

Cities

Urban park-type preferences vary by personality traits: Evidence from Hangzhou, China

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Abstract:	<p>Urban green-space planning typically relies on quantity-based provision standards that overlook typological diversity and preference heterogeneity among user populations. Although sociodemographic factors are known to shape park use, whether stable psychological traits further differentiate demand for qualitatively distinct park types has received little attention in the landscape planning evidence base. This study examined whether Big Five personality traits systematically differentiate stated preferences for eight distinct park typologies operationalised through the perceived sensory dimensions (PSD) framework in Hangzhou, China, using a large-scale online survey (N=2,000) and ordered logit models with a comprehensive set of sociodemographic covariates and district fixed effects. Results showed that each personality trait was associated with a distinct pattern of park-type preferences. Extraversion was negatively associated with quiet and low-stimulation typologies and positively associated with socially animated parks, while agreeableness and openness to experience were broadly and positively associated with most park types. Notably, neuroticism showed no significant association with quiet-park preference, contrary to predictions of stress recovery theory and attention restoration theory. Internal migrants expressed stronger preferences for quiet and biodiverse parks than native residents; older adults similarly favoured quiet and prospect-oriented parks; and higher household income was negatively associated with preference for popular parks. These findings identify personality as a previously overlooked dimension of green-space demand heterogeneity and support typology-sensitive planning approaches that calibrate park portfolios to the psychological and sociodemographic diversity of urban populations.</p>



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Dear Editor,

We wish to submit a manuscript entitled “Urban park-type preferences vary by personality traits: Evidence from Hangzhou, China” to *cities*.

Urban green-space planning typically relies on quantity-based provision standards that overlook typological diversity and preference heterogeneity among user populations. Although sociodemographic factors such as age, income, and migration background are known to shape park use, stable psychological traits have received little attention as predictors of demand for qualitatively distinct park types, leaving a structural gap in the landscape planning evidence base. Using a large-scale survey in Hangzhou and ordered logit models across eight park typologies operationalised through the perceived sensory dimensions framework, this study shows that Big Five personality traits systematically differentiate stated park-type preferences. Extraversion is negatively associated with quiet and low-stimulation typologies yet positively associated with socially animated parks, while agreeableness and openness to experience are broadly and positively linked to most park types. Migration background, age, and household income further structure typological demand, reinforcing the need for user-profiled green infrastructure provision. These findings identify personality as a previously overlooked dimension of green-space demand heterogeneity and support typology-sensitive planning approaches that calibrate park portfolios to the psychological and sociodemographic diversity of urban populations. We believe this manuscript aligns well with *Landscape and Urban Planning's* interdisciplinary focus on landscape science, planning, and the social-ecological processes influencing landscape change.

We hope that it will be acceptable for publication but will be pleased to make any further changes deemed necessary by the editor and / or reviewers. Please do not hesitate to contact me should you require any additional information.

Sincerely yours,

Haijun Bao

Highlights

- Personality traits predict qualitatively distinct urban green-space preferences.
- Extraversion shows opposite associations with quiet and socially animated parks.
- Neuroticism shows no significant association with quiet-park preference.
- Internal migrants show stronger preference for quiet and biodiverse parks.

Urban park-type preferences vary by personality traits: Evidence from Hangzhou, China

Abstract

Urban green-space planning typically relies on quantity-based provision standards that overlook typological diversity and preference heterogeneity among user populations. Although sociodemographic factors are known to shape park use, whether stable psychological traits further differentiate demand for qualitatively distinct park types has received little attention in the landscape planning evidence base. This study examined whether Big Five personality traits systematically differentiate stated preferences for eight distinct park typologies operationalised through the perceived sensory dimensions (PSD) framework in Hangzhou, China, using a large-scale online survey ($N = 2,000$) and ordered logit models with a comprehensive set of sociodemographic covariates and district fixed effects. Results showed that each personality trait was associated with a distinct pattern of park-type preferences. Extraversion was negatively associated with quiet and low-stimulation typologies and positively associated with socially animated parks, while agreeableness and openness to experience were broadly and positively associated with most park types. Notably, neuroticism showed no significant association with quiet-park preference, contrary to predictions of stress recovery theory and attention restoration theory. Internal migrants expressed stronger preferences for quiet and biodiverse parks than native residents; older adults similarly favoured quiet and prospect-oriented parks; and higher household income was negatively associated with pref-

erence for popular parks. These findings identify personality as a previously overlooked dimension of green-space demand heterogeneity and support typology-sensitive planning approaches that calibrate park portfolios to the psychological and sociodemographic diversity of urban populations. *Keywords:* urban green-space planning; park typology; perceived sensory dimensions; landscape preference; Big Five personality; sociodemographic heterogeneity

1. Introduction

Urban green spaces are fundamental components of sustainable urban landscapes, contributing to ecological functioning, social cohesion, and human wellbeing. Converging evidence from epidemiology, environmental psychology, and urban planning establishes that residential access to parks and green areas reduces cardiovascular mortality, lowers the prevalence of mental health disorders, and strengthens social cohesion (Twohig-Bennett and Jones, 2018; Nieuwenhuijsen, 2021; Nordh et al., 2024). Two theoretical frameworks articulate the mechanisms underlying these benefits. Stress recovery theory (Ulrich, 1984; Wang et al., 2024a) proposes that natural environments trigger rapid psychophysiological recovery from sympathetic arousal, while attention restoration theory (Kaplan, 1995; Yao et al., 2021) holds that the soft fascination afforded by nature replenishes depleted directed attention. Together, these frameworks have motivated widespread adoption of minimum green-space provision standards, making urban green-space investment a global policy priority.

Yet prevailing planning instruments treat green space as a largely undifferentiated commodity. Quantity-based guidelines, such as the World

Health Organization’s recommendation of at least 0.5 hectares of accessible green space within 300 m of every urban dwelling (World Health Organization, 2016), capture proximity but are blind to experiential quality and typological diversity. Urban parks in fact span a wide experiential spectrum, from quiet, species-rich woodlands suited to solitude and passive restoration, to animated social plazas designed for communal recreation and physical activity (Grahn and Stigsdotter, 2010; Stigsdotter and Grahn, 2011; Yang et al., 2025). Accumulating evidence confirms that person-environment mismatches reduce restorative outcomes even when green space is physically accessible (Wang et al., 2024a; Yang et al., 2025), and that park underutilization is partly attributable to a mismatch between the types of spaces supplied and the preferences of local populations (Schipperijn et al., 2010; Nordh et al., 2024). Treating urban green space as a monolithic amenity thus produces systematically biased assessments of what green-space portfolios cities actually need.

