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Nature Posters Enhance Subjective but not Objective Cleanness in Public Housing:

Evidence from a Field Experiment

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Nature Posters Enhance Subjective but not Objective Cleanness in Public Housing: Evidence from a Field Experiment

Abstract

Littering has negative effects on the environment and is seen as a sign of social disorder. A previous field experiment in public housing buildings showed that implicit posters using eyes and nature posters were more effective in reducing litter than explicit posters using norms and financial costs. The aim of the present field experiment was to test the effects of the nature poster against a control group. We assessed “objective” (based on ratings of photos) and “subjective” cleanness (based on residents’ reports) and explored the role of connectedness to nature. Results from 182 waste disposal areas and 739 residents show that nature posters did not enhance objective cleanness, but did enhance subjective cleanness after one month. This effect was partly accounted for by feelings of connectedness to nature in residents. Also, objective ratings indicated greater cleanness compared to subjective cleanness ratings. We conclude that nature posters had little impact on objective cleanness but enhanced subjective experiences of cleanness, which can be an important driving force for feelings of social order and comfort.

Keywords: implicit, explicit, pro-environmental behavior, social housing, nature connectedness

Highlights:

- Effects of nature posters on objective and subjective cleanness were examined.
- Nature posters enhanced subjective but not objective assessments of cleanness.
- The effect can partly be attributed to nature connectedness.
- Overall, objective ratings revealed greater cleanness than did subjective ratings of cleanness.

1. Introduction

Littering is a widespread problem in many societies, undermining environmental quality, and clean-up costs are substantial. Moreover, litter in public spaces is also perceived as a sign of social disorder (Ramos & Torgler, 2012), negatively affecting residents' well-being, for example in the public housing context. Consequently, political stakeholders and researchers aim to identify cost-effective measures to foster the correct disposal of waste (e.g., Chaudhary et al., 2021; Almosa et al., 2017).

Posters and signs are classic tools used to reduce littering (Almosa et al., 2017). A previous field experiment in public housing buildings in Vienna, Austria examined the effect of four different posters using either explicit or implicit messages on littering, assessed by analysing photos taken of the floor (Gangl et al., 2022). The explicit messages aimed at increasing awareness and knowledge by presenting either the injunctive norm of correct waste disposal behavior or the monetary costs of cleaning needed because of littering. In contrast, the implicit messages attempted to promote behavior change in more indirect (and subtle) ways by presenting either watching eyes or posters of nature. The watching eyes are a frequently used image to increase norm-compliant behavior by enhancing feeling of surveillance and reputation-based cooperation (e.g., Manesi et al., 2016; Wu et al., 2016).

Nature posters are a novel approach to examine thoughts, feelings, and behaviors relevant to nature conservation (Van Lange, 2021). Based on the virtual nature experience concept it can be assumed that positive emotional associations elicited by a "virtual" nature poster are transferred to the waste disposal area which can create more favorable attitudes towards keeping the area clean, for instance through picking-up litter (Hartmann & Apaolaza-Ibáñez, 2008; 2009). Indeed, there is ample evidence for an emotional affinity and preference for natural scenery compared to built sceneries (e.g., Purcell et al., 1994; Hartmann & Apaolaza-Ibáñez, 2009) as well as of positive effects of nature images on attitudes and behavioral intentions (Gangl, Torgler, & Kirchler, 2016) including pro-environmental consumption intentions (Hartmann & Apaolaza-Ibáñez, 2008).

In a recent large field-experiment, Gangl et al. (2022) showed that implicit messages (watching eyes, nature poster) were more effective in reducing litter than were explicit messages, however, no difference to a control group was observed. One explanation for the lack of effect between intervention and control group might have been the overall high cleanness of the waste disposal areas ($M = 2.12$, $SD = 1.09$) on a scale from 1 = totally clean to 7 = totally dirty. This finding contrasts with stereotypical reports of low cleanness in public housing in the media (e.g., Kronen Zeitung, 2023) and resident complaints, indicating that subjective ratings and objective conditions might differ.

The aim of the current field-experiment is to focus on the effect of the nature poster intervention against a control group because of growing interest in nature exposure as a potential driver of pro-environmental behavior (Martin et al., 2020; Luo et al., 2022, Stöckli et al., 2016). In addition, exploratory research following the original Gangl et al. (2022) study indicated that children reported being scared of the watching eyes, which led to the ethical

decision not to include the watching eyes as an alternative intervention.¹ Extending earlier research based on studying real behavior, we included both subjective and objective indicators of cleanness, and examined the role of connectedness to nature. The study was preregistered (<https://osf.io/s47b8>; <https://osf.io/6p9yt>; <https://osf.io/eavmh>) and approved by the Ethics Committee of the Institute for Advanced Studies.

2. Method

2.2 Experimental design

We conducted a field experiment in the waste-disposal areas of public housing buildings in Vienna, Austria with one intervention group (nature posters) and one control group (no change of set-up). We assessed objective and subjective cleanness after one month (T2) and objective cleanness also after three (T3) and 13 months (T4).

2.1 Sample of waste-disposal areas

Within 26 different buildings (with a total population of 37,901), 182 waste disposal areas were selected. The available resources provided for the study allowed for this sample size, and a power analysis using G*power for a *t*-test comparing two dependent means (power: 95%, $p = .05$, $d = .35$, two-sided) revealed a necessary sample size of 90 per condition. This matches the sample sizes of previous studies in this field (Gangl et al., 2022). The selected disposal areas were used by 13,569 residents, and 83 (45.6%) were situated outdoors and 99 (54.4%) were indoors.

2.2 Sample of residents

The initial sample consisted of 739 residents who participated in door-surveys (i.e. a survey at the door of their apartment; 53.18% female, $M_{\text{age}} = 33.08$, $SD = 19.86$). As pre-registered, we excluded participants who were not able to see the intervention because the posters (either on the wall or door) were missing at Time 2 ($N = 215$), because they had not visited the waste-disposal area since the installation of the posters ($N = 9$) or because they were not able to indicate the waste-disposal area they used ($N = 25$).² Thus, for the main hypothesis testing on the effect of the nature posters, the final sample consisted of 494 residents (109, thus 22.06 % were in the intervention group with nature posters and the others were in the control group).

2.3 Randomization

The 182 waste-disposal areas were randomly assigned to the intervention ($N = 90$) or control group ($N = 92$) using the R-package minMSE (Schneider & Schlather, 2021). Randomization was stratified based on 31 variables (e.g., objective cleanness at Time 1, indoor/outdoor location, number of small and large items on the floor; see Appendix A for the full list of variables).

¹ Prior to the implementation of the watching eyes in the original study, the ethics commission responsible recommended to remove the watching eyes in case of feedback that they might scare residents. Although no concerns were raised through the established mitigation processes (complaint hotline, contact to resident-representatives) during the original study, we learned of potential distress associated with the watching eyes during exploratory research conducted after concluding the first study in preparation of the current study.

