Cities

Spatial Personality and Leisure Facility Choice: How Big Five Traits Are Associated with Public Recreation Preferences in Hangzhou, China

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Abstract:	Urban leisure facility planning relies primarily on demographic variables to predict resident needs, overlooking the role of individual psychological differences. This study extends the concept of ``spatial personality''---the systematic influence of stable personality traits on preferences for physical spaces---from behavioural ecology to human leisure facility choice, testing its relevance using survey data from 2{,}000 Hangzhou residents. A 20-item Chinese-language personality measure adapted from the Big Five Inventory framework assessed extraversion, agreeableness, conscientiousness, neuroticism, and openness; multinomial logistic regression modelled preferences for five facility types. Results demonstrate that personality traits explain statistically significant but modest incremental variance in facility preference beyond demographics. Four of five facility types exhibit distinct personality profiles: social venues attract extraverts, cultural spaces attract individuals high in openness, home-based leisure associates with introversion, while sports facilities are driven by gender rather than personality and parks show a pattern confounded with acquiescence bias. However, acquiescence bias in personality measurement correlates strongly with agreeableness and openness (r = 0.80--0.84), precluding statistical correction and warranting cautious interpretation of findings involving these traits, particularly the openness--cultural space association. These findings suggest that facility-type allocation within 15-minute community life circles could potentially benefit from accounting for the psychological composition of local populations.

Cover letter

April 30, 2026

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Dear Sir or Madam Editor,

We are pleased to submit our manuscript entitled "Spatial Personality and Leisure Facility Choice: How Big Five Traits Are Associated with Public Recreation Preferences in Hangzhou, China" for consideration for publication in *Cities*.

This study bridges geographical psychology and urban facility planning by extending the concept of "spatial personality"—stable personality traits that systematically shape preferences for physical spaces—from behavioural ecology to human leisure facility choice. Using survey data from 2,000 Hangzhou residents, we examine how Big Five personality traits predict preferences for five types of public leisure facilities (parks, cultural venues, social spaces, sports facilities, and home-based leisure) through multinomial logistic regression.

Our key findings are: (1) personality traits explain significant incremental variance in facility preference beyond demographics; (2) social venues attract extraverts, cultural spaces attract individuals high in openness, and home-based leisure associates with introversion; (3) sports facility preference is driven by gender rather than personality, identifying an important boundary condition; and (4) acquiescence bias strongly confounds agreeableness and openness measurements, warranting cautious interpretation. These results suggest that facility-type allocation within 15-minute community life circles could potentially benefit from accounting for the psychological composition of local populations.

We believe this manuscript is well suited for *Cities* because it offers a novel psychological perspective on urban facility planning—a topic central to the journal's scope. The study addresses a critical gap between demand-oriented planning rhetoric, which relies solely on demographic variables, and the psychological heterogeneity that drives individual leisure preferences. The Chinese urban context, with its rapid adoption of the 15-minute community life circle concept, provides a timely and policy-relevant setting.

This manuscript has not been published and is not under consideration for publication elsewhere. All authors have approved the manuscript and agree with its submission to *Cities*. The study received ethics approval from the Medical Ethics Committee of Hangzhou City University (Approval No. HZCU2025-31). The manuscript contains approximately 8,000 words of main text, 5 figures, and 4 tables. All figures were

generated by the authors using the study's survey data; no third-party figures or images are included.

Sincerely yours,

Zeyu Cao

Highlights

- Big Five traits explain significant variance in leisure facility preferences.
- Social venues attract extraverts; home-based leisure associates with introversion.
- Sports facility preference is driven by gender rather than personality traits.
- Acquiescence bias strongly confounds agreeableness and openness findings.
- Spatial personality extends geographical psychology to urban facility planning.

Spatial Personality and Leisure Facility Choice: How Big Five Traits Are Associated with Public Recreation Preferences in Hangzhou, China

Abstract

Urban leisure facility planning relies primarily on demographic variables to predict resident needs, overlooking the role of individual psychological differences. This study extends the concept of "spatial personality"—the systematic influence of stable personality traits on preferences for physical spaces—from behavioural ecology to human leisure facility choice, testing its relevance using survey data from 2,000 Hangzhou residents. A 20-item Chinese-language personality measure adapted from the Big Five Inventory framework assessed extraversion, agreeableness, conscientiousness, neuroticism, and openness; multinomial logistic regression modelled preferences for five facility types. Results demonstrate that personality traits explain statistically significant but modest incremental variance in facility preference beyond demographics. Four of five facility types exhibit distinct personality profiles: social venues attract extraverts, cultural spaces attract individuals high in openness, home-based leisure associates with introversion, while sports facilities are driven by gender rather than personality and parks show a pattern confounded with acquiescence bias. However, acquiescence bias in personality measurement correlates strongly with agreeableness and openness ($r = 0.80$–0.84), precluding statistical correction and warranting cautious interpretation of findings involving these traits, particularly the openness–cultural space association. These findings suggest that facility-

type allocation within 15-minute community life circles could potentially benefit from accounting for the psychological composition of local populations.
Keywords: Spatial personality, Big Five traits, Leisure facility preference, Public service facility planning, 15-minute community life circle, Person–environment fit

1. Introduction

Imagine two residents of the same neighbourhood: both are 28-year-old women with similar incomes and education levels, yet one spends her weekends in cafés and community markets while the other prefers solitary walks in the park. Traditional urban planning frameworks cannot distinguish between them because their demographic profiles are identical. What helps explain their different preferences is not only *who* they are in sociodemographic terms, but partially *how* they psychologically engage with physical space—a phenomenon that behavioural ecologists have termed "spatial personality" [1] and that we extend here from animal movement ecology to human leisure facility choice.

Urban leisure facility planning has undergone a paradigm shift from supply-oriented standards toward demand-oriented approaches that center resident preferences [2, 3, 4]. The 15-minute community life circle concept, now adopted in cities worldwide, exemplifies this shift by emphasizing that essential services—including leisure facilities—should be accessible within a short walk from home [2]. Empirical assessments in cities from Barcelona [4] to Nanjing [5] and Wuhan [6] have quantified accessibility gaps and supply–demand mismatches in park and green space provision,

revealing substantial inequities even within well-served cities. In China, the State Council's 2021 guidelines explicitly incorporate leisure facilities as a core component of 15-minute community life circles, requiring that public recreation spaces be planned to serve local populations [5]. Yet despite this demand-oriented rhetoric, the "demand" side remains narrowly operationalized through demographic variables—age, gender, income, and education—that capture only population-level tendencies and overlook the psychological heterogeneity driving individual preferences [5, 3, 7, 8].