Understanding this preference heterogeneity requires moving beyond the sociodemographic variables, including age, gender, income, and cultural background, that have historically dominated the park-use literature (Bedimo-Rung et al., 2005; Schipperijn et al., 2010; Nordh et al., 2024). Within these demographic dimensions, important gradients remain underexplored. Age and life-course stage shape both the capacity and the motivation to visit green spaces, with older adults tending to favour quieter, more naturalistic settings that support passive contemplation and stress relief (Ode Sang et al., 2016; Dzhambov and Dimitrova, 2014), while marital status may constrain discretionary leisure time and redirect preferences toward family-oriented facilities. Socioeconomic position further stratifies

park use; lower-income residents often face compounded disadvantages of reduced park quality and limited typological choice (Wolch et al., 2014; Rigolon, 2016), and population-level studies confirm that the health benefits of green-space exposure are strongest among the most income-deprived communities (Mitchell and Popham, 2008; Nieuwenhuijsen, 2021). Although such factors partially explain variation in park visitation, two individuals with identical demographic profiles may hold sharply divergent preferences for a quiet woodland and a bustling recreational plaza. This residual variance points toward stable psychological characteristics as an underexplored explanatory dimension. Personality traits, defined as enduring individual differences in cognition, affect, and behavior that are consistent across situations and contexts (John and Srivastava, 1999; McCrae and Costa, 1987; Wang et al., 2024a), offer precisely this explanatory leverage.

The big five model operationalises personality along five dimensions, namely extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience (Soto and John, 2017). Two complementary mechanisms link big five traits to park-type preferences. The concept of affordances (Gibson, 1979; Wang et al., 2024a) holds that the action possibilities offered by any environment are relational properties contingent on the perceiver’s psychological constitution, such that a dense enclosed woodland affords refuge and sensory immersion to a stress-prone introvert yet may feel understimulating to a high-extraversion sensation-seeker. Complementary, niche-picking theory (Scarr and McCartney, 1983; Matz and Harari, 2021) predicts that individuals actively select environments that match and reinforce their dispositional tendencies, producing systematic covariation between personality and habitual environmental choices. Taken together,

these mechanisms predict that personality shapes not merely the frequency of green-space visitation, but the qualitative types of spaces sought.

These mechanisms generate directionally testable predictions across the big five dimensions. High extraversion, characterized by positive affectivity, sociability, and stimulus-seeking, is expected to drive preferences for popular and socially animated park environments; by the same logic, high-extraversion individuals should show reduced preference not only for quiet parks but for any low-stimulation typology (e.g., spacious, biodiverse, or prospect-oriented spaces) that lacks the social density they seek. High neuroticism, reflecting chronic negative affect and heightened stress reactivity, should amplify demand for quiet, restorative spaces congruent with the predictions of stress recovery theory and attention restoration theory (Ulrich, 1984; Kaplan, 1995; Yao et al., 2021); indeed, green spaces have been shown to buffer the health impact of stressful life events particularly among stress-prone individuals (van den Berg et al., 2010; Yao et al., 2021), generating a strong *a priori* expectation that neuroticism will be positively associated with quiet-park preference.

High agreeableness, defined by prosocial orientation and cooperative motivation, has recently been shown to exert a complex, bidirectional influence on nature-based restorative experiences, both facilitating and potentially inhibiting restoration depending on social context (Yang et al., 2025). High openness to experience, implying aesthetic sensitivity and novelty engagement, is expected to translate into stronger preferences for biodiverse and culturally rich landscapes (Nisbet et al., 2009; Yang et al., 2025). Conscientiousness, associated with orderliness and goal persistence, may favor well-maintained, structured environments (Chen et al., 2021). Critically, recent

empirical work demonstrates that these personality-environment associations persist after controlling for sociodemographic characteristics (Wang et al., 2024a; Feng et al., 2022), confirming that traits carry genuine explanatory power beyond conventional demographic predictors.

Despite this theoretical foundation, rigorous empirical evidence directly linking big five traits to preferences for specific urban park typologies at population scale remains scarce. Prior research has primarily examined personality as a moderator of restorative outcomes in specific forest or park settings (Wang et al., 2024a; Yang et al., 2025; Chen et al., 2021) rather than as a predictor of stated preferences across the full typological spectrum of urban green spaces. Studies that do examine park-type preferences concentrate overwhelmingly on demographic predictors (Schipperijn et al., 2010; Feng et al., 2022), leaving the personality dimension unmeasured. This constitutes a structural blind spot in the planning evidence base. Where psychological traits shape demand for qualitatively distinct park environments at the population level, ignoring them generates systematic mismatches between green-space supply and the heterogeneous preferences of urban residents.

This study uses a large-scale online survey of adult residents in Hangzhou, China, to investigate how big five personality traits shape stated preferences for eight distinct park typologies operationalised through the perceived sensory dimensions framework (Grahm and Stigsdotter, 2010; Stigsdotter and Grahm, 2011), with ordered logit models estimated for each typology and a comprehensive set of sociodemographic variables and district fixed effects included as controls. Specifically, the study aims to (1) examine whether big five personality traits are systematically associated with preferences for

distinct park typologies; (2) determine whether personality traits predict divergent demand for restorative versus social settings; and (3) assess how substantial these associations are relative to, and independent of, conventional demographic predictors. The findings provide landscape planners with a new demand-side analytical dimension and identify internal migrants as a planning-relevant population segment whose park preferences are not fully captured by standard demographic indicators.

2. Materials and Methods

2.1. Study area and data collection

Hangzhou (30°16'N, 120°09'E), the capital of Zhejiang Province and one of China's most rapidly urbanising cities, served as the study setting. With a registered resident population of approximately 12.4 million as of 2023, the city encompasses a diverse portfolio of urban green infrastructure, ranging from the UNESCO World Heritage-listed West Lake and the Xixi National Wetland Park to hundreds of neighbourhood pocket parks across ten urban districts. This typological breadth provides a nationally relevant and contextually rich setting for examining heterogeneous park-type preferences (Nordh et al., 2024; Schipperijn et al., 2010). An online questionnaire survey was administered in 2024 through a professional survey platform, targeting adults aged ≥ 18 years across all urban districts of Hangzhou. To promote sociodemographic representativeness, stratified quota sampling was applied by district and gender, with quotas proportional to the 2023 district-level population registry. All participants provided informed digital consent. Of 5,024 responses received, 1,621 incomplete submissions and 617 failing eligibility screening were excluded, leaving 2,786 questionnaires

for quality control. A multi-stage quality-control protocol was then applied, comprising: (i) IP-address verification excluding non-Hangzhou and educational-network responses; (ii) student-status screening via IP filtering, social media account content review, and cross-referencing against a university student register; (iii) social media profile deduplication via automated QR-code parsing (Xiaohongshu, Weibo, Bilibili) and manual comparison (Douyin); (iv) phone-number deduplication retaining the earliest valid submission per respondent; and (v) telephone follow-up for remaining ambiguous cases, with an appeals mechanism for respondents who could not be reached. Following quality control, 786 questionnaires were rejected, yielding a final analytical sample of $N = 2,000$ valid observations. Park-type preferences were assessed using eight purpose-designed five-point Likert items (1 = strongly disagree to 5 = strongly agree); the full instrument and variable coding scheme are provided in Appendix A.