² The high quantity of missing posters was the consequence of the wrong glue being used for attaching the posters. Thus, within a few hours, many posters fell off the wall. This resulted, as preregistered, in a high quantity of residents that needed to be excluded from the sample.

3. Materials

3.1 Experimental manipulation of intervention and control group

In the intervention groups, an implicit reminder of nature was applied by fixing posters depicting nature views on the wall and door of the waste disposal area. Three A0 format posters were fixed on the wall (Fig 1.; in 3.3% of cases, we used fewer than three due to space constraints). In addition, one A3 poster was fixed on each side of the entrance door of each waste disposal area in the intervention group. After Time 2, any missing posters were replaced (22 wall posters, 37 door posters).

Figure 1: Implicit reminders of nature via posters.



3.2 Measures.

In the following, we present the main variables of the study. All assessed variables can be found in Appendix A.

3.2.1 Objective cleanness

To assess objective cleanness, two photos of the floor of the waste disposal areas were taken on two consecutive Saturdays. The first picture covered the whole floor, and the second picture covered only the part of the floor which contained litter and dirt. Trained employees of the City of Vienna took the photos and also ensured that only the identifying area number via a sheet of paper on the floor, but no information on the wall or door was included in the photo. Two trained research assistants rated each photo on several categories. In addition to assessing details (e.g., the number of small or large items, see Appendix B), they rated objective cleanness on a 7-point Likert scale (1 = totally clean; 7 = totally dirty). In total, objective cleanness was assessed four times: one month (T1: 25.06.22 and 02.07.22) prior to the intervention (30.08.2022), one month (T2: 24.09.22 and 01.10.22), three months (T3: 26.11.22 and 03.12.22) and 13 months (T4: 30.09.23 and 07.10.23) after the intervention. Pearson correlations between the two ratings were $\geq .84$. Interrater-reliability measured via Cohen's Kappa was greater than .45 (except on two days with .40 and .35).

3.2.2 Subjective cleanness

Residents were asked to recall the last time they visited the waste disposal area, and to rate its cleanness on a 7-point Likert scale (1 = totally clean, 7 = totally dirty). Seven trained research assistants documented the answers on a tablet (see original questionnaire in Appendix C) in a period between three and six weeks after the intervention (17.09.2022 to 12.10.2022).

3.2.3 Control and moderating variables

Surveys assessed subjective smell, nature connectedness, and last visit. Research assistants asked residents to indicate the smell when they last visited the waste disposal area on a 7-

point Likert-type scale (1 = very good; 7 = very bad) and to state their agreement with three statements concerning their connectedness with nature, woods, and living creatures on a 7-point scale (1 = totally agree, 7 = totally disagree, adapted from Mayer & Frantz, 2004). Residents were also asked when they last visited the waste disposal area (before or after August 30, which was the day of poster attachment).

Employees assessed cleanness, smell, and missing posters. They took photos of the floor to assess objective cleanness, and also assessed the cleanness on a 7-point scale (1 = totally clean, 7 = totally dirty). From Time 2 onwards they also assessed the smell at that moment (1 = very good; 7 = very bad). Moreover, they assessed the presence or absence of posters on the wall and on the door.

3.2.4 Salience Check

Residents were asked whether they had noticed a change in their waste disposal area. Research assistants recorded responses as one of three categories: (a) yes - a poster, (b) yes - something else, (c) no, without prompting possible answer options. After that, all residents in the intervention group who had not indicated to have seen a poster were asked whether they had seen a poster with a nature picture (response options: yes, no).

Out of the 109 residents who were part of the intervention group, 26 (23.9%) indicated to have seen a poster on the wall, 21 (19.3%) indicated to have noticed a change without being able to tell what exactly had changed, and 62 (56.9%) indicated to have noticed no change. Twenty-five (22.9%) out of the 109 residents agreed to the explicit question whether residents of the interventions group had noticed a nature poster.

Of the 385 residents in the control group, 2 (0.01%) participants reported having seen a poster on the wall and 85 (22.1%) indicated to have noticed a change without being able to tell what this was. 77.4% reported to have noticed no change. Differences between treatment and control group were significant (Chi-square (2) = 86.82, $p < .001$).

4. Analytical approach

To test whether the nature posters improved objective cleanness over time (Hypothesis 1), we used panel data regression with fixed effects for timing and waste disposal area. These models compared the effect of the treatment to the control group, distinguishing between periods before and after the poster was installed. We employed OLS-regressions to test whether the nature poster improved subjective cleanness compared to the control group at Time 2 (Hypothesis 2), where fixed effects were not applicable due to a single time point.³ Both fixed effects and the OLS-regressions included additional models to assess heterogeneous effects based on the location of the waste disposal area (indoor/outdoor). To explore whether nature connectedness played a role in potential effects of the nature poster on objective or subjective cleanness, a moderation analysis was conducted by calculating the interaction of nature connectedness with a dummy for the nature poster in an OLS regression (Hypothesis 3). In addition, we explored with a mediation analysis using the “mediation” function from the psych package and the “sem” function from the lavaan package in R whether the effect of the nature poster was mediated via nature connectedness. Chi-square

³ Fixed effects for rooms were also not applicable because treatment was constant within each room, leading to collinearity issues, making it impossible to disentangle the treatment effect from room-specific factors. Moreover, clustering standard errors by area did not alter the results.

tests and *t*-test were used to test differences between outdoor and indoor areas. Finally, we used *t*-tests to explore the difference between objective and subjective cleanness.

5. Results

For clarity, we only present results of the main pre-registered hypotheses including possible heterogeneous effects for indoor and outdoor areas and an investigation of nature connectedness as a mechanism that explains the effect of the nature picture. Extended results can also be found in the project report (Gangl et al., 2023 [in German]).

5.1 Nature effects on objective cleanness (preregistered Hypothesis 1)

Fixed-effect regression results showed no difference between nature posters and control for objective cleanness at T2, T3 (Models 1 and 2 in Table 1) or T4 (Models 3 and 4). Specifically, *t*-tests showed no difference in means between the intervention group (M_I) and control group (M_C) for T2 ($M_I = 2.67$, $SD_I = 1.10$, $M_C = 2.61$, $SD_C = 1.19$, $t(179.5) = -0.33$ $p = .75$, Cohen's $d = -0.05[-0.34, 0.24]$), T3 ($M_I = 2.83$ $SD_I = 1.40$, $M_C = 2.63$ $SD_C = 1.17$, $t(173.1) = -1.10$, $p = .31$, Cohen's $d = -0.15[-0.44, 0.14]$) or T4 ($M_I = 2.80$ $SD_I = 1.16$, $M_C = 2.74$, $SD_C = 1.17$, $t(180) = -0.37$, $p = .71$, Cohen's $d = -0.05[-0.35, 0.24]$). Also, no differences emerged if only indoor (all $p > 0.19$) or outdoor areas (all $p > 0.16$) were considered, as pre-registered and as confirmed by the three-way-interaction regression models (Models 2 and 4).⁴

Results show a significant decline in cleanness from T1 to all subsequent time points (Table A.2 in the Appendix; *t*-tests, all $p < 0.012$). However, there were no significant differences between T2, T3, and T4 (all $p > 0.39$). This is reflected in the significant positive estimate of the post-treatment dummy, which, however, needs to be carefully interpreted in presence of interaction terms and conditionally depends on the interaction terms.