This oversight is striking because personality psychology has established that stable individual traits systematically shape how people select, experience, and benefit from leisure activities. Research consistently links extraversion to preference for social and physically active leisure [9], openness to aesthetic and cultural pursuits [10], and neuroticism to avoidance of stimulating environments [11]. Cross-cultural evidence confirms these associations: Yang et al. [12] found that Chinese and American older adults exhibit systematically different leisure activity patterns shaped by cultural values, while a scoping review by Chen [13] examined Big Five–quality of life research in China and identified personality–environment interactions as a key frontier. These patterns suggest that the match between personality and leisure environment matters for well-being, consistent with person–environment fit theory which posits that congruence between individual characteristics and environmental features promotes satisfaction and psychological health [14, 15, 16].

The emerging field of geographical psychology reinforces this perspective by demonstrating that personality traits are spatially clustered and that person–environment interactions shape well-being outcomes across geo-

graphic contexts [17, 18, 19]. Large-scale cross-cultural studies have mapped personality profiles across 36 cultures, revealing systematic geographic variation in trait distributions [20]. Spatial analytical methods have confirmed that these regional personality differences are robust across the United States and Germany [21]. Several lines of evidence further support the geographic relevance of personality: the fit between individual and regional personality profiles predicts life satisfaction [15]; personality–well-being associations vary across neighbourhoods within the same city [22]; and geographically clustered personality traits help explain urban economic growth beyond standard determinants [23]. In the Chinese context, Obschonka et al. [24] demonstrated that regional personality profiles across 44 Chinese cities—including indigenous Confucian traits—predict entrepreneurial activity, confirming that personality geography extends beyond Western contexts. These findings converge on a fundamental insight: the psychological characteristics of individuals interact with features of the local environment in consequential ways [19].

However, three critical gaps separate these psychological insights from planning practice. First, the personality–leisure behaviour literature resides almost exclusively in psychology journals and has never been systematically integrated into urban planning discourse. Second, existing evidence derives overwhelmingly from Western samples; the Big Five structure and its behavioural correlates may manifest differently in collectivist cultural contexts such as China, where agreeableness norms are notably elevated [25, 26, 27]. Third, no study has translated personality–leisure associations into actionable facility planning and design guidance.

The present study addresses these gaps by extending the concept of "spa-

tial personality"—originally coined in behavioural ecology to describe consistent individual differences in spatial behaviour such as home range size and movement patterns [1]—to the domain of human leisure facility choice. We define spatial personality in the urban planning context as the systematic influence of stable personality traits on individuals' preferences for, experiences within, and emotional responses to physical spaces, and empirically test its relevance using survey data from 2,000 Hangzhou residents. Using a 20-item Chinese personality measure adapted from the Big Five framework and multinomial logistic regression, we investigate two research questions. First, do Big Five personality traits explain significant incremental variance in leisure facility preferences beyond demographic variables? Second, do different facility types—social venues, cultural spaces, sports facilities, parks, and home-based leisure—correspond to distinct personality profiles?

This study makes three contributions. Conceptually, we extend "spatial personality" from its origins in animal movement ecology [1] to human urban planning, bridging person–environment fit theory with spatial planning practice. Empirically, we provide what we believe is the first evidence from a Chinese city demonstrating that leisure facility types attract residents with distinct personality profiles—social venues drawing extraverts, cultural spaces attracting those high in openness, and home-based leisure associating with introversion—while sports facilities are driven primarily by gender rather than personality. Practically, we propose a planning framework that translates these findings into facility-type allocation recommendations for 15-minute community life circles.

The remainder of this paper is organised as follows. Section 2 reviews the relevant literature and presents the theoretical framework. Section 3

describes the study area, measures, and analytical approach. Section 4 presents the results, testing H1 and H2 in turn. Section 5 discusses the findings, and Section 6 outlines a research agenda for personality-informed planning. Section 7 concludes.

2. Literature Review and Theoretical Framework

2.1. Leisure facility planning: From supply-oriented to demand-oriented

Urban public facility planning has traditionally been governed by supply-side metrics—service radius, per-capita quotas, and spatial density standards—designed to ensure minimum provision levels [2]. This approach answers the question "are there enough facilities?" but overlooks whether the facilities provided match what residents actually want and need. As cities transition from rapid expansion to quality-oriented development, the limitations of purely supply-side planning become increasingly apparent [5].

A demand-oriented shift has emerged over the past decade, driven by two parallel developments. Internationally, the 15-minute city concept—whereby residents can reach essential services within a 15-minute walk—has reframed facility planning around proximity and accessibility [3, 4]. In China, the Ministry of Housing and Urban–Rural Development's 15-minute community life circle standards explicitly require that leisure facilities, including parks, cultural venues, and sports facilities, be planned to serve neighbourhood populations within walking distance [5]. Simultaneously, equity-oriented research has demonstrated that the spatial distribution of parks and green spaces often fails to match population demand, with peripheral communities and vulnerable groups disproportionately underserved [6, 28, 8]. Studies in Beijing [8], Havana [29], and Zunyi [7] have consistently

revealed supply–demand mismatches, where green space provision does not align with residents' recreational needs. Xu and Wang [30] emphasized that modelling supply–demand relationships from the perspective of city dwellers—rather than solely from spatial metrics—better captures actual recreational service accessibility.

Yet even this demand-oriented turn remains incomplete. Studies assessing supply–demand balance typically operationalize "demand" through population density, age structure, and socioeconomic status [5, 6, 31]. While these demographic indicators capture important dimensions of need, they treat all individuals within a demographic category as homogeneous—assuming, for instance, that all young adults share the same leisure preferences. This assumption overlooks the substantial within-group variation that arises from psychological individuality, a dimension we address through the concept of spatial personality. Even research on green space satisfaction—such as Mao et al.'s [32] evaluation of residential green space cultural ecosystem services—focuses on aggregate satisfaction scores rather than individual-level psychological antecedents of preference.

2.2. Personality psychology and leisure behaviour

The Big Five personality framework—extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience—has become the dominant taxonomy for studying individual differences in behavioural tendencies [27]. Each trait dimension captures a stable predisposition that shapes how individuals select and respond to environmental stimuli, including leisure contexts.

Extraversion exhibits the most robust and consistent associations with

leisure behaviour. Extraverts prefer social and physically stimulating activities—team sports, parties, group outings—because they are characterized by lower baseline cortical arousal and consequently seek external stimulation [9]. In a Taiwanese sample, Lu and Hu [9] demonstrated that extraversion correlated positively with almost all categories of leisure involvement and mediated the relationship between leisure and happiness. Recent smartphone-tracking evidence confirms that extraverts visit more unique locations, travel greater daily distances, and exhibit more diverse spatial movement patterns [33]. Beyond daily spatial behaviour, personality also shapes longer-range location decisions: Weisser [34] showed that personality traits influence university students' choices of study locations, demonstrating that personality-driven spatial selection extends to major life decisions.