2.2. Measures

Park-type preferences (dependent variables). We operationalised park-type preferences using eight items, each corresponding to one of the eight Perceived Sensory Dimensions (PSDs) originally developed by Grahn and Stigsdotter (2010) and subsequently applied extensively in green-space research (Stigsdotter and Grahn, 2011; Wang et al., 2024a; Yang et al., 2025). Grounded in empirical studies of urban green-space experience under stress and recovery conditions, the PSD framework characterises green-space qualities along a continuum from tranquil-restorative to social-stimulating environments, encompassing eight theoretically and empirically distinguishable dimensions. Participants rated their preference for parks emphasising

each characteristic on a five-point Likert scale; the eight items and their PSD classifications are:

- (1): Quiet parks or green spaces (**Serene**)
- (2): Popular/Crowded parks or green spaces (**Social**)
- (3): Unmanaged/Original ecology parks (**Nature**)
- (4): Artistic/Cultured parks (e.g., with sculptures or flower beds) (**Culture**)
- (5): Enclosed/Sheltered parks surrounded by plants (**Refuge**)
- (6): Spacious parks with open views (**Space**)
- (7): Parks full of life/biodiversity (e.g., many birds and insects) (**Rich in Species**)
- (8): Parks suitable for climbing high to view scenery (**Prospect**)

Personality traits (independent variables). The Big Five personality traits (Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience) were assessed using the 20-item Big Five Inventory (BFI-20), a psychometrically validated short-form instrument comprising four items per trait (Soto and John, 2017; John and Srivastava, 1999). The BFI-20 has been widely adopted in recent studies linking personality to urban green-space experience and preference (Chen et al., 2021; Wang et al., 2024a; Yang et al., 2025; Feng et al., 2022). Negatively keyed items were reverse-scored prior to scale computation. Each trait score was computed as the mean of its four constituent items and standardised to a z -score

($M = 0$, $SD = 1$), such that regression coefficients represent the change in outcome per one-standard-deviation increment in each trait, enabling direct cross-trait comparisons. Subscale internal consistency (Cronbach’s α and McDonald’s ω) is reported in Section 3.1; all values meet the recommended adequacy threshold for short-form measures (Soto and John, 2017). The complete item wording and reverse-coding key are provided in Appendix A.

Control variables and fixed effects. Following established conventions in the urban green-space preference literature (Schipperijn et al., 2010; Nordh et al., 2024), we include age (continuous, in years) and six binary sociodemographic indicators as covariates: gender (1 = male), education (1 = senior high school or above), household income (1 = ≥ 200 k CNY per year), marital status (1 = married), self-rated health (1 = fair, good, or excellent; 0 = poor), and Hangzhou nativity (1 = native resident; 0 = migrant to Hangzhou). Self-rated health and gender are established predictors of park satisfaction and perceived green-space quality (Chen et al., 2021; Dzhambov and Dimitrova, 2014); education and income capture socioeconomic constraints on green-space access (Schipperijn et al., 2010); and the nativity indicator accounts for the systematically distinct green-space orientations documented among internal migrants in Chinese cities, reflecting environmental nostalgia and elevated restorative needs (Zhang et al., 2022; Wang et al., 2024b). District fixed effects (μ_d) are included in all full models to absorb time-invariant, location-specific confounders, including variation in green-space supply, park accessibility, and neighbourhood socioeconomic composition, across Hangzhou’s ten urban districts. A complete variable coding table is provided in Appendix A.

2.3. Statistical analysis

2.3.1. Model specification

Because each dependent variable is an ordered categorical outcome ($Y \in \{1, 2, 3, 4, 5\}$), proportional odds (ordered logit) models were estimated, representing the standard analytical framework for ordinal Likert-type responses (McCullagh, 1980; Wooldridge, 2010). Each model posits a latent continuous propensity Y_i^* underlying the observed discrete response, structured as:

$$Y_i^* = \beta_1 \text{Ext}_i + \beta_2 \text{Agr}_i + \beta_3 \text{Con}_i + \beta_4 \text{Neu}_i + \beta_5 \text{Ope}_i + \boldsymbol{\delta}' \mathbf{X}_i + \mu_{d(i)} + \varepsilon_i, \quad (1)$$

where $\text{Ext}_i, \dots, \text{Ope}_i$ denote the standardised Big Five z -scores; \mathbf{X}_i is the vector of sociodemographic controls; $\mu_{d(i)}$ captures district fixed effects; and ε_i is independently and identically distributed as standard logistic. The observed outcome is generated by four estimated threshold parameters $\alpha_1 < \alpha_2 < \alpha_3 < \alpha_4$ such that $Y_i = j$ if and only if $\alpha_{j-1} < Y_i^* \leq \alpha_j$. For each of the eight park-type outcomes, we estimated two nested models: (a) a *trait-only* specification including only the five personality z -scores, isolating the raw personality signal; and (b) a *full* specification augmenting (a) with all sociodemographic controls and district fixed effects. Comparing coefficients across specifications (a) and (b) indicates the extent to which personality associations are confounded by observed demographic characteristics or district-level heterogeneity.

2.3.2. Average marginal effects

Ordered logit coefficients are expressed in log-odds units and are not directly interpretable in probability terms. To quantify key associations on

a probability scale, average marginal effects (AME) on $\Pr(Y = 5)$ were computed for the two principal outcomes, (1) Quiet parks and (2) Popular parks, which together represent the core restorative-social contrast within the PSD framework (Grahn and Stigsdotter, 2010; Stigsdotter and Grahn, 2011). AME for the remaining six outcomes are reported in Appendix Figure A1 for completeness; the patterns are qualitatively consistent with the log-odds coefficients in Table 3. Following Wooldridge (2010), the AME of personality trait k is defined as:

$$\text{AME}_k = \frac{1}{N} \sum_{i=1}^N \frac{\partial \Pr(Y_i = 5 \mid \mathbf{z}_i, \mathbf{X}_i)}{\partial z_{ik}}, \quad (2)$$

where the partial derivative is evaluated at each respondent’s observed covariate profile and then averaged across the full sample. The AME thus quantifies the average percentage-point change in the probability of the strongest preference ($Y = 5$) associated with a one-standard-deviation increase in trait k , holding all other covariates at their observed values. Confidence intervals are computed via the delta method.

2.3.3. Multiple testing

Estimating the associations of five personality traits with eight park-type outcomes yields 40 simultaneous hypothesis tests in the full-model specification, substantially elevating the risk of false positives. Rather than applying a single formal correction (which would substantially reduce statistical power given the directional hypotheses and the correlated structure of outcomes), we adopt a pattern-consistency approach: a finding is treated as credible only when the sign and approximate significance of a coefficient are replicated across both the trait-only and full models, and across the

ordered logit and ordered probit specifications (Section 2.3.4). Coefficients attaining marginal significance ($0.01 < p < 0.05$) in only one specification are explicitly flagged and interpreted with caution.