⁴ If all areas where the poster had fallen off by T4 were excluded, the three-way interaction has a p-value of $p = .081$). Post-hoc *t*-tests show no significant ($p = .09$) difference between outdoor areas with a poster ($N = 21$) and outdoor areas of the control group ($N = 92$).

Table 1: Fixed-effect regression models 1-4 on the effect of the nature posters on objective cleanliness

	(1)		(2)		(3)		(4)	
	Estimate (SE)	95% CI	Estimate (SE)	95% CI	Estimate (SE)	95% CI	Estimate (SE)	95% CI
Post-treatment	0.31** (0.11)	[0.09, 0.53]	0.63*** (0.17)	[0.30, 0.95]	0.35*** (0.10)	[0.14, 0.55]	0.59*** (0.16)	[0.28, 0.89]
Post-treatment x nature poster	0.19 (0.16)	[-0.13, 0.50]	0.27 (0.23)	[-0.19, 0.73]	0.17 (0.15)	[-0.13, 0.46]	0.29 (0.22)	[-0.14, 0.72]
Post-treatment x location			-0.58** (0.22)	[-1.01, -0.14]			-0.43* (0.21)	[-0.84, -0.02]
Post-treatment x location x nature poster			-0.18 (0.31)	[-0.80, 0.44]			-0.25 (0.30)	[-0.84, 0.33]
N	182		182		182		182	
R2	0.07		0.11		0.06		0.09	

Note. * $p < .05$; ** $p < .01$; *** $p < .001$. Fixed effects for timing and waste disposal area. Post-treatment represents the period after the intervention. Nature poster x post-treatment examines the overall treatment effect. The three-way-interaction (Models 2 and 4) analyzes the treatment effect interacts with location (outdoor, indoor). Nature poster x location assess how post-treatment differs between locations. The main effect of post-treatment should be interpreted cautiously due to these interaction terms.

5.2 Nature effects on subjective cleanness (preregistered Hypothesis 2)

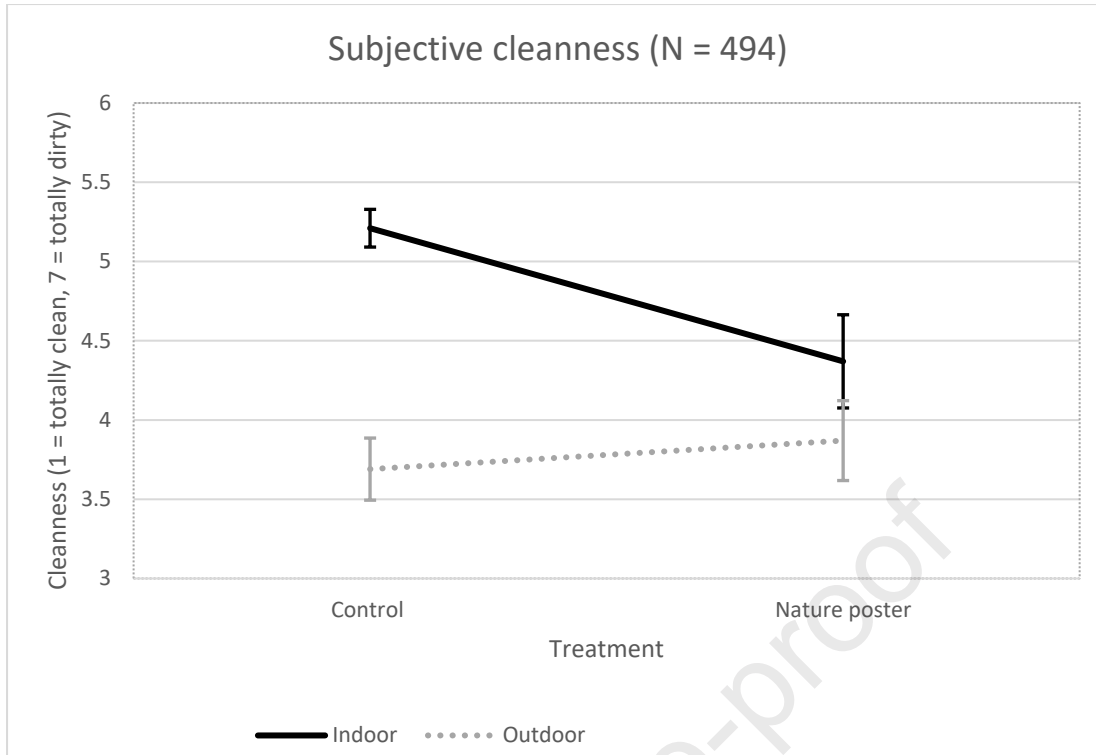
Results show (Table 2, Model 1) that nature posters improved subjective cleanness. Independent *t*-tests indicate that residents in the control group ($M = 4.08$; $SD = 1.97$) rated cleanness better than did residents in the control group ($M = 4.80$; $SD = 2.11$; $t(184.1) = 3.29$, $p = .001$, Cohen's $d = 0.34$ [0.13, 0.56], difference in means = 0.714). As pre-registered, we also examined possible differences between indoor and outdoor areas. As Figure 2 indicates, subjective cleanness only improved in indoor areas ($t(62.91) = 2.74$, $p = .008$, Cohen's $d = 0.42$ [0.10, 0.73]) but not in outdoor areas ($t(127.8) = -0.56$, $p = .570$, Cohen's $d = -0.09$ [-0.40, 0.22], Table 2, Model 2). Exploratory analysis reported in Appendix D show that the posters on the door but likely not those on the wall impacted subjective cleanness.

Table 2. OLS regression models 1-2 on the effect of the nature posters on subjective cleanness

	(1)		(2)	
	Estimate (SE)	95% CI	Estimate (SE)	95% CI
Intervention: Nature poster	-0.71** (0.23)	[-1.16, -0.27]	0.18 (0.32)	[-0.45, 0.81]
Location (outdoor = 0, indoor = 1)			1.51*** (0.22)	[1.06, 1.96]
Nature poster x location			-1.02* (0.45)	[-1.90, -0.13]
Constant	4.80*** (0.11)	[4.59, 5.01]	3.69*** (0.20)	[3.31, 4.08]
N	494		494	
R ²	0.02		0.10	

Note. * $p < .05$; ** $p < .01$; *** $p < .001$.

Figure 2: Effect of nature posters on subjective cleanness in indoor versus outdoor areas



5.3 Nature connectedness as potential moderator (preregistered Hypothesis 3)

In our OLS regression (Table 3, Model 2) which included an interaction term for the nature poster and nature connectedness, we again observed a significant main effect of the nature posters on subjective cleanness. In addition, greater connectedness to nature was associated with enhanced perceived cleanness, in the presence of the interaction with the nature poster. However, the interaction term was insignificant, indicating that the effect of the nature poster was not moderated by nature connectedness.