Openness to experience predicts engagement with aesthetic, intellectual, and culturally novel activities. Individuals high in openness seek variety, appreciate art and beauty, and are drawn to experiences that challenge conventional thinking [10]. In the leisure domain, openness is associated with preference for museums, galleries, foreign travel, and creative pursuits—activities characterized by cognitive stimulation rather than social interaction. The link between openness and novelty-seeking extends to destination choice: Bayarsaikhan et al. [35] demonstrated that personality types systematically predict international tourists' recreation setting preferences.

Neuroticism, characterized by emotional instability and anxiety sensitivity, tends to dampen leisure engagement. High neuroticism individuals avoid socially demanding or overstimulating environments, preferring predictable, low-arousal settings [11]. This avoidance pattern has important implications for public space design: if highly neurotic individuals system-

atically avoid certain types of public leisure facilities, the current provision may inadvertently exclude a segment of the population.

Agreeableness and conscientiousness show more context-dependent associations with leisure. Agreeableness, reflecting cooperativeness and social harmony, may manifest differently across cultures. In collectivist Chinese contexts, where agreeableness norms are elevated compared to Western samples [25, 26], this trait may produce both genuine preference for harmonious shared spaces and acquiescence bias in survey responses [27]. Allik and McCrae [20] documented that Asian cultures consistently score higher on agreeableness than European and American cultures, a pattern that may reflect both genuine cultural dispositions and response styles. Conscientiousness, associated with discipline and order, has been linked to structured leisure activities such as fitness routines but may reduce preference for spontaneous or unstructured recreation.

Crucially, this personality–leisure literature has developed almost entirely within psychology, with limited cross-pollination into urban planning. Planning studies acknowledge preference heterogeneity but attribute it to demographic rather than psychological variation. The present study bridges this disciplinary gap by testing whether personality traits explain leisure facility preferences beyond demographic controls in an urban planning context. Weidmann and Chopik [36] have called for more nuanced understandings of environmental influences on personality, while Garner and Revelle [37] demonstrated that personality–environment associations vary geographically, underscoring the need for context-specific empirical tests.

2.3. The "spatial personality" concept and theoretical framework

We define *spatial personality* in the urban planning context as the systematic influence of stable personality traits on individuals' preferences for, experiences within, and emotional responses to physical spaces. This extends the original usage of the term in behavioural ecology, where "spatial personality" refers to consistent individual differences in spatial behaviour such as home range size, movement patterns, and habitat selection [1]. While the ecological concept concerns how animals use physical space, our extension concerns how humans *choose* among different types of designed spaces—a shift from movement ecology to preference psychology. This concept integrates three theoretical traditions.

First, person–environment fit theory, originating in organizational psychology, posits that congruence between individual characteristics and environmental attributes promotes satisfaction, performance, and well-being [14]. Götz et al. [15] extended this framework to geographic contexts, demonstrating that the match between individual and regional personality profiles predicts subjective well-being over time. Jokela et al. [22] further showed that personality–well-being associations vary across neighbourhoods within the same city, suggesting that the local physical and social environment moderates how personality translates into life outcomes. Chopik and Motyl [38] similarly found geographic variation in adult attachment orientation, reinforcing the idea that spatial context shapes psychological processes. Applied to leisure facilities, person–environment fit theory predicts that residents whose personality traits align with the characteristics of nearby leisure spaces will experience greater satisfaction and more frequent use.

Second, attention restoration theory provides a complementary mechanism. Natural environments restore depleted directed attention through "soft fascination"—gentle, effortless engagement that allows cognitive resources to replenish [39]. Green spaces provide a peaceful setting to escape urban stimulation and restore mental energy, a benefit well-documented in studies of urban parks and their health impacts [40, 32]. However, the restorative benefit of nature exposure may vary by personality: individuals high in openness may derive greater restoration from aesthetically rich natural settings, while those high in neuroticism may find even modest social presence in parks depleting rather than restorative. This suggests that the same park can serve different restorative functions for different personality types—but only if its internal design accommodates this diversity.

Third, geographical psychology demonstrates that personality traits are spatially organised and that this organization carries practical consequences. Rentfrow et al. [17] identified distinct psychological regions within the United States that map onto political, economic, and health outcomes. Garretsen et al. [23] showed that geographically clustered personality traits predict urban economic growth beyond standard economic determinants. Ebert et al. [21] confirmed the robustness of these regional personality patterns using spatial econometric methods in both the United States and Germany. These findings suggest that the psychological composition of local populations—their collective spatial personality profile—should inform the planning of environments those populations will use.

Integrating these three traditions, we propose that spatial personality influences leisure facility choice through two properties (see Figure 1):

1. **Incrementality** (H1): Personality traits explain significant variance

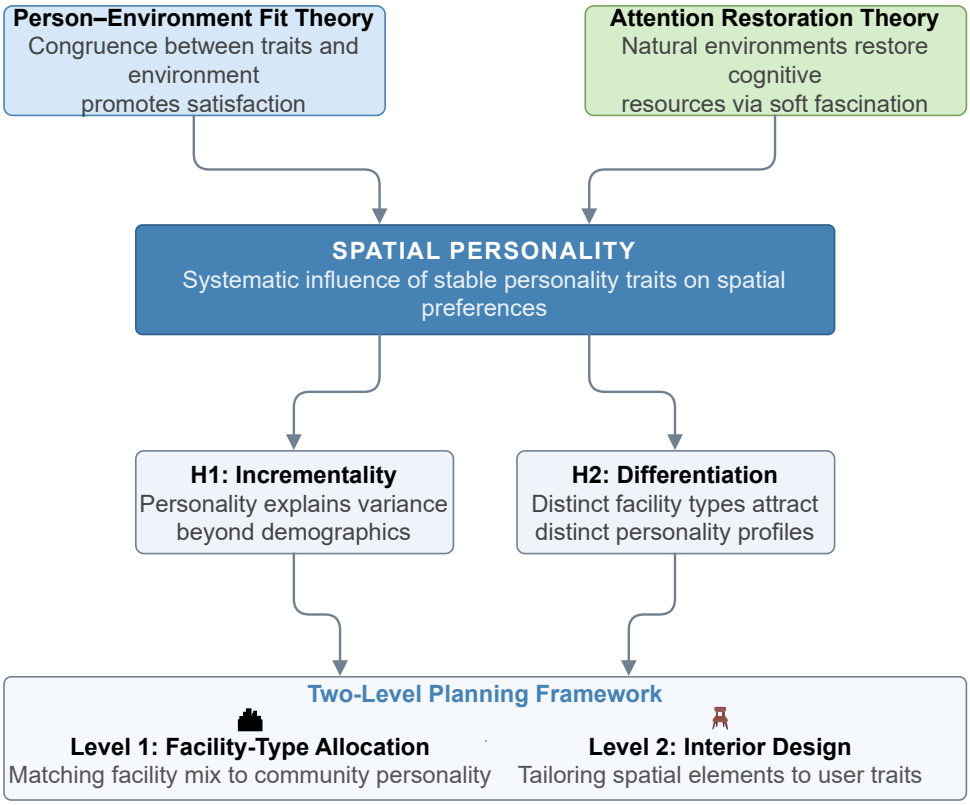

Figure 1: Theoretical framework of spatial personality and leisure facility choice. Three research traditions—person–environment fit theory, attention restoration theory, and geographical psychology—converge on the spatial personality concept, which predicts leisure facility preferences through two hypothesised properties: incrementality (H1) and differentiation (H2). These properties inform facility-type allocation recommendations for 15-minute community life circles.

in leisure facility preferences beyond demographic variables.