2.3.4. Robustness checks

Two complementary sets of checks validate the primary estimates. First, we re-estimated all focal-outcome models using an *ordered probit* (cumulative normal link) specification to verify robustness to the logistic distributional assumption; sign patterns and significance rankings were compared across specifications. Because the logistic and normal distributions differ in scale ($\sigma_{\text{logistic}}/\sigma_{\text{normal}} \approx 1.814$), probit coefficients are expected to be proportionally smaller in absolute value but fully consistent in direction and rank order. Second, we assessed the adequacy of the proportional odds (parallel lines) assumption, which requires covariate effects to be constant across all response thresholds, via an approximate Wald test comparing coefficient vectors estimated at each cumulative binary split (Greene, 2012). Outcomes for which the test fails to reject the null of parallel slopes ($p > 0.05$) are treated as conforming to the standard ordered logit; for outcomes where departures are detected, their magnitude and implications for inference are documented.

3. Results

3.1. Descriptive statistics and reliability

Table 1 presents descriptive statistics for all key variables. Panel A reports big five personality traits as standardised z -scores (mean = 0, $SD \approx 1$); Distributions are approximately symmetric but differ in range.

Agreeableness shows a longer left tail (min = -4.19) whereas neuroticism has a longer right tail (max = 2.78). Panel B reports sociodemographic characteristics. The sample is predominantly young (mean age ≈ 32 years, $SD = 9.6$), 41.4% male, and 94.2% hold senior high school qualifications or above. Approximately one-third (33.3%) reported household income exceeding 200k CNY, 41.0% were married, and 95.7% rated their health as fair or above. Hangzhou natives constituted 46.2% of the sample, with migrants comprising the remaining 53.8%.

Table 1. Descriptive statistics of key variables ($N = 2000$).

Variable	Description	Mean	SD	Min	Max
<i>Panel A: Big Five personality traits (standardized z-scores)</i>					
Extraversion	z-score of 4 BFI-20 items	0.0000	1.0003	-3.2287	2.0516
Agreeableness	z-score of 4 BFI-20 items	0.0000	1.0003	-4.1931	1.5335
Conscientiousness	z-score of 4 BFI-20 items	0.0000	1.0003	-3.9245	1.8772
Neuroticism	z-score of 4 BFI-20 items	0.0000	1.0003	-2.1224	2.7838
Openness	z-score of 4 BFI-20 items	0.0000	1.0003	-3.7251	1.7083
<i>Panel B: Control variables</i>					
Age	Years (2024 – birth year)	32.3455	9.5892	21.00	71.00
Gender	1 = male, 0 = female	0.4140	0.4927	0.00	1.00
Education	1 = senior high or above, 0 = otherwise	0.9415	0.2347	0.00	1.00
Income	1 = household \geq 200k CNY, 0 = otherwise	0.3330	0.4714	0.00	1.00
Marriage	1 = married, 0 = unmarried	0.4095	0.4919	0.00	1.00
Health	1 = fair/good/excellent, 0 = poor	0.9570	0.2029	0.00	1.00
Hangzhou native	1 = native resident, 0 = migrant	0.4615	0.4986	0.00	1.00

Table 2 summarises the internal consistency of BFI-20 subscales. Cronbach’s α ranged from 0.66 (conscientiousness) to 0.82 (openness); McDonald’s ω estimates were comparable or marginally higher, confirming accept-

able to good reliability for the short-form instrument.

Table 2. Internal consistency of BFI-20.

Trait	Items	Cronbach's α	McDonald's ω
Extraversion	4	0.725	0.753
Agreeableness	4	0.783	0.793
Conscientiousness	4	0.661	0.703
Neuroticism	4	0.726	0.749
Openness	4	0.817	0.818

3.2. Baseline distributions and bivariate associations

Figure 1 displays stacked bar charts of Likert responses for the eight preference items. Responses are generally right-skewed, but the degree of skew varies across typologies. Quiet/serene parks and spacious parks attract the strongest overall agreement, whereas popular/social parks and unmanaged/nature parks show more dispersed distributions, indicating greater heterogeneity in demand for these attributes.

Figure 2 presents Spearman rank correlations (ρ) between the five personality traits and eight preference items. Extraversion is negatively correlated with quiet parks ($\rho < 0$) and positively correlated with popular parks ($\rho > 0$), foreshadowing the contrasting regression results. Agreeableness and openness are broadly positively correlated with most park types, suggesting a general pro-environmental orientation, whereas neuroticism shows weaker and more variable associations. These patterns provide preliminary support for the hypothesised trait-preference relationships but do not account for confounders, motivating the multivariate analyses below.

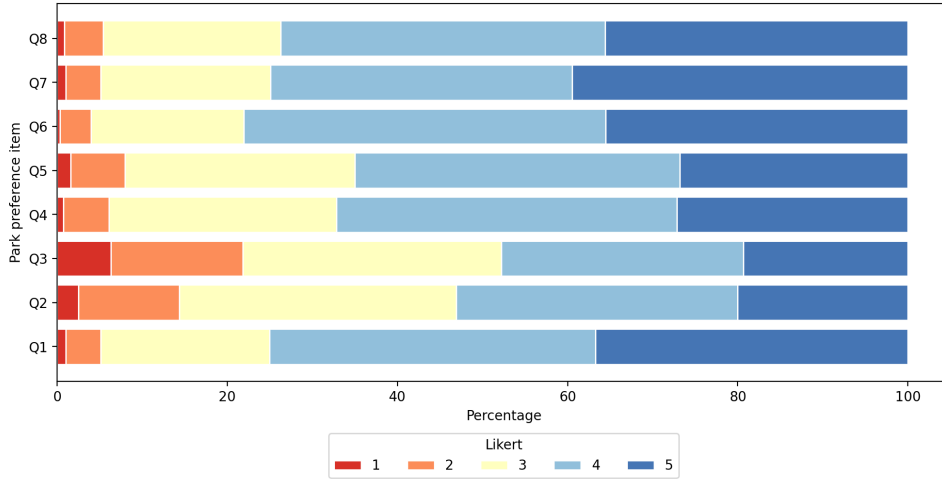


Figure 1. Stacked response distributions for all eight park-type preference items (Q1–Q8, rated on a 1–5 Likert scale), with darker shades indicating higher agreement.



Figure 2. Spearman rank correlations (ρ) between big five personality traits and park-type preference items (Q1–Q8), with cells shaded by correlation strength.

3.3. Ordered logit models

Table 3 reports ordered logit coefficients (log-odds) for all eight park-type outcomes. Columns labelled ‘a’ correspond to the personality-only specification; columns labelled ‘b’ incorporate sociodemographic controls and district fixed effects. All 16 models are jointly significant (χ^2 test, $p < 0.001$); pseudo- R^2 values range from 0.023 (nature, personality only) to 0.104 (spacious, full model).