Table 3. OLS regression model on the effect of the nature posters on subjective cleanness

	(1)		(2)	
	Estimate	95% CI	Estimate	95% CI
Nature connectedness	-0.20***	[-0.29, -0.10]	-0.21***	[-0.30, -0.11]
	(0.05)		(0.05)	
Intervention: Nature poster			-2.42*	[-4.33, -0.52]
			(0.97)	
Nature poster x nature connectedness			0.31	[-0.00, 0.63]
			(0.16)	
Constant	5.69***	[5.17, 6.21]	5.87***	[5.33, 6.41]
	(0.27)		(0.28)	
N	494		494	

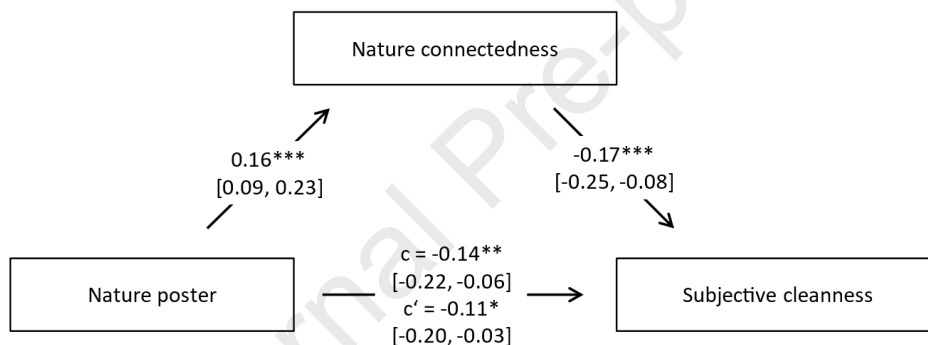
	(1)		(2)	
	Estimate	95% CI	Estimate	95% CI
R2	0.04		0.06	

Note. * $p < .05$; ** $p < .01$; *** $p < .001$.

5.4 Nature connectedness as a potential mediator (exploratory analysis)

A mediation analysis with 5,000 bootstrapped samples showed that the nature poster was associated with increased nature connectedness, which in turn exhibited a positive association with subjective cleanness (total standardized effect: $z = -3.28$, $d = -0.14$, $p = .001$, 95% CI [-0.22, -0.06]; mediated effect $z = -2.73$, $d = -0.03$, $p = .006$, 95% CI [-0.05, -0.01]). Figure 3 displays the direct and indirect relationships between the nature picture, reported nature connectedness and subjective cleanness.

Figure 3: Mediated effect of the nature picture on subjective cleanness via nature connectedness



Note. * $p < .05$; ** $p < .01$; *** $p < .001$. c = standardized regression estimates for the total effect of the treatment. c' = standardized regression estimate for the direct effect of the treatment, controlling for the mediator. Unstandardized effects: nature poster to nature connectedness = 0.78 (95% CI [0.46, 1.09], $p < .001$), nature connectedness to subjective cleanness = -0.18 (95% CI [-0.26, -0.09], $p < .001$), total effect (c) = -0.72 (95% CI [-1.15, -0.29], $p = .001$), and direct effect (c') = -0.58 (95% CI [-1.02, -0.14], $p = .01$).

5.5 Difference between objective and subjective cleanness (exploratory analysis)

At Time 2 in the control group, objective cleanness ($M = 2.61$, $SD = 1.19$; $N = 92$) was rated better than subjective cleanness at the level of waste disposal areas ($M = 4.31$, $SD = 1.48$; $N = 67$; $t(122,7) = -7.76$, $p < .001$, Cohen's $d = -1.29$ [-1.63, -0.94]).⁵ In addition, employees' assessments of cleanness during taking the photos ($M = 2.90$, $SD = 1.57$, $N = 92$) were also better than subjective retrospective ratings of cleanness by residents ($t(147.1) = -5.77$, $p < .001$, Cohen's $d = -0.92$ [-1.25, -0.59]). These findings indicate that the difference between

⁵ In total, 739 residents rated the cleanness of 125 waste disposal areas, of which 67 were in the control group and 58 in the treatment group.

objective cleanness and subjective residents' perceptions were substantial and not only the consequence of different measurement methods – residents thought waste areas were significantly dirtier than they really appeared to be. In a similar vein, residents also rated the smell ($M = 4.71$; $SD = 1.51$, $N = 67$) worse than the employees at Time 2 in the control group ($M = 3.01$; $SD = 1.57$, $N = 92$, $t(145.3) = 6.88$, $p < .001$, Cohen's $d = 1.10$ [0.76, 1.43]). Objective and subjective cleanness were weakly correlated ($r_s = 0.23$, $p = .06$). Subjective cleanness by residents and employees were moderately correlated ($r_s = 0.66$, $p < .001$).⁶

6. Discussion

The aim of the present field experiment was to examine the impact of nature posters on objective and subjective cleanness compared to a control condition, in the context of public housing in Vienna, Austria. Results showed that whereas nature posters (versus no posters) had no significant impact on objective cleanness (in the short or long run), they did improve subjective cleanness. In indoor waste disposal areas especially, nature posters improved the subjective perception of cleanness while the effect was not significant in outdoor areas. Supplementary analysis showed that in particular posters on doors rather than walls were effective. Connectedness to nature did not moderate the effect of the posters and thus supports the evidence of a previous study on the effects of virtual nature experiences (Hartmann & Apaolaza-Ibáñez, 2010). Instead, explorative mediation results show that nature posters could have increased the salience of nature connectedness, which, in turn, partly explained the relationship between nature pictures and subjective cleanness ratings.

Why did nature posters have no large effect on objective cleanness? One reason is that the descriptive norm of visible cleanness might exert a stronger influence on people's perception and behavior than nature posters. In the present study, the general decline of cleanness over time, including in the control condition, might have served as a descriptive norm that exhibited a stronger impact on objective cleanness than did the nature posters (Schultz et al., 2013).⁷ For instance, a field experiment showed that if there was already a fair amount of litter, a prohibition sign on littering caused even more rather than less littering (Keizer et al., 2011). Likewise, a social norm of some littering may have been present, which, in turn, potentially undermined environmentally friendly behavior and reduced the impact of nature posters as well. Indeed, cleaning up is the most important preventive measure to enhance correct disposal of waste in the future because it communicates a high social norm of cleanness (Cialdini et al., 1990; Finnie, 1973). Future experimental research needs to examine the combined impact of poster-interventions and descriptive norms to allow targeted implementation of posters depending on the prevailing level of cleanness.