2. **Differentiation** (H2): Different facility types correspond to distinct personality profiles, such that each facility type disproportionately attracts individuals with specific trait configurations.

These two hypotheses are tested empirically in the sections that follow, using data from a city-wide survey of Hangzhou residents.

3. Methods

3.1. Study area and sample

The study was conducted in Hangzhou, the capital of Zhejiang Province in eastern China. Hangzhou is a major digital-economy hub with a resident population exceeding 12 million across 13 administrative districts. The city's rapid urbanisation, high green-space coverage, and active implementation of 15-minute community life circle policies make it a representative case for studying leisure facility preferences in a high-density Chinese city.

Data were collected through a structured questionnaire survey administered online via the Wenjuanxing platform from October 2025 to January 2026. Participants were recruited through convenience sampling across 13 districts, with stratification targets used to achieve broad geographic coverage across all administrative districts. Responses were considered valid if the respondent completed all personality items and the Q50 leisure facility preference item. Survey platform settings required responses to all BFI and Q50 items before submission, so incomplete responses were excluded at the platform level rather than post hoc. After excluding incomplete responses, 2,000 valid responses were retained for analysis, covering all 13 districts.

The sample comprised 58.6% female and 41.4% male respondents, with a mean age of 32.35 years (SD = 9.59, range 21–71). Education levels were skewed toward higher attainment: 63.4% held bachelor's degrees, 11.0% master's degrees, and 1.8% doctoral degrees. Household income was predominantly in the 100,000–200,000 yuan range (37.6%), with 29.1% earning below 100,000 yuan and 20.5% in the 200,000–300,000 yuan bracket. The sample's demographic profile—younger and more educated than Hangzhou's general population—reflects the online convenience-based recruitment strategy, which disproportionately reaches younger, digitally connected residents. This limits generalisability to older and less-educated populations but ensures adequate statistical power for detecting personality effects within a relatively homogeneous subgroup. While the sample is not demographically representative of Hangzhou's full population, it captures the working-age adults (20–50) who constitute the primary users of community leisure facilities.

3.2. Measures

3.2.1. Dependent variable: Leisure facility preference

The dependent variable was measured by item Q50: "Considering your personal leisure habits, if a new public leisure facility were to be built within walking distance (15 minutes) of your home, which of the following would you most prefer?" Respondents chose from five nominal categories: (1) parks and green spaces, (2) cultural spaces (community galleries, bookstores), (3) social venues (cafés, bars), (4) sports facilities (public courts, gyms), and (5) home-based leisure (no need for external facilities). As this is a stated-preference measure with unordered categories, multinomial logistic

regression was employed.

3.2.2. Independent variable: Big Five personality traits

Personality was assessed using a 20-item Chinese-language personality measure adapted from the Big Five Inventory framework [41]. The instrument measures five dimensions—extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience—with four items each on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The 20 items were selected from Chinese translations of BFI-44 items, choosing the four items with highest item-rest correlations per dimension from a pilot sample. Of the 20 items, 3 were reverse-keyed (15%); notably, all four agreeableness items are positively keyed, making this dimension particularly vulnerable to acquiescence bias. All reverse-scored items were recoded prior to analysis. All variance inflation factors (VIF) were below 2.5 (maximum = 2.35 for agreeableness), indicating no problematic multicollinearity among predictors. Dimension scores were computed as the mean of constituent items and subsequently standardized to z-scores for the regression analysis.

A critical measurement limitation warrants early disclosure because it directly affects the interpretation of all results that follow. The instrument's strong imbalance toward positively keyed items (85% positively worded) means that acquiescence bias—the tendency to agree with Likert items regardless of content—cannot be statistically separated from trait variance. Acquiescence scores (mean of all 20 items) correlate with agreeableness ($r = 0.84$), openness ($r = 0.80$), extraversion ($r = 0.74$), and conscientiousness ($r = 0.73$), but negligibly with neuroticism ($r = -0.014$). These correlations are structurally inflated because acquiescence and personality

scores share the same item pool, precluding statistical correction. Readers should therefore interpret all personality coefficients—especially those involving agreeableness and openness—with the understanding that they may partially reflect response style rather than genuine trait effects. The extraversion–introversion axis is the least confounded with acquiescence among the positively biased dimensions and represents the most robust personality signal in the data. A full discussion of this issue appears in Section 5.5.

3.2.3. Control variables

Four demographic variables were included as controls: age (entered as birth year, e.g., 1990; a one-unit increase thus corresponds to one year younger), gender (male = 1), education level (categorical: primary school, middle school, high school, bachelor's, master's, doctoral; middle school as reference), and household income (categorical: six bands; 100,000–200,000 yuan as reference).

3.3. Analytical approach

The analysis proceeded in three stages. First, scale reliability was assessed using Cronbach's alpha for each personality dimension. Second, descriptive statistics and frequency distributions were computed for all variables.

Third, the core analysis employed multinomial logistic regression using `statsmodels` MNLogit in Python, with parks and green spaces as the reference category. Parks were selected as the reference category because they constitute the largest preference group (37.2%), facilitating intuitive interpretation of coefficients as the log-odds of choosing each alternative over the

most popular option. Three nested models were estimated: a demographics-only model (age, gender, education, income); Model 1 (five standardized personality scores only); and Model 2 (personality + demographics). Model fit was compared using the likelihood ratio (LR) test, McFadden's pseudo-R^2, and AIC. H1 is tested by the LR test comparing the demographics-only model against Model 2, which directly assesses whether personality explains significant incremental variance beyond demographics. H2 is tested by examining whether personality coefficients differ significantly across facility types in Model 2. The Independence of Irrelevant Alternatives (IIA) assumption was assessed using Small-Hsiao tests for each category exclusion; all tests were non-significant ($p > 0.18$), supporting the IIA assumption.