Personality traits. Three broad patterns emerge across the eight outcomes. First, *extraversion* shows a distinctive bipolar profile and is the only trait that switches sign between park types, being strongly negatively associated with quiet parks ($\beta = -0.41$, $p < 0.001$; Model 1b) yet positively associated with popular parks ($\beta = +0.29$, $p < 0.001$; Model 2b). Importantly, extraversion’s negative associations extend well beyond the quiet–popular contrast. Extraversion is also significantly negative for spacious ($\beta = -0.15$, $p < 0.01$), biodiverse ($\beta = -0.21$, $p < 0.001$), and prospect ($\beta = -0.19$, $p < 0.001$) parks, indicating that high-extraversion individuals show reduced preference for the majority of non-social park typologies. This contrast is consistent with the trait’s theoretical link to sensation-seeking and sociability, and it is robust to the inclusion of controls. Second, *agreeableness* is the strongest and most consistent predictor, with uniformly positive and highly significant coefficients across all eight outcomes (β ranging from +0.31 to +0.75, all $p < 0.001$). This suggests a generalized positive orientation toward green-space amenities among agreeable individuals, possibly reflecting prosocial engagement and environmental concern. Third, *openness* is broadly positive and significant for all eight outcomes, with the largest effect on quiet parks ($\beta = +0.42$, $p < 0.001$). Conscientiousness

shows significant positive associations across all eight outcomes (all $p < 0.01$ or better), while neuroticism is significant for social, nature, culture, refuge, and marginally for spacious ($\beta = +0.084$, $p < 0.05$) outcomes, but not for quiet, biodiverse, or prospect parks. The null association between neuroticism and quiet-park preference ($\beta = +0.004$, $p = 0.94$) is noteworthy given the strong *a priori* prediction from SRT and ART that stress-prone individuals should seek restorative environments; we return to this finding in the Discussion.

Personality-trait coefficients are substantively stable across specifications (comparing ‘a’ and ‘b’ columns), indicating that personality-preference associations are not confounded by observed demographic characteristics or district-level heterogeneity. Given the 40 personality-coefficient tests, the marginally significant neuroticism effects (e.g., $p = 0.04$ for spacious) should be interpreted cautiously in light of potential Type I error inflation (see Section 2.3.3).

Control variables. Among the sociodemographic covariates, gender emerges as the most frequently significant predictor. Males are less likely to prefer quiet ($\beta = -0.33$, $p < 0.001$), artistic ($\beta = -0.27$, $p < 0.001$), biodiverse ($\beta = -0.33$, $p < 0.001$), prospect ($\beta = -0.22$, $p < 0.01$), and spacious parks ($\beta = -0.39$, $p < 0.001$), but more likely to prefer unmanaged/natural parks ($\beta = +0.30$, $p < 0.001$). Self-rated health is strongly negatively associated with quiet-park preference ($\beta = -0.82$, $p < 0.001$). The Hangzhou-native indicator is significantly negative for quiet parks ($\beta = -0.20$, $p < 0.01$), biodiverse parks ($\beta = -0.19$, $p < 0.01$), and for prospect parks ($\beta = -0.16$, $p < 0.05$), indicating that migrants express stronger preferences for these park types than native residents.

Several additional control-variable findings merit attention. Age is positively associated with preference for quiet parks ($\beta = +0.013$, $p < 0.01$) and prospect parks ($\beta = +0.018$, $p < 0.001$). Married respondents express significantly lower preference for quiet ($\beta = -0.32$, $p < 0.001$) and prospect parks ($\beta = -0.31$, $p < 0.001$) relative to unmarried individuals, possibly reflecting life-course constraints on discretionary leisure time or a shift toward family-oriented outdoor activities. Higher household income is negatively associated with preference for popular parks ($\beta = -0.18$, $p < 0.01$), suggesting that socioeconomic position differentiates demand for socially dense versus exclusive recreational settings. Education is significant only for prospect parks ($\beta = +0.45$, $p < 0.01$), where higher education predicts stronger preference for open, panoramic green spaces.

Table 3. Ordered logit results for all eight park-type preference outcomes, where columns labelled ‘a’ report the personality-only specification and columns labelled ‘b’ the full model with sociodemographic controls and district fixed effects.

Variable	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)	(5a)	(5b)	(6a)	(6b)	(7a)	(7b)	(8a)	(8b)
extraversion	-0.4342*** (0.0618)	-0.4113*** (0.0629)	+0.2969*** (0.0587)	+0.2893*** (0.0596)	+0.0112 (0.0581)	+0.0095 (0.0589)	-0.0745 (0.0593)	-0.0685 (0.0602)	-0.0883 (0.0588)	-0.0742 (0.0595)	-0.1620*** (0.0606)	-0.1453** (0.0617)	-0.2137*** (0.0611)	-0.2082*** (0.0621)	-0.2097*** (0.0601)	-0.1909*** (0.0610)
agreeableness	+0.7340*** (0.0678)	+0.7473*** (0.0688)	+0.3467*** (0.0645)	+0.3554*** (0.0651)	+0.3095*** (0.0632)	+0.3089*** (0.0638)	+0.5131*** (0.0672)	+0.4948*** (0.0678)	+0.4879*** (0.0662)	+0.4837*** (0.0665)	+0.6974*** (0.0689)	+0.6915*** (0.0696)	+0.6927*** (0.0680)	+0.6951*** (0.0690)	+0.7531*** (0.0683)	+0.7455*** (0.0688)
conscientiousness	+0.2501*** (0.0622)	+0.2621*** (0.0635)	+0.1962*** (0.0595)	+0.1782*** (0.0604)	+0.1063* (0.0585)	+0.1217** (0.0594)	+0.2324*** (0.0618)	+0.2509*** (0.0629)	+0.1935*** (0.0605)	+0.1839*** (0.0614)	+0.2312*** (0.0624)	+0.2382*** (0.0634)	+0.2215*** (0.0620)	+0.2147*** (0.0631)	+0.1925*** (0.0615)	+0.1927*** (0.0625)
neuroticism	+0.0459 (0.0490)	+0.0040 (0.0500)	+0.1860*** (0.0475)	+0.2029*** (0.0484)	+0.1884*** (0.0470)	+0.1993*** (0.0479)	+0.1926*** (0.0481)	+0.1682*** (0.0490)	+0.1456*** (0.0473)	+0.1339*** (0.0482)	+0.1166** (0.0496)	+0.0840* (0.0505)	+0.0155 (0.0490)	-0.0039 (0.0500)	+0.0831* (0.0485)	+0.0652 (0.0495)
openness	+0.4224*** (0.0594)	+0.4224*** (0.0612)	+0.1444** (0.0562)	+0.1785*** (0.0579)	+0.1609*** (0.0559)	+0.1579*** (0.0574)	+0.3364*** (0.0581)	+0.3557*** (0.0600)	+0.3241*** (0.0573)	+0.3259*** (0.0588)	+0.3330*** (0.0594)	+0.3336*** (0.0613)	+0.2978*** (0.0591)	+0.3193*** (0.0610)	+0.2319*** (0.0588)	+0.2264*** (0.0605)
age		+0.0131** (0.0062)		-0.0024 (0.0058)		-0.0061 (0.0057)		+0.0040 (0.0060)		+0.0084 (0.0060)		+0.0104* (0.0063)		+0.0066 (0.0062)		+0.0182*** (0.0061)
education		-0.0292 (0.2004)		-0.3021 (0.1870)		+0.0383 (0.1832)		-0.1806 (0.1971)		+0.2118 (0.1917)		+0.1893 (0.1987)		-0.0272 (0.1969)		+0.4465** (0.1957)
gender		-0.3269*** (0.0883)		+0.0186 (0.0845)		+0.2996*** (0.0832)		-0.2745*** (0.0867)		-0.0562 (0.0853)		-0.3905*** (0.0887)		-0.3253*** (0.0880)		-0.2226** (0.0876)
income		-0.0244 (0.0938)		-0.1836** (0.0905)		-0.0509 (0.0895)		-0.0578 (0.0919)		+0.0082 (0.0911)		-0.0259 (0.0949)		-0.1056 (0.0939)		+0.0059 (0.0932)
marriage		-0.3215*** (0.1137)		+0.1694 (0.1080)		+0.1232 (0.1073)		-0.0324 (0.1112)		-0.0113 (0.1096)		-0.2140* (0.1153)		-0.0314 (0.1129)		-0.3109*** (0.1125)
health		-0.8194*** (0.2406)		+0.3092 (0.2157)		+0.0649 (0.2157)		-0.3006 (0.2172)		-0.0771 (0.2171)		-0.3980* (0.2291)		-0.1255 (0.2282)		-0.1788 (0.2259)
hangzhou		-0.1981** (0.0903)		-0.0602 (0.0871)		+0.0577 (0.0853)		-0.0448 (0.0888)		-0.0977 (0.0880)		-0.1185 (0.0910)		-0.1872** (0.0907)		-0.1615* (0.0896)
District	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
/																
cut1	-5.0791	-5.9020	-3.9637	-4.0586	-2.8080	-2.8228	-5.2757	-5.9606	-4.4446	-4.0804	-6.1786	-6.3720	-5.0621	-5.1106	-5.2137	-4.5506
cut2	0.5419	0.5471	0.6622	0.6696	0.3598	0.3656	0.7924	0.7919	0.5422	0.5437	0.9390	0.9390	0.5469	0.5473	0.6842	0.6900
cut3	0.7313	0.7426	0.6118	0.6195	0.3531	0.3642	0.8055	0.8118	0.6989	0.7080	0.7600	0.7712	0.7219	0.7262	0.7162	0.7284
cut4	0.6747	0.6945	0.5398	0.5471	0.3539	0.3609	0.6735	0.6887	0.6118	0.6220	0.7943	0.8096	0.5909	0.6038	0.6407	0.6519
N	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
r2_p	0.092464	0.102780	0.057814	0.062836	0.023371	0.027802	0.073844	0.081301	0.061675	0.066497	0.095622	0.103692	0.086079	0.092137	0.081313	0.087563
chi2	456.447050	507.371847	323.329949	351.417209	140.354368	166.962472	374.115959	411.894835	324.505513	349.879189	451.432274	489.532679	424.706792	454.594807	404.392586	435.478841
p	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

3.4. Average marginal effects for key outcomes

Ordered logit coefficients are expressed in log-odds units and do not permit direct probability-scale interpretation. Average marginal effects (AME) on $\Pr(Y = 5)$, the probability of reporting the highest preference rating, were therefore computed for the two focal outcomes representing the core restorative-social contrast. Each AME quantifies the average percentage-point change in $\Pr(Y = 5)$ associated with a one-standard-deviation increase in each trait at observed covariate values (Eq. 2). AME for all eight outcomes are provided in Supplementary Figure A1.

3.4.1. Quiet parks/green spaces (*Serene*)

Figure 3 displays the AME for quiet parks. Extraversion has the largest negative marginal effect. A one-*SD* increase in extraversion reduces the probability of strongly preferring quiet parks by approximately 6–8 percentage points (AME < 0, $p < 0.001$). In contrast, agreeableness (AME > 0, $p < 0.001$) and openness (AME > 0, $p < 0.001$) are associated with substantial increases in strong preference. Conscientiousness shows a modest positive effect, while neuroticism is not statistically significant. These results indicate that quiet, restorative green spaces are disproportionately preferred by individuals low in extraversion and high in agreeableness and openness, consistent with elevated needs for cognitive restoration and aesthetic experience.

3.4.2. Popular (crowded) parks/green spaces (*Social*)

Figure 4 presents the AME for popular parks. In a mirror image of the quiet-park results, extraversion now shows a significant positive marginal effect (AME > 0, $p < 0.001$). A one-*SD* increase in extraversion raises

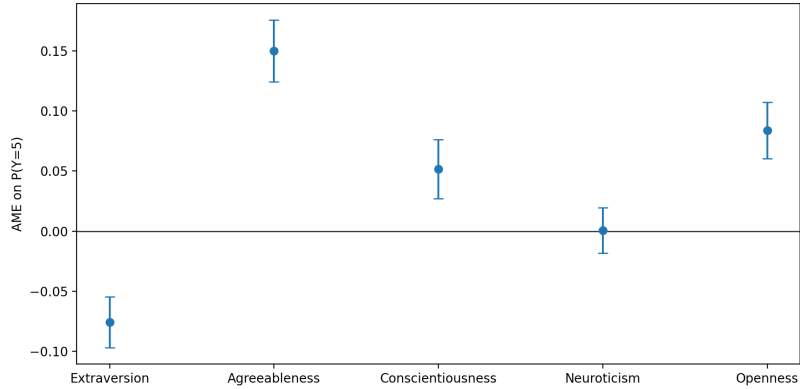


Figure 3. Average marginal effects (AME) on $\Pr(Y = 5)$ for quiet parks of a one- SD increase in each big five trait, with error bars showing 95% delta-method confidence intervals.

the probability of strongly preferring popular parks by approximately 4–6 percentage points. Agreeableness again shows a significant positive effect, consistent with a general prosocial orientation that values both quiet *and* social green spaces. Neuroticism emerges as a significant positive predictor for this outcome ($p < 0.001$), suggesting that individuals higher in emotional instability may also seek out stimulating, crowded environments—possibly as a form of social coping or distraction from negative affect. The contrasting AME profiles for outcomes (1) and (2) provide probability-scale evidence for the extraversion-stimulation hypothesis and highlight the planning relevance of maintaining both restorative and social park typologies within urban green infrastructure.

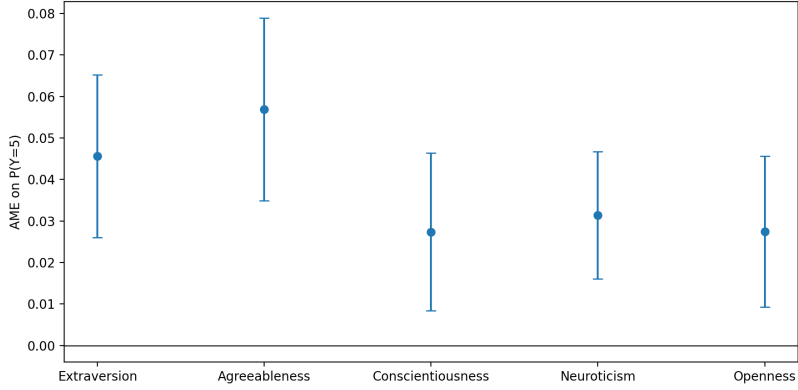


Figure 4. Average marginal effects (AME) on $\Pr(Y = 5)$ for popular parks of a one- SD increase in each big five trait, with error bars showing 95% confidence intervals.

3.5. Robustness checks

3.5.1. Ordered probit re-estimation

To assess sensitivity to the logistic distributional assumption, the full models for the two focal outcomes were re-estimated using an ordered probit (cumulative normal) link function. Table A3 in Appendix A presents both sets of big five coefficients. Across all ten trait-outcome pairs, sign, relative magnitude, and significance are preserved. Extraversion remains strongly negative for quiet parks ($\beta_{\text{probit}} = -0.23$, $p < 0.001$) and positive for popular parks ($\beta_{\text{probit}} = +0.16$, $p < 0.001$), and agreeableness retains the largest positive coefficient in both outcomes. Probit estimates are uniformly smaller in absolute value, consistent with the logistic-to-normal scale factor ($\sigma_{\text{logistic}}/\sigma_{\text{normal}} \approx 1.8$), confirming that personality-preference associations are robust to the choice of link function.

3.5.2. Proportional odds (parallel lines) diagnostic

The ordered logit model assumes that the effect of each covariate is constant across all cumulative splits of the ordinal outcome (the proportional odds or parallel-lines assumption). Violation of this assumption would imply that a predictor affects transitions between low and high response categories differently. The assumption was evaluated by fitting cumulative binary logit models at each response threshold and comparing coefficient vectors via an approximate Wald test. Table 4 reports results for three selected outcomes. For all three outcomes (popular, culture, and prospect), the Wald test fails to reject the null of parallel slopes ($p > 0.35$), supporting the adequacy of the standard ordered logit. For remaining outcomes, departures from proportionality are acknowledged as a limitation for future investigation.

Table 4. Approximate parallel-lines (proportional odds) Wald test for selected outcomes.

DV	Wald statistic	df	p
(2) Popular	16.1218	15	0.3740
(4) Culture	8.1400	15	0.9180
(8) Prospect	16.3800	15	0.3573

4. Discussion

4.1. Summary of main findings

Across model specifications, personality traits exhibit systematic and differentiated associations with park-type preferences. In summary, extraversion uniquely reverses sign across park typologies, agreeableness is the

strongest and most consistent predictor, openness and conscientiousness are uniformly positive, and neuroticism shows a null effect for quiet-park preference contrary to stress recovery theory and attention restoration theory predictions (Ulrich, 1984; Kaplan, 1995; Yao et al., 2021). These patterns are broadly consistent with research demonstrating that personality shapes differential greenspace evaluation and use (Chen et al., 2021; Wang et al., 2024a), while the concurrent multi-typology design of the present study advances prior single-outcome analyses by revealing structurally differentiated rather than uniformly valenced personality effects. The breadth of extraversion’s negative associations across low-stimulation typologies is consistent with niche-picking theory (Scarr and McCartney, 1983; Götz et al., 2020), whereby individuals differentially gravitate toward environments that match their characteristic stimulation preferences; the critical dimension appears to be social density, as extraversion is negative across all park types characterised by low social affordance regardless of their specific ecological or aesthetic features.

The agreeableness pattern is interpretable through convergent evidence linking this trait to pro-environmental attitudes (Hirsh, 2010), nature relatedness (Nisbet et al., 2009), and engagement with restorative green settings (Yang et al., 2025), suggesting it encodes a generalised orientation toward shared green resources that extends uniformly across diverse park typologies. Openness and conscientiousness each show broad positive effects: openness aligns with its established role as the primary personality predictor of nature relatedness (Nisbet et al., 2009), while the positive associations of conscientiousness are consistent with the trait’s role in motivating structured, health-promoting outdoor activity in urban greenspace contexts

(Feng et al., 2022). The null association between neuroticism and quiet-park preference is corroborated by Sella et al. (2023), who likewise found neuroticism unrelated to perceived restorativeness during garden exposure; these converging null findings across two distinct methodological designs jointly challenge the assumption that stress-prone individuals preferentially seek quiet restorative environments, a discrepancy explored further in Section 4.2. These results are robust to ordered probit re-estimation and stable across model specifications.

4.2. Interpretation and potential mechanisms

One interpretation is that park types differ in their dominant affordances (restoration vs. social interaction), and individuals self-select into environments that fit their preferences and typical activity patterns. For example, restorative environments are theorized to support stress reduction and attentional recovery (Ulrich, 1984; Kaplan, 1995; Yao et al., 2021; Huang et al., 2021). Individuals higher in extraversion tend to prefer more socially engaging and stimulating environments (Matz and Harari, 2021). In environmental contexts, personality traits also shape the perceived qualities and restorative potential of public and natural settings (Sella et al., 2023; Wang et al., 2024a). Against this background, the negative association between extraversion and quiet parks may reflect a broader tendency away from low-stimulation environments rather than a specific aversion to quietness alone. The additional negative associations with spacious, bio-diverse, and prospect-dominated park typologies are consistent with this interpretation, although evidence for these specific environmental qualities remains more indirect (Senese et al., 2019; Sella et al., 2023). Meanwhile,

agreeableness may reflect a broader pro-social orientation and comfort in shared spaces, consistent with its positive associations across multiple park typologies (Yang et al., 2025).

The null association between neuroticism and quiet-park preference warrants careful interpretation, as stress recovery theory and attention restoration theory generate a strong prediction that stress-prone individuals should gravitate toward restorative environments (Ulrich, 1984; Kaplan, 1995; van den Berg et al., 2010; Wang et al., 2024a). Several non-mutually-exclusive explanations may account for this result. First, elevated neuroticism may simultaneously increase the desire for restorative quiet and the avoidance of unfamiliar or isolated outdoor settings, producing offsetting effects that cancel at the population level. Second, the restorative benefits of green space may operate primarily through unconscious psychophysiological pathways (Bratman et al., 2019; Yao et al., 2021) rather than through conscious stated preference, such that neurotic individuals benefit from quiet parks without explicitly preferring them. Third, neuroticism's significant positive associations with nature, culture, and refuge parks suggest that stress-prone individuals do seek specific environmental qualities, including enclosure, sensory richness, and cultural familiarity, but not the sparse, open quietness captured by the serene dimension (Feng et al., 2022). Future research using experience-sampling or physiological measures may disentangle these competing mechanisms.

The control variable results also offer substantive insights. Since good health status is coded as 1 for self-reported good health, the negative coefficient implies that individuals in poorer health show a stronger preference for quiet parks, suggesting they place greater value on restorative environments.

This pattern is consistent with stress recovery theory, which posits that natural settings can facilitate recovery from stress, as well as with evidence that quiet and acoustically favorable green environments are perceived as more restorative (Uebel et al., 2021; Berto, 2014; Yakınlr and Akpınar, 2022). Gender differences were observed in preferences for different park typologies (Braçe et al., 2021). These differences may be partly related to gendered perceptions of safety, comfort, and restoration (Lis et al., 2019). The Hangzhou-native variable reveals that migrants express somewhat stronger preferences for quiet and biodiverse parks. This finding resonates with a growing body of literature on migrants' greenspace experiences. Rishbeth and Finney (2006) found that refugees actively seek out natural elements reminiscent of their former homes, with memory and nostalgia playing a central role in how migrants engage with urban greenspaces. In the Chinese context, Zhang et al. (2022) demonstrated that urban green space can alleviate homesickness among relocated rural migrants, with naturalistic and suburban green spaces providing the strongest restorative effects. Similarly, Wang et al. (2024b) reported that rural-to-urban migrants in China exhibit a stronger preference for wild, biodiverse green spaces and recommended that local authorities promote the restoration and construction of such spaces to enhance migrants' place sentiment. These findings suggest that migrants' heightened preference for quiet and biodiverse parks may stem from a combination of nostalgia for rural natural environments and greater restorative needs arising from the psychological stress of relocation and cultural displacement (Edge et al., 2023).

Age and marital status emerge as additional structuring variables. Older respondents show significantly stronger preferences for quiet and prospect

parks, consistent with life-course transitions toward lower-arousal leisure and with prior evidence that older adults derive disproportionate wellbeing benefits from naturalistic, contemplative green settings (Ode Sang et al., 2016). The negative marriage coefficients for quiet and prospect parks may reflect time-budget constraints, as married individuals, particularly those with dependent children, may have less discretionary time for solitary contemplation and may instead gravitate toward family-friendly, multi-use park environments. Higher household income is associated with lower preference for popular (crowded) parks, suggesting that socioeconomic position differentiates not merely access to, but also demand for, different park typologies (Wolch et al., 2014; Rigolon, 2016). This finding aligns with environmental justice scholarship documenting that lower-income communities are often served predominantly by smaller, higher-density parks that afford fewer opportunities for solitary recreation (Mitchell and Popham, 2008). Taken together, the control variable findings reveal that preferences for park typologies are structured by a broad set of sociodemographic factors, including health status, gender, migration background, age, marital status, and household income, reinforcing the need to move beyond aggregate green-space provision metrics toward typology-sensitive planning that accounts for the full heterogeneity of urban populations.

4.3. Planning implications

The results support planning strategies that treat urban green infrastructure as a portfolio of complementary typologies rather than a single generic park type. Planners should maintain or create quiet, low-stimulation green spaces (e.g., small neighborhood parks, contemplative gardens, shaded

walking loops) that can serve restorative needs (Yao et al., 2021; Berto, 2014), while also providing social and activity-oriented parks (e.g., plazas, event lawns, sports and group-activity areas) that support interaction and higher stimulation (Matz and Harari, 2021). Embedding micro-zoning within parks (quiet sub-areas separated from activity nodes) can reduce conflict between user groups and accommodate heterogeneous preferences (Sella et al., 2023).

Beyond typological diversity, planning should also respond to the demographic heterogeneity of park users. Age-friendly design elements (seating, shade, accessible paths, panoramic viewpoints) should be prioritized in neighbourhoods with ageing populations, given that older adults express significantly stronger preferences for quiet and prospect-oriented green spaces (Ode Sang et al., 2016). Lower-income districts should receive not only sufficient park acreage but also typological diversity, as higher-income residents are less reliant on popular (crowded) public parks and lower-income communities may bear disproportionate costs from a narrow typological supply (Rigolon, 2016). Gender-responsive design features (improved lighting, clear sightlines, perceived safety cues) should be incorporated across park typologies, as gender differences in green space perceptions relate to feelings of safety, comfort, and restoration (Braçe et al., 2021; Lis et al., 2019). Finally, quiet and biodiverse park typologies should be preserved or created in neighbourhoods with high migrant populations, as migrants show consistently stronger preferences for these typologies, consistent with theories of environmental nostalgia and heightened restorative needs (Zhang et al., 2022; Wang et al., 2024b). These recommendations align with the broader literature emphasizing heterogeneous well-being benefits and the need for

inclusive, typology-sensitive green infrastructure planning (Keniger et al., 2013; Nieuwenhuijsen, 2021; Wang et al., 2024a).

4.4. Limitations and future research

Three methodological limitations bear on the interpretation of the present findings. First, the cross-sectional design and reliance on stated preferences preclude causal inference. Reverse causality cannot be excluded, as habitual park use may itself reinforce or modify personality expression over time, and longitudinal or quasi-experimental designs would be better placed to evaluate this alternative account. Second, the proportional odds assumption was formally tested for only three of the eight park-type outcomes (Table 4), and for the remaining outcomes departures from proportionality may exist, which could be addressed in future work using partial proportional odds or multinomial logit models. Third, although consistent cross-model patterning provides partial protection against spurious discovery, a formal multiple-testing correction was not applied across the 40 personality coefficients, and some associations should therefore be interpreted with appropriate caution.

Several directions for future research also emerge. Interaction effects between personality traits and demographic characteristics were not modeled in the present study, and whether the link between extraversion and park preference varies by gender or migrant status remains an open question that pre-specified subgroup analyses could productively address. Future studies would benefit from combining stated preferences with objective behavioral data, such as GPS-derived park visit frequency or physiological measures collected during actual park exposure, to assess the correspondence between expressed and enacted preference. Incorporating objective landscape met-

rics, such as tree canopy cover, ambient sound levels, and species richness, alongside personality assessments repeated at multiple time points would substantially strengthen the internal validity and long-term applicability of the present findings. A complete set of supplementary materials, including the full BFI-20 item wording, variable coding scheme, and additional regression tables, is provided in Appendix A to facilitate replication.

5. Conclusion

Across eight park typologies in Hangzhou, big five personality traits predict green-space preferences in a differentiated rather than uniformly valenced manner. Agreeableness and openness were each positively associated with most typologies, whereas extraversion negatively predicted preference for the full range of low-stimulation environments, including quiet, spacious, biodiverse, and prospect parks. The absence of a neuroticism effect on quiet-park preference, which conflicts with predictions from stress recovery theory and attention restoration theory, suggests that stress-prone individuals may not reliably translate restorative motivation into expressed preference and calls for follow-up using behavioral or physiological designs.

Health status, gender, migration background, age, marital status, and household income were each independently associated with park-type demand, indicating that personality is one of several overlapping axes of heterogeneity shaping urban green-space use. The stronger preference for quiet and biodiverse parks among migrants relative to Hangzhou natives aligns with accounts of environmental nostalgia and acculturative stress, and points to a user group whose green-space needs may be underweighted in planning practice. Taken together, the results suggest that incorporating

personality data alongside conventional sociodemographic indicators could strengthen the empirical basis for typology-sensitive green infrastructure provision. These results call for landscape planning practice to move beyond aggregate provision metrics toward user-profiled, typology-sensitive green-space portfolios that account for both psychological and sociodemographic dimensions of preference heterogeneity.

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Urban park-type preferences vary by personality traits: Evidence from Hangzhou, China

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