The differences between objective and subjective cleanness seem rather intriguing. One explanation could be derived from the availability heuristic (Tversky & Kahneman, 1973), suggesting that residents might recall extreme events of dirt more easily than the rather clean environments that tend to be more common. Similarly, media reports about supposedly dirty waste disposal areas might also increase awareness and selective attention and retrieval from

⁶ In Appendix E we explored further determinants of objective and subjective cleanness and found that only the presence of bulky waste was related to objective cleanness on the floor.

⁷ The T1 measure was conducted at the beginning of the summer holidays when many residents might have gone on holidays already. Thus, the number of residents that used the waste disposal area was likely lower than at the other measurement times, possibly creating less litter.

memory which can lead to an overestimation of dirt. Finally, virtual nature experience through a poster might have only improved attitudes towards perceived cleanness but not attitudes towards picking-up litter which could transfer to behavior and improved objective cleanness (Hartmann & Apaolaza-Ibáñez, 2008; 2009). Taken together, while the present findings highlight the importance of subjective experiences of cleanness, it is up to future research to assess the determinants and consequences of such ratings. After all, subjective experiences of the environment may be at least as important a predictor of behavior as objective aspects of the environment.

The relationship between nature posters being present and nature connectedness was surprising. However, this finding makes sense in light of some evidence indicating that nature posters may elicit similar emotions such as “feeling one with nature” (Hartmann & Apaolaza-Ibáñez, 2010; Kals, Schumacher, & Montada, 1999) that are often used to measure nature connectedness (i.e., I feel strongly connected to nature). Thus, the present experiment offers first evidence that virtual nature imagery might increase nature connectedness, or at least salience of nature, as an important predictor of pro-environmental behavior.

7. Conclusion

In previous research, nature posters as a more implicit message were more effective than posters with explicit messages (Gangl et al., 2022). The present research shows that nature posters enhanced subjective cleanness, while objective cleanness was unaffected. At present, it is not clear how subjective experiences might drive human behavior, especially when clean environments are the rule and dirty environments the exception. However, it is plausible that reminders of nature can have a meaningful impact, and, as the present findings suggest, this might work through increasing salience of connectedness to nature.

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Appendix

Appendix A: Summary of all assessed variables, measurement scale, source of measurement and indication whether the variable was used for stratification

The study was not only used to test the effect of nature posters. It was also an aim to investigate other research questions such as on the impact of infrastructures variables (e.g., the volume of containers) and on the prevalence and determinants of “other managing behavior” (picking up other peoples’ waste). For transparency, all variables that were assessed in the study are presented, whereas we highlight those variables that were used for stratification of the randomization.

Table A.1. Summary of assessed variables.

Variable description	Scale	Source	Stratification
Evaluation of cleanliness by Wiener Wohnen (WIWO)	0 = clean, 1 = average, 2 = dirty	Employees	
Presence of bulky waste	0 = no, 1 = yes	Employees	
Number of complaints about littered waste	Number	WIWO database	
Costs for removal of bulky waste	Euro	WIWO database	
Cleanness based on objective photo-rating	1 = totally clean, 7 = totally dirty	Photo-rating	X
Cleanness based on subjective employee-rating	1 = totally clean, 7 = totally dirty	Employees of WIWO	X
Cleanness based on subjective inhabitant-rating	1 = totally clean, 7 = totally dirty	Door-survey	
Smell based on subjective employee-rating	1 = totally clean, 7 = totally dirty	Employee rating	

Table A.1. Summary of assessed variables.

Variable description	Scale	Source	Stratification
Smell based on subjective inhabitant- rating	1 = very good, 7 = very bad	Door survey	
Satisfaction with design of waste disposal areas by inhabitants	1 = very satisfied, 7 = not at all satisfied	Door survey	
Number of small pieces of litter	1 = none, 7 = countless	Photo-rating	X
Number of large pieces of litter	1 = none, 7 = countless	Photo-rating	X
Removal of litter: Equipment necessary	0 = no, 1 = yes	Photo-rating	X
Removal of litter: Dirty	0 = no, 1 = yes	Photo-rating	X
Removal of litter: Effort necessary	0 = no, 1 = yes	Photo-rating	X
Removal of litter: Heavy	0 = no, 1 = yes	Photo-rating	X
Waste in front of room	0 = no, 1 = yes	Employees of WIWO	X
Cigarette butts in room	0 = no, 1 = yes	Employees of WIWO	X
Bulky waste in room	0 = no, 1 = yes	Employees of WIWO	X
Full waste containers	0 = no, 1 = yes	Employees of WIWO	X
Infrastructure of building			
District in Vienna	1-23	WIWO database	X
Building	Code of building	WIWO database	X
Year of construction	Year	WIWO database	
Building and outdoor care (HAB) or just building care (HB)	Text	WIWO database	

Table A.1. Summary of assessed variables.

Variable description	Scale	Source	Stratification
If building (WHA) is supervised by building and outdoor care (HAB) or just building care (HB)	0 = HAB, 1 = others	WIWO database	
Inhabitants' association	0 = no; 1 = yes	WIWO database	
Restaurants	Number	WIWO database	
Playground	0 = no; 1 = yes	WIWO database	
Seating area	0 = no; 1 = yes	WIWO database	
Kindergarden (Preschool)	0 = no; 1 = yes	WIWO database	
School	0 = no; 1 = yes	WIWO database	
Seniors-Club	0 = no; 1 = yes	WIWO database	
Housing-Partner premise	0 = no; 1 = yes	WIWO database	
Youth-Club	0 = no; 1 = yes	WIWO database	
Premise for festivities	0 = no; 1 = yes	WIWO database	
Police station	0 = no; 1 = yes	WIWO database	
Infrastructure of disposal areas			
Waste room (indoor) or waste area (outdoor)	Text	WIWO database	
Indoor	0 = no; 1 = yes	WIWO database	X
Number of waste rooms (indoor)	Number	WIWO database	X
Number of waste areas (outdoor)	Number	WIWO database	X

Table A.1. Summary of assessed variables.

Variable description	Scale	Source	Stratification
Number of disposal areas	Number	WIWO database	X
Light and movement sensors	0 = no; 1 = yes	WIWO employees	
Number of windows in a waste room	Number	WIWO employees	
Angled room	0 = no; 1 = yes	WIWO employees	
Enclosure	0 = no; 1 = yes	WIWO employees	
Residual waste container	0 = no; 1 = yes	WIWO employees	
Number of residual waste containers	Number	WIWO/waste collector data	
Volume of residual waste containers	Litre	WIWO/waste collector data	X
Volume of residual waste containers per inhabitant	Liter	WIWO/waste collector data	
Wastepaper container	0 = no; 1 = yes	WIWO/waste collector data	
Number of wastepaper container	Number	WIWO/waste collector data	
Volume of wastepaper containers	Litre	WIWO/waste collector data	X
Volume of wastepaper containers per inhabitant	Litre	WIWO/waste collector data	
Volume of wastepaper and residual waste container	Litre	WIWO/waste collector data	
Volume of wastepaper and residual waste container per inhabitant	Litre	WIWO/waste collector data	
Number of plastic/metal containers	Number	WIWO/waste collector data	

Table A.1. Summary of assessed variables.

Variable description	Scale	Source	Stratification
Total number of waste collection days according to MA 48	Number	Waste collector data	X
Apartments			
Size in m ² of all apartments in a staircase	m ²	WIWO database	
Average size in m ² per apartment in the staircase	m ²	WIWO database	
Average living space in m ² per resident	m ²	WIWO database	X
Number of apartments per staircase	Number	WIWO database	X
Number of two-room apartments in the staircase	Number	WIWO database	
Number of three-room apartments in the staircase	Number	WIWO database	
Number of four-room apartments in the staircase	Number	WIWO database	
Number of new rentals in the staircase	Number	WIWO database	
Resident turnover rate per staircase (fluctuation)	In percent (N rented / N apartments)	WIWO database	X
Rate of vacant apartments in the staircase	In percent (N vacant / N apartments)	WIWO database	
Inhabitants			
Number of inhabitants according to the building description	Number	WIWO database	
Number of inhabitants in the staircase	Number	WIWO database	X

Table A.1. Summary of assessed variables.

Variable description	Scale	Source	Stratification
Number of male inhabitants in the staircase	Number	WIWO database	
Number of female inhabitants in the staircase	Number	WIWO database	
Share of male inhabitants	In percent	WIWO database	
Share of female inhabitants	In percent	WIWO database	
Ratio of male to female inhabitants	In percent	WIWO database	X
Average age of inhabitants	Number	WIWO database	
Number of inhabitants under the age of 19 in the staircase	Number	WIWO database	
Number of inhabitants aged between 20 and 59 in the staircase	Number	WIWO database	
Number of inhabitants over 60 in the staircase	Number	WIWO database	
Average number of inhabitants per apartment	Number	WIWO database	X
Variables based on previous Study (Gangl et al., 2022)			
Baseline cleanness based on photo-rating	1 = totally clean, 7 = totally dirty	Gangl et al. (2022)	X
Previously treated area	0 = no, 1 = yes	Gangl et al. (2022)	X
Intervention gone in May 2022	0 = no, 1 = yes	WIWO	X
Intervention deinstalled in May 2022	0 = no, 1 = yes	WIWO	X

Table A.2. Descriptive statistics of objective and subjective cleanness, overall and grouped by treatment and/or location.

Treatment	Location	Rating	Time	<i>N</i>	<i>Mean (SD)</i>	95% CI
All	All	Photo	T1	182	2.28 (1.08)	[2.12, 2.44]

All	All	Photo	T2	182	2.64 (1.14)	[2.47, 2.81]
All	All	Photo	T3	182	2.73 (1.28)	[2.54, 2.91]
All	All	Photo	T4	182	2.77 (1.16)	[2.60, 2.94]
Control	All	Photo	T1	92	2.31 (1.05)	[2.10, 2.53]
Control	All	Photo	T2	92	2.61 (1.19)	[2.37, 2.86]
Control	All	Photo	T3	92	2.63 (1.17)	[2.39, 2.87]
Control	All	Photo	T4	92	2.74 (1.17)	[2.50, 2.98]
Nature poster	All	Photo	T1	90	2.25 (1.11)	[2.02, 2.48]
Nature poster	All	Photo	T2	90	2.67 (1.10)	[2.44, 2.90]
Nature poster	All	Photo	T3	90	2.83 (1.40)	[2.53, 3.12]
Nature poster	All	Photo	T4	90	2.8 (1.160)	[2.56, 3.04]
All	Outside	Photo	T1	83	2.05 (0.87)	[1.86, 2.24]
All	Outside	Photo	T2	83	2.72 (1.10)	[2.48, 2.96]
All	Outside	Photo	T3	83	2.90 (1.33)	[2.61, 3.19]
All	Outside	Photo	T4	83	2.73 (1.17)	[2.47, 2.98]
All	Inside	Photo	T1	99	2.48 (1.20)	[2.24, 2.72]
All	Inside	Photo	T2	99	2.57 (1.18)	[2.33, 2.80]
All	Inside	Photo	T3	99	2.58 (1.23)	[2.33, 2.82]
All	Inside	Photo	T4	99	2.81 (1.15)	[2.58, 3.04]
Control	Outside	Photo	T1	41	2.15 (0.85)	[1.88, 2.41]
Control	Outside	Photo	T2	41	2.85 (1.19)	[2.48, 3.23]
Control	Outside	Photo	T3	41	2.69 (1.26)	[2.30, 3.09]
Control	Outside	Photo	T4	41	2.65 (1.20)	[2.27, 3.03]
Control	Inside	Photo	T1	51	2.45 (1.17)	[2.12, 2.78]
Control	Inside	Photo	T2	51	2.42 (1.16)	[2.09, 2.74]
Control	Inside	Photo	T3	51	2.58 (1.10)	[2.27, 2.89]
Control	Inside	Photo	T4	51	2.81 (1.15)	[2.48, 3.13]
Nature poster	Outside	Photo	T1	42	1.95 (0.88)	[1.68, 2.23]
Nature poster	Outside	Photo	T2	42	2.60 (1.01)	[2.28, 2.91]
Nature poster	Outside	Photo	T3	42	3.11 (1.38)	[2.68, 3.54]
Nature poster	Outside	Photo	T4	42	2.80 (1.15)	[2.44, 3.16]
Nature poster	Inside	Photo	T1	48	2.51 (1.23)	[2.15, 2.87]
Nature poster	Inside	Photo	T2	48	2.73 (1.18)	[2.39, 3.07]
Nature poster	Inside	Photo	T3	48	2.58 (1.38)	[2.18, 2.98]
Nature poster	Inside	Photo	T4	48	2.81 (1.17)	[2.47, 3.15]
All	All	Survey	T2	494	4.64 (2.10)	[4.45, 4.83]
Control	All	Survey	T2	385	4.80 (2.11)	[4.59, 5.01]
Nature poster	All	Survey	T2	109	4.08 (1.97)	[3.71, 4.46]
All	Outside	Survey	T2	167	3.76 (1.97)	[3.46, 4.06]
All	Inside	Survey	T2	327	5.09 (2.03)	[4.87, 5.31]

Control	Outside	Survey	T2	104	3.69 (1.95)	[3.31, 4.07]
Control	Inside	Survey	T2	281	5.21 (2.02)	[4.97, 5.44]
Nature poster	Outside	Survey	T2	63	3.87 (2.01)	[3.37, 4.38]
Nature poster	Inside	Survey	T2	46	4.37 (1.90)	[3.81, 4.93]

Appendix B: Assessment of objective cleanliness (photo-rating)

Intuitive impression

Description: Just intuitively rate your first impression from 1 to 7. Don't count out the bulky waste - it's about the overall impression. Please focus on the garbage here, so don't include dirty floors/walls, old containers etc. too much!

1 (totally clean) to 7 (totally dirty)

Definition of bulky waste: Anything that does not fit in the garbage can (slatted frame, wardrobe, armchair, baby carriage, shopping cart, pallet, etc.) or electronic waste (printer, microwave, etc.). If there are parts of a piece of furniture that would fit in the garbage can (drawers, broken chair legs, etc.), classify them as large items of waste!.

How many small pieces of waste?

Description: Count the number of pieces of garbage that are roughly the same size or smaller than a hand or that can be crumpled up in it, e.g. plastic bottle, small brochure/newspaper, small pieces of paper.

If you can't tell from the picture whether it's garbage or just leaves/stones or stains on the ground, look at the 2nd picture. If it is still unclear whether it is garbage, do not classify it as garbage. Only classify as garbage what is clearly recognizable as garbage! But write a comment in the table with "ambiguous whether garbage". For example, if a piece of paper is obviously torn and the two pieces are close together, then count it as 1 piece. Evaluate the garbage room/garbage area only on the basis of the garbage, i.e. independently of cigarettes and bulky waste (is collected separately by the OB) - so ignore cigarettes and bulky waste for the evaluation.

1: nothing is on the floor

2: 1 piece

3: 2-3 pieces

4: 4-6 pieces

5: 7-10 pieces

6: 11-20 pieces

7: Countless pieces

How many large pieces of waste?

Description: Count the quantity of all other pieces of garbage here, i.e. those that are larger than a hand (e.g. garbage bag, cardboard, pieces of wood, etc.). If there are pieces inside each other, e.g. boxes with something inside, count them as 1 piece.

1: nothing is on the floor

2: 1 piece

3: 2-3 pieces

4: 4-6 pieces

5: 7-10 pieces

6: 11-20 pieces

7: Countless pieces

Liquid waste (if it looks like something has just leaked, yogurt, paint, etc. - this does not mean water stains, puddles, dried stains on the floor) is scored as waste (i.e. either small or large), and equipment is marked as 4).

What do you have to do to take the garbage room/garbage area down to a "1" rating?

Description: Evaluate the garbage room/garbage area as a whole. Imagine you wanted to clean the entire garbage room/garbage area, i.e. remove all the pieces: Write a "1" in the columns that apply, write a "0" if it does not apply.

Equipment: Do you need a dustpan, broom, cleaning kit or other equipment, e.g. because:

- ... the waste is dangerous, e.g. broken glass.
- ... the waste consists of many small pieces, so that picking it up by hand would be possible but would take too long.
- ... the waste is unhygienic (e.g. handkerchiefs, torn open bin bag with organic waste) or damp (e.g. wet wastepaper), so that picking it up by hand would be possible but disgusting.
- ... the waste cannot be picked up by hand, e.g. mushy leftover food, "liquid" waste such as leaked yogurt.

Dirty: Would you get your hands dirty if you picked up everything - things that you could theoretically pick up (i.e. not liquid stains) (e.g. sticky or wet pieces, organic waste, garbage bag not completely closed)? This does not mean that the room looks dirty or that the garbage looks dirty.

Effort: Should pieces be made smaller before they can be disposed of (so that as much as possible can fit in the garbage can) (e.g. larger cardboard box, approx. everything from the size of a pizza box)?

Heavy: Could a weak person (e.g. children, elderly people) not pick up the garbage (e.g. heavy large garbage bag)?

Appendix C: Guide for door-to-door interviews and subjective cleanliness

Greeting

(...)

Informed consent

The information you provide in the survey does not allow any conclusions to be drawn about you personally. The data collected will be used exclusively to improve the waste sector and for scientific purposes (e.g. publications, presentations).

Your participation in the study is voluntary. You can cancel the questionnaire at any time and your data will be deleted.

Selections waste disposal area

Apartment building (drop-down; interviewer selects apartment building without asking)

On which staircase is the garbage area that you use most often? At staircase x, at staircase y ...? (drop-down, incl. option "Other")

Contact with waste area

Do you remember the last time you were in your garbage area? (before 30.08; after 30.08)

Cleanliness and satisfaction (1 = totally clean, 7 = totally dirty)

Please remember: How clean did you find the garbage area when you were last there? Please answer on a scale from 1 to 7: 1 means totally clean and 7 means totally dirty.

How was the smell in the garbage area when you were last there? 1 means very good and 7 means very bad.

MC1: Subliminal manipulation check (1 = I agree completely, 7 = I don't agree at all)

When you think about the design of the waste area, how much do you agree with the following statements? Please answer on a scale from 1 to 7: 1 means "I agree completely" and 7 means "I don't agree at all".

I am satisfied with the design of the waste area.

The design of the garbage area shows me that Wiener Wohnen cares.

Behavior (1 = always, 7 = never)

I will now describe various situations to you. Please imagine the situations and tell me on a scale of 1 to 7 how you would behave. 1 means "always" and 7 means "never".

The first bin is full. Do you move on to use an empty container further back?

All the bins are full. Do you squeeze the garbage in the container so that your garbage bag still fits in?

You throw garbage into the container. A piece of paper falls on the floor. Do you pick up the piece of paper?

Behavior of others (OMB)

You go to the garbage area. There is a small garbage bag in front of the door. Do you take this garbage bag into the garbage area to dispose of it correctly?

You are in the garbage area and see that there is a small garbage bag in front of the container. Do you pick up the bin liner and dispose of it correctly?

You drop a piece of paper in the garbage area. You pick up the piece and see that there are other pieces of paper on the floor. Do you also pick up the other pieces of paper?

Behaviors bulky waste

You have an old armchair and no longer need it. Are you selling the armchair on the Internet (for example on "willhaben.at")?

You want to throw away a broken box. Do you call the MA 48 bulky waste collection service to have the broken box picked up?

You want to throw away a broken clothes horse. Do you take the clothes horse to the MA 48 waste disposal site?

Statements (1 = I agree completely, 7 = I don't agree at all)

I am now going to read out various statements to you. Please tell me on a scale of 1 to 7 how much you agree with these statements. 1 means "I agree completely" and 7 means "I don't agree at all".

Picking up other people's garbage is a good thing.

Picking up other people's garbage is sensible.

My family and friends pick up other people's garbage to dispose of it.

Residents in my apartment complex voluntarily take care of the trash that others leave behind.

Picking up other people's garbage is an easy task for me.

It is up to me to pick up other people's garbage and dispose of it correctly.

I can call my neighbors if I need help.

The people in my neighborhood trust each other.

Negative and positive emotions (1= I agree completely, 7 = I don't agree at all; 1 = very much, 7 = not at all)

Please tell me on a scale of 1 to 7 how much you agree with the following statements. 1 again means: "I agree completely" and 7 means "I don't agree at all". I pick up other people's garbage,

... because I feel guilty when there is garbage lying around

... because I feel ashamed when there is a lot of garbage lying around in my apartment building.

Please answer again on a scale from 1 to 7. This time 1 means "very much" and 7 means "not at all".

How much do you like picking up other people's garbage?

How much would you like to pick up other people's garbage in the coming days?

Willingness (drop down, scale 1-7)

How much extra money would you spend per month to keep your apartment complex clean? (drop-down from 0 to 100 euros or more in increments of 10)

How long would you volunteer to work per week to keep your apartment complex clean? (drop-down from 0 minutes to 150 minutes or more in increments of 10)

Imagine that a joint garbage collection campaign is organized in your residential complex. On a scale of 1 to 7, how likely are you to take part?

Infrastructure (yes/no, open number)

Do you always use the same waste area? (yes/no)

Is there cleaning equipment in your waste area? (yes/no)

How often do you go to the garbage area per month? (open number)

Salience check (yes/no)

Have you noticed a change in your garbage area recently? (Yes, there is a poster / Yes, something else / No)

Have you seen a picture of nature in your garbage area? (yes/no) (Only for the intervention group; only ask if the poster was not mentioned and possibly describe the poster)

MC2: Open manipulation check (only for the intervention group) (1 = I agree completely, 7 = I don't agree at all)

When you think about the image of nature, how much do you agree with the following statements? Please answer on a scale from 1 to 7: 1 means "I agree completely" and 7 means "I don't agree at all".

The nature picture makes the waste area more beautiful.

The nature picture reminds me of the beauty of Austria.

The nature picture shows me how important environmental protection is.

The nature picture calms me down.

What would you prefer? 3 euros or the nature picture as a poster for your home?

Connectedness with nature (1 = I agree completely, 7 = I don't agree at all)

On a scale of 1 to 7, please tell me how much you agree with the following statements. 1 means "I agree completely" and 7 means "I don't agree at all".

I feel strongly connected to nature.

Just as a tree is part of a forest, I am also part of nature.

All living beings on this earth are connected and I feel part of it.

Sociodemographics

Now I have a few more questions about you personally:

Gender (male, female, diverse; recorded by interviewer without asking)

May I ask how old you are? (drop-down: 14-99, n/a)

How many people live in your apartment in total and permanently? (drop-down: 1 to 15 or more)

How many children under the age of 14 live permanently in your household? (drop-down: 1 to 15 or more)

How long have you lived in Vienna? Since which year? (drop-down: 2022 to 1940 or earlier)

What is your mother tongue? (drop-down: German, Turkish, Serbian, Polish, Romanian, Arabic, other)

Comments

Is there anything else you would like to add? Do you have any comments? (open)

Notes/observations of the interviewer (open)

Debriefing & farewell

(...)

Appendix D: Exploration of the difference between posters on the wall versus door

In an exploration, we analyze whether it is sufficient to assemble the nature posters either on the door or on the wall or whether both posters are necessary. All residents who indicated to have been in a waste disposal area since the nature poster was assembled (N = 705) were included in the analysis. Regression results (Table D.1) show that subjective cleanness is most likely only affected by the posters on the door whereas the posters on the wall seem to have little effect on subjective cleanness.

Table D.1: OLS regression models on the effect of the nature posters on the wall versus on the door on subjective cleanness

	(1)		(2)		(3)	
	Estimate (SE)	95% CI	Estimate (SE)	95% CI	Estimate (SE)	95% CI
Nature poster on door	-0.77*** (0.20)	[-1.16, -0.38]			-0.90*** (0.23)	[-1.35, -0.46]

	(1)		(2)		(3)	
Nature poster in room			-0.11	[-0.45, 0.23]	0.25	[-0.13, 0.63]
			(0.17)		(0.19)	
Constant	4.88***	[4.70, 5.06]	4.76***	[4.56, 4.95]	4.82***	[4.63, 5.02]
	(0.09)		(0.10)		(0.10)	
N	706		706		706	
R2	0.020		0.000		0.022	

Note. * $p < .05$; ** $p < .01$; *** $p < .001$.

Appendix E: Determinants of objective and subjective cleanness

To allow a better interpretation of the results, we conduct exploratory OLS-regressions in which we present the relationship between several assessed variables that have been identified as relevant (e.g., by the housing company) with objective and subjective cleanness at Time 2, where both variables were assessed simultaneously (Table E.1). Exploratory regression results show that bulky waste is the most important determinant of objective cleanness. For subjective cleanness also bulky waste and in addition, the location of the waste disposal area and the number of inhabitants are important determinants.

Table E.1: Spearman correlations and OLS regression models on the determinants of objective and subjective cleanness.

	Objective cleanness (T2)			Subjective cleanness (T2)		
	Spearman correlation	OLS-Regression		Spearman correlation	OLS-Regression	
		Estimate (SE)	95% CI		Estimate (SE)	95% CI
Nature picture	0.04	0.11 (0.15)	[-0.18, 0.41]	-0.15***	0.11 (0.23)	[-0.34, 0.56]
Location (outdoor = 0, indoor = 1)	-0.08	-0.11 (0.18)	[-0.47, 0.25]	0.31***	0.80*** (0.23)	[0.35, 1.25]
Number waste disposal areas in building	-0.00	0.01	[-0.01, 0.03]	0.11*	0.01	[-0.01, 0.03]

		(0.01)			(0.01)	
Number of inhabitants in staircase	0.10	0.003 ⁺	[0.00, 0.01]	0.36 ^{***}	0.01 ^{***}	[0.01, 0.01]
		(0.002)			(0.00)	
Average number of inhabitants per apartment	0.04	0.02	[-0.37, 0.41]	0.15 ^{***}	-0.05	[-0.53, 0.43]
		(0.207)			(0.24)	
Mean age of inhabitants in staircase	-0.13	-0.02	[-0.06, 0.02]	-0.09 [*]	0.02	[-0.03, 0.07]
		(0.02)			(0.03)	
Fluctuation rate	-0.03	-1.50	[-5.24, 2.23]	0.21 ^{***}	1.81	[-3.67, 7.29]
		(1.90)			(2.80)	
Waste container volume per inhabitant	0.11	0.00	[0.00, 0.00]	-0.28 ^{***}	0.00	[0.00, 0.00]
		(0.00)			(0.00)	
Waste disposal area is lockable (0 = no, 1 = yes)	0.04	0.40	[-0.35, 1.16]	-0.04	0.20	[-0.61, 1.02]
		(0.38)			(0.41)	
Bulky waste in area (0 = no, 1 = yes)	0.49 ^{***}	1.53 ^{***}	[1.09, 1.97]	0.11 [*]	0.84 ^{**}	[0.26, 1.42]
		(0.22)			(0.30)	
Constant		2.11 ⁺	[-0.28, 4.51]		1.72	[-1.24, 4.67]
		(1.21)			(1.50)	
N		182			494	
R2		0.279			0.201	

Note. * $p < .05$; ** $p < .01$; *** $p < .001$.

Nature Posters Enhance Subjective but not Objective Cleanness in Public Housing:
Evidence from a Field Experiment

Highlights:

- Effects of nature posters on objective and subjective cleanness were examined.
- Nature posters enhanced subjective but not objective assessments of cleanness.
- The effect can partly be attributed to nature connectedness.
- Overall, objective ratings revealed greater cleanness than did subjective ratings of cleanness.