4. Results

4.1. Sample description and reliability

Table 1 presents the descriptive statistics and reliability for the five personality dimensions. Four of five dimensions reached the conventional 0.70 threshold for acceptable internal consistency (Cronbach's α ranging from 0.725 to 0.817), with openness showing the highest reliability ($\alpha = 0.817$). Conscientiousness fell slightly below the threshold ($\alpha = 0.661$), consistent with the known limitations of short personality scales, where fewer items per dimension attenuate reliability estimates [27]. This modest reliability for conscientiousness may attenuate observed effect sizes for this dimension; true conscientiousness effects may therefore be larger than estimated. Regarding control variables, the sample's education distribution was skewed toward higher attainment, with 76.2% holding bachelor's degrees or above; household income was distributed across six bands, with the

majority (37.6%) in the 100,000–200,000 yuan range.

Notably, agreeableness exhibited the highest mean ($M = 3.93$, SD = 0.70), substantially above the typical range observed in Western samples (approximately 3.0–3.5), consistent with cultural norms emphasizing interpersonal harmony in collectivist Chinese society [25, 26]. Neuroticism showed the lowest mean ($M = 2.73$, SD = 0.82), suggesting that the sample reported relatively low levels of anxiety and emotional instability. The remaining dimensions—extraversion ($M = 3.45$), conscientiousness ($M = 3.71$), and openness ($M = 3.74$)—fell within expected ranges. Figure 2 visualizes the distribution of each personality dimension.

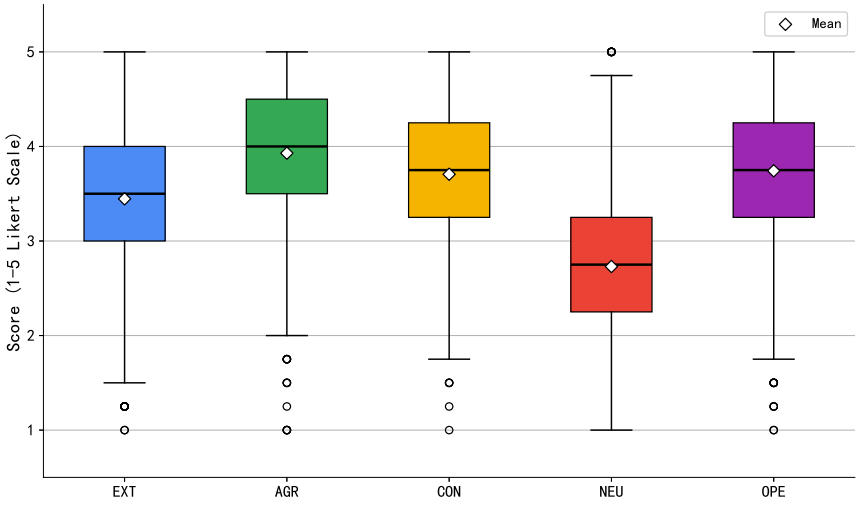

Figure 2: Distribution of Big Five personality dimension scores ($N = 2{,}000$). EXT = Extraversion, AGR = Agreeableness, CON = Conscientiousness, NEU = Neuroticism, OPE = Openness. Boxes represent the interquartile range; horizontal lines indicate medians; diamonds indicate means.

Table 1: Descriptive statistics and reliability of Big Five personality dimensions (N = 2,000)

Dimension	Items	M	SD	Min	Max	α
Extraversion (EXT)	4	3.446	0.758	1.0	5.0	0.725
Agreeableness (AGR)	4	3.929	0.699	1.0	5.0	0.783
Conscientiousness (CON)	4	3.706	0.690	1.0	5.0	0.661
Neuroticism (NEU)	4	2.730	0.816	1.0	5.0	0.726
Openness (OPE)	4	3.742	0.736	1.0	5.0	0.817

Note: Scores computed as the mean of four items per dimension on a 1–5 Likert scale, with reverse-scored items recoded. α = Cronbach's alpha. Parenthesised abbreviations are used in subsequent tables and figures.

4.2. Distribution of leisure facility preferences

Figure 3 displays the distribution of Q50 responses. Parks and green spaces were the most preferred option (37.2%), followed by cultural spaces (21.1%), social venues (16.4%), sports facilities (12.7%), and home-based leisure (12.7%). Percentages do not sum to 100% due to rounding. No single category dominated: even the most popular choice attracted less than 40% of respondents. This dispersed distribution indicates that leisure facility preferences are far from monolithic—a prerequisite for examining individual-difference predictors. The relatively even spread across all five categories suggests that a one-size-fits-all approach to leisure facility provision would leave large segments of the population underserved.

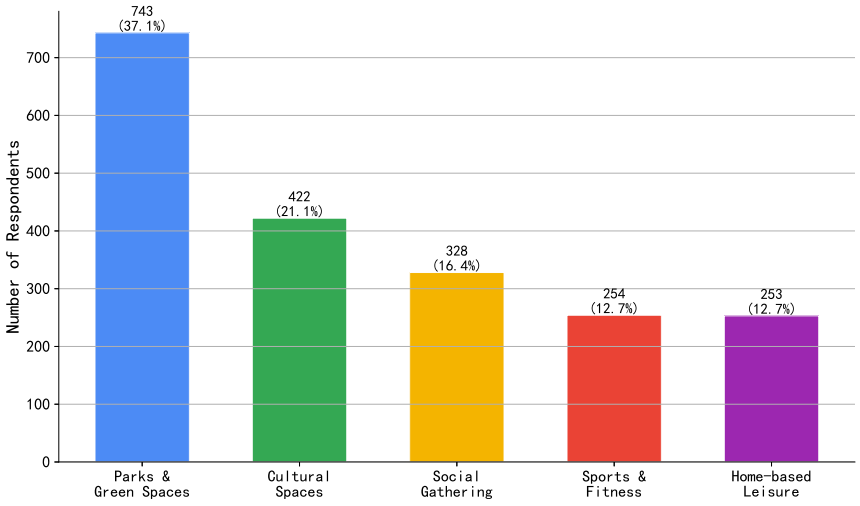

Figure 3: Distribution of leisure facility preferences (Q50) among 2,000 Hangzhou residents. Parks and green spaces were the most popular category (37.2%), but no single option attracted a majority, indicating substantial preference heterogeneity.

4.3. Incremental explanatory power of personality (H1)

To test H1—that personality explains significant incremental variance beyond demographics—three multinomial logistic regression models were estimated (Table 2). A demographics-only model yielded a McFadden pseudo-R^2 of 0.022; Model 1 (personality only) produced pseudo-$R^2 = 0.025$; and Model 2 (personality + demographics) achieved pseudo-$R^2 = 0.044$.

Two pieces of evidence support H1. First, a direct LR test comparing the demographics-only model against Model 2 confirms that personality explains significant incremental variance ($\chi^2 = 133.58$, df $= 20$, $p < 0.001$; $\Delta R^2 = 0.022$). Second, the key personality coefficients remain statistically significant in Model 2 even after controlling for age, gender, education, and income (Table 3): extraversion for social venues ($\beta = 0.572$, $p < 0.001$), openness for cultural spaces ($\beta = 0.237$, $p = 0.005$), and introversion for

home-based leisure ($\beta = -0.386$, $p < 0.001$). This persistence of personality effects constitutes direct evidence that personality provides incremental explanatory power beyond demographics.

Interpreting the model's explanatory power.. The full model's pseudo-R^2 of 0.044 indicates that personality and demographics together explain only 4.4% of the variance in facility preference—meaning that over 95% of the variation is driven by factors outside our model, such as habit, peer influence, transportation access, proximity to existing facilities, and idiosyncratic personal history. Among the personality effects, only extraversion's influence on social venue preference (OR = 1.77, 95% CI: 1.45–2.17 per SD) reaches a practically meaningful effect size; most other effects correspond to odds ratios of 1.1–1.3, which are small at the individual level. Furthermore, the acquiescence analysis described in Section 5.5 indicates that the personality signal likely contains a substantial response-style component that cannot be statistically removed. These results should be interpreted as evidence that personality is one of many factors influencing leisure facility preference—statistically detectable in a large sample but insufficient for individual prediction. The policy value of these findings lies not in predicting any single individual's choice, but in identifying systematic group-level patterns that could inform facility mix decisions at the community scale.

Coefficient stability across models.. Comparing personality coefficients between Model 1 and Model 2 reveals important variation in their robustness to demographic controls. Four coefficients changed by less than 10%: extraversion for social venues (+1.9%) and home-based leisure (−2.4%), agreeableness for social venues (−0.2%) and home-based leisure (−7.3%).

Table 2: Model fit comparison for multinomial logistic regression predicting leisure facility preference

	Demographics only	Model 1 (Personality)	Model 2 (Pers. + Demog.)
Log-likelihood	-2966.93	-2956.10	-2900.14
AIC	6037.86	5960.20	5944.28
Pseudo-R^2	0.022	0.025	0.044
LR test (Demographics vs. Model 2): $\chi^2 = 133.58$, df $= 20$, $p < 0.001$			
LR test (Model 1 vs. Model 2): $\chi^2 = 111.92$, df $= 48$, $p < 0.001$			

Note: DV = Q50 (5 nominal categories). The Demographics-only model includes age, gender, education, and income. Model 1 includes five personality z-scores. Model 2 combines both. The LR test of Demographics vs. Model 2 directly tests H1 ($\Delta R^2 = 0.022$).

These four constitute the most robust "pure personality effects"—unlikely to be confounded with demographics.

In contrast, two coefficients lost statistical significance when demographics were added: openness for social venues (Model 1: $\beta = 0.208$, $p = 0.025$; Model 2: $\beta = 0.120$, $p = 0.210$) and conscientiousness for home-based leisure (Model 1: $\beta = -0.214$, $p = 0.043$; Model 2: $\beta = -0.165$, $p = 0.124$). Both attenuations are driven primarily by age: younger respondents score higher in openness and are simultaneously more likely to prefer social venues. This pattern serves as a reminder that some personality–preference associations are partially confounded with life-stage effects—a consideration that tempers causal interpretation.

4.4. Personality profiles across five facility types (H2)

Table 3 presents the multinomial logistic regression coefficients from Model 2 (with demographic controls), using parks and green spaces as the reference category. Each row reports how a one-standard-deviation increase in the predictor alters the log-odds of preferring the given facility type over parks.

Figure 4 visualises the predicted probabilities for three key personality dimensions, showing how the probability of choosing each facility type changes across the trait continuum while holding all other predictors at their sample means. The extraversion panel reveals the most pronounced pattern: as extraversion increases, the probability of preferring social venues rises sharply while home-based leisure declines correspondingly. The openness panel shows a monotonic increase in cultural space preference with openness. The neuroticism panel confirms minimal personality effects, consistent with the mostly non-significant regression coefficients. Figure 5 presents the odds ratios and 95% confidence intervals for all 20 personality coefficients, providing a comprehensive visual summary of effect sizes and statistical significance.

4.4.1. Social venues: The extraverts' preferred arena

Social venues exhibited the clearest personality signature of all five categories. Extraversion was the strongest personality predictor in the entire model ($\beta = 0.572$, $z = 5.52$, $p < 0.001$): each standard-deviation increase in extraversion raised the odds of preferring social venues over parks by approximately 77% (OR = 1.77, 95% CI: 1.45–2.17). Additionally, agreeableness ($\beta = -0.265$, $p = 0.014$; OR = 0.77) and conscientiousness ($\beta =$

Table 3: Multinomial logistic regression coefficients (Model 2, parks as reference category)

	Social	Cultural	Sports	Home
Personality				
EXT	0.572***	−0.033	0.152	−0.386***
	(0.104)	(0.087)	(0.106)	(0.101)
	$z = 5.52$	$z = -0.38$	$z = 1.43$	$z = -3.83$
AGR	−0.265*	−0.165†	−0.170	−0.222*
	(0.108)	(0.096)	(0.116)	(0.110)
	$z = -2.46$	$z = -1.71$	$z = -1.46$	$z = -2.02$
CON	−0.293**	−0.162†	−0.113	−0.165
	(0.098)	(0.089)	(0.107)	(0.107)
	$z = -2.99$	$z = -1.83$	$z = -1.05$	$z = -1.54$
NEU	0.013	0.036	−0.034	−0.151†
	(0.077)	(0.070)	(0.084)	(0.086)
	$z = 0.17$	$z = 0.51$	$z = -0.41$	$z = -1.75$
OPE	0.120	0.237**	0.177†	0.075
	(0.096)	(0.085)	(0.103)	(0.099)
	$z = 1.25$	$z = 2.80$	$z = 1.72$	$z = 0.76$
Demographics				
Age	0.040***	0.019**	0.007	0.035***
Male	0.114	−0.035	0.686***	0.095

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, † $p < 0.10$. For personality variables, coefficients are shown with standard errors in parentheses and z-values below. Coefficients represent the change in log-odds of preferring the given category over parks for each SD increase (personality) or unit increase (demographics). Education and income dummies omitted for brevity.

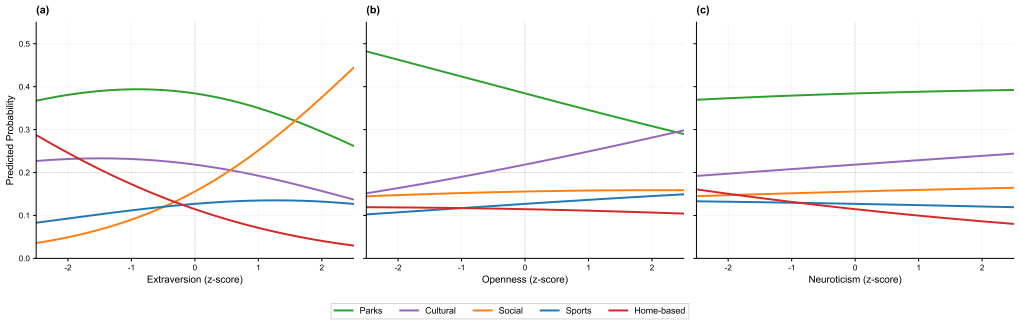

Figure 4: Predicted probabilities of leisure facility preference by personality dimension. Each panel shows how the probability of choosing each facility type varies across the z-score range of the focal personality dimension, holding all other predictors at their sample means. (a) Extraversion, (b) Openness, (c) Neuroticism.

-0.293, $p = 0.003$; OR $= 0.75$) were both significantly negative. Age was also significant ($\beta = 0.040$, $p < 0.001$), indicating that younger respondents disproportionately preferred social venues.

4.4.2. Cultural spaces: The aesthetes' sanctuary

Openness to experience was the sole significant positive personality predictor for cultural spaces ($\beta = 0.237$, $z = 2.80$, $p = 0.005$; OR $= 1.27$, 95% CI: 1.07–1.50). Agreeableness and conscientiousness showed marginally significant negative associations ($p < 0.10$). Age was also significant ($\beta = 0.019$, $p = 0.009$).

4.4.3. Sports facilities: Gender-driven, personality-weak

Sports facilities showed a qualitatively different pattern from all other categories. No personality dimension reached conventional significance at $p < 0.05$; the strongest personality effect was openness ($\beta = 0.177$, $p = 0.085$), which was marginally significant at the trend level. In stark contrast,

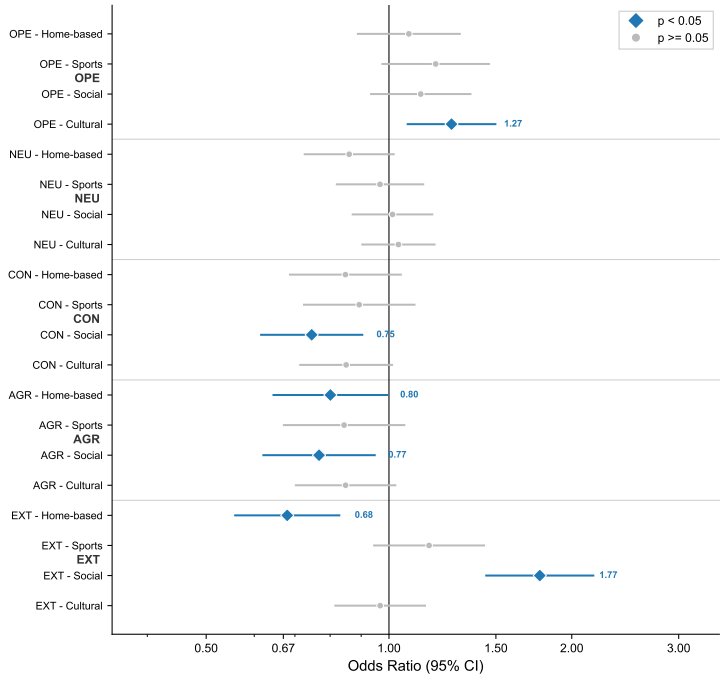

Figure 5: Odds ratio forest plot for personality coefficients (Model 2). Blue diamonds indicate statistically significant coefficients ($p < 0.05$); grey circles indicate $p \geq 0.05$. Marginally significant coefficients ($p < 0.10$, marked † in Table 3) are shown as grey circles. Horizontal lines represent 95% confidence intervals. The vertical line at OR = 1.0 indicates no effect. EXT = Extraversion, AGR = Agreeableness, CON = Conscientiousness, NEU = Neuroticism, OPE = Openness.

gender was by far the dominant predictor ($\beta = 0.686$, $z = 4.59$, $p < 0.001$): men were approximately twice as likely as women to prefer sports facilities over parks.

4.4.4. Home-based leisure: Potential underservice of introverts

Home-based leisure was most strongly predicted by low extraversion ($\beta = -0.386$, $z = -3.83$, $p < 0.001$; OR = 0.68, 95% CI: 0.56–0.83). Lower agreeableness ($\beta = -0.222$, $p = 0.043$; OR = 0.80) and a marginally significant association with higher neuroticism ($\beta = -0.151$, $p = 0.080$) completed the profile. Older respondents were also more likely to choose home-based leisure ($\beta = 0.035$, $p < 0.001$).

4.4.5. Parks and green spaces: The personality-inclusive default

As the reference category, parks' personality profile is inferred indirectly from the consistently negative agreeableness coefficients across all four alternative categories ($\beta = -0.265$ to -0.165), suggesting that high-agreeableness individuals disproportionately prefer parks. However, given that all four agreeableness items are positively keyed and agreeableness correlates $r = 0.84$ with acquiescence, this pattern may partly reflect acquiescent responding rather than genuine spatial preference. Parks also attracted the largest and most demographically diverse group (37.2%), suggesting they function as a personality-inclusive "consensus" choice—the leisure equivalent of a public good that satisfies a broad range of psychological needs without requiring specific trait configurations.

5. Discussion

5.1. Empirical validation of the spatial personality concept

This study extends the spatial personality framework—the idea that stable personality traits systematically shape how individuals engage with physical space—from its behavioural ecology origins [1] to the context of urban leisure facility choice. Both hypothesised properties received support. The incremental property (H1) was confirmed by the persistence of significant personality coefficients in the full model controlling for demographics, demonstrating that personality explains leisure facility preferences beyond traditional socio-demographic variables. The differentiation property (H2) was supported by distinct personality profiles across four of five facility types, with effect sizes and directions consistent with psychological theory.

Together, these findings suggest that spatial personality is a meaningful construct that captures systematic variation in how individuals evaluate and select leisure environments—variation that planning approaches relying solely on demographic variables cannot capture.

5.2. Personality-driven vs. demographics-driven facility preferences

A central insight from the regression results is that leisure facility preferences are not uniformly shaped by personality. Instead, the five facility types fall along a continuum from strongly personality-driven to strongly demographics-driven, with important implications for how planners should conceptualise "demand."

At one end of this continuum, social venues and cultural spaces exhibit clear personality signatures (see Table 3 and Figure 5). Social venues

are the most personality-dependent facility type—consistent with the well-established link between extraversion and social stimulation-seeking [9]—with the broader profile of low conscientiousness and low agreeableness suggesting a preference for spontaneous, unconstrained interaction. Cultural spaces, by contrast, are defined by openness to experience, confirming that aesthetically and intellectually oriented individuals seek environments matching their cognitive style [10]. These two facility types demonstrate that personality provides the primary organising logic for preference formation: the same demographics (young, educated) predict both choices, yet personality cleanly distinguishes between them.

At the other end, sports facilities represent the demographics-driven pole. The negligible personality effects alongside a dominant gender effect demonstrate that some leisure preferences are driven by social roles, physical needs, and structural factors rather than psychological disposition. The practical implication is that planners need not assess community personality to allocate sports facilities—standard demographic indicators suffice.

Between these poles, parks and home-based leisure present contrasting cases. Parks function as a "consensus" choice—the most popular category, attracting a personality-diverse population. Home-based leisure, conversely, may represent personality-based avoidance rather than active preference: the profile of introversion, lower agreeableness, and marginally higher neuroticism (visible in the diverging curves of Figure 4a) suggests individuals for whom the available public leisure options do not match their spatial personality [11].

This personality-driven vs. demographics-driven distinction carries direct planning implications: personality-dependent facilities should be allo-

cated based on community psychological composition, while demographics-driven facilities can rely on traditional demographic indicators.

5.3. The Chinese cultural context

The elevated agreeableness in our sample ($M = 3.93$, versus Western norms of approximately 3.0–3.5) warrants careful interpretation. On one hand, this may reflect genuine cultural differences: collectivist Chinese society emphasizes interpersonal harmony, which may produce higher levels of genuine agreeableness [27]. However, measurement artefacts substantially complicate this interpretation. First, the agreeableness dimension contains an item that shares conceptual overlap with conscientiousness ("Generally reliable," Q36.3), which may inflate agreeableness–conscientiousness correlations and contribute to the elevated agreeableness mean. Second, and more critically, all four agreeableness items are positively keyed, making this dimension the most vulnerable to acquiescence bias ($r = 0.84$ with acquiescence; see Limitations). Given this confound, we cannot determine whether the negative association between agreeableness and all non-park options reflects genuine preference, social desirability—parks being perceived as the "correct" or "safe" choice in a survey context—or acquiescent responding. We therefore treat the agreeableness–parks finding as methodologically ambiguous rather than theoretically informative.

The Chinese context also provides a unique perspective on introversion and public space use. In Western settings, it is plausible that introverts may prefer smaller or quieter commercial venues. In China's high-density urban environment, where public spaces tend to be intensively used and socially demanding, introverts may face a more acute mismatch—explaining why

12.7% of respondents effectively opt out of public leisure altogether. This finding resonates with Stavrova's [42] cross-national review showing that the sources of happiness—including social and environmental factors—vary substantially across cultures.

5.4. Theoretical contributions

This study makes three contributions. First, we extend "spatial personality" from its origins in behavioural ecology—where it describes consistent individual differences in animal spatial behaviour [1]—to the domain of human leisure facility choice, connecting person–environment fit theory [14, 15] with urban spatial planning. While P–E fit has been applied to workplace, educational, and residential contexts, its extension to leisure facility selection within neighbourhoods represents a new application domain. We position this not as a new theoretical construct with independent causal mechanisms, but as an interdisciplinary framework that translates existing psychological knowledge into planning-relevant predictions.

Second, we extend geographical psychology [19] by demonstrating that personality–environment interactions are detectable not only at regional or national scales [20, 21] but also at the micro-scale of individual facility choice within a single city—a finding that, while consistent with decades of personality–leisure research in psychology [9], has not previously been framed in planning terms.

Third, the empirical differentiation between personality-driven and demographics-driven facility types provides a descriptive framework for understanding why some public services show high uniformity in usage patterns while others exhibit substantial individual variation. We note that this continuum emerged

from our results rather than from a priori theoretical prediction; future research should investigate the mechanisms—such as social norm strength, facility physical attributes, or institutional constraints—that determine a facility type's position on this continuum. This has implications beyond leisure facilities: any public service involving voluntary choice (libraries, community centers, cultural programmes) may be subject to similar personality effects. In the Chinese context, where regional personality differences are shaped by both universal Big Five structures and indigenous Confucian traits [24], incorporating personality into planning may require culturally adapted assessment tools.

5.5. Limitations

Several limitations should be acknowledged. First, Q50 captures stated preferences rather than revealed behaviour; actual facility use may differ from expressed desires. Second, the single-city design limits generalizability. Hangzhou is one of China's wealthiest and greenest cities, potentially inflating park preference; replication in cities with different urban characteristics is needed. Third, the sample skews toward younger, more educated respondents (mean age 32.35; 76.2% with bachelor's degrees or above), limiting inference to older and less-educated populations.

Fourth, the instrument's brevity (4 items per dimension) poses measurement challenges: conscientiousness reliability ($\alpha = 0.661$) falls below the conventional 0.70 threshold, which attenuates observed effect sizes for this dimension (i.e., the true conscientiousness effect may be larger than estimated). Additionally, the instrument includes only 3 reverse-scored items (15%), so item keying is strongly imbalanced toward positively worded

items. This imbalance is the structural cause of the acquiescence concern discussed below (Point 8).

Fifth, the overall model fit is modest (pseudo-$R^2 = 0.044$), though this is consistent with the range reported in comparable preference studies. Studies of individual preference heterogeneity using multinomial logistic regression routinely report pseudo-R^2 values below 0.10, as nominal choice outcomes are inherently difficult to predict from individual-level variables alone. Many other factors—including habit, peer influence, and transportation access—undoubtedly contribute to facility preference.

Sixth, the cross-sectional design precludes causal inference; longitudinal or quasi-experimental designs would be needed to establish whether personality causally determines facility preference.

Seventh, although Small-Hsiao tests supported the IIA assumption (see Section 3.3), the conceptual distinction between home-based leisure (an opt-out) and the four facility types remains a concern; future research should consider nested logit or two-stage models to address this distinction.

Eighth, a significant concern is acquiescence bias—the tendency to agree with Likert items regardless of content. Because the instrument contains only 3 reverse-scored items out of 20 (15%), it is heavily imbalanced toward positively keyed items. This asymmetry means that response style cannot be empirically separated from trait content: an individual who genuinely endorses all positively worded items and an individual who simply agrees with all statements regardless of content will produce identical item-level responses. As a result, acquiescence scores (computed as the mean of all 20 items) correlate strongly with agreeableness ($r = 0.840$), openness ($r = 0.801$), conscientiousness ($r = 0.733$), and extraversion ($r = 0.739$),

but negligibly with neuroticism ($r = -0.014$). The near-zero correlation for neuroticism reflects the fact that neuroticism items include negatively worded content (e.g., anxiety, emotional instability), which an acquiescent respondent would endorse less strongly than positively worded items—thus creating a negative bias that offsets the positive acquiescence tendency. These correlations are tautologically inflated because acquiescence and personality scores share the same item pool. Statistical correction is not possible without an independent measure of response style. We therefore interpret agreeableness and openness findings—which correlate most strongly with acquiescence—with particular caution, while noting that the extraversion–introversion axis remains the most robust personality signal in the data. Future research should employ instruments with balanced keying (approximately equal numbers of