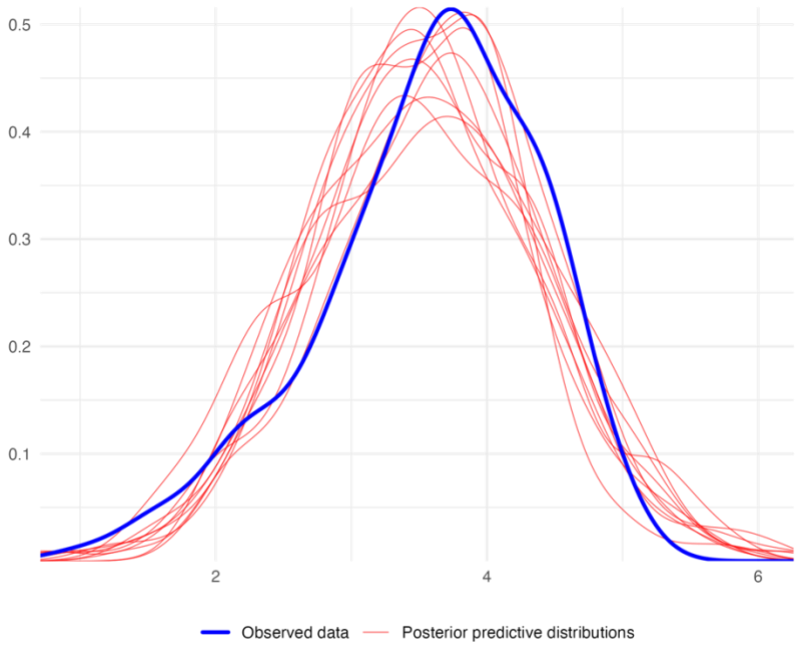


Fig A4.2: Comparing the observed data (black line) against posterior predictive distributions (red lines).

References

1. FDZ German Microdata Lab. *Berechnung des Äquivalenzeinkommens*. 2024 27.08.2024]; Available from: https://www.gesis.org/missy/materials/MZ/tools/auswertungsbeispiele.
2. Bürkner, P.C. and E. Charpentier, *Modelling monotonic effects of ordinal predictors in Bayesian regression models.* British Journal of Mathematical and Statistical Psychology, 2020. **73**(3): p. 420-451.
3. Zozmann, H. and R. Karutz, Perceptions of green facades among residents of buildings with and without a greened envelope – Data from a household survey in Leipzig, Germany, 2024. doi: https://doi.org/10.5281/zenodo.13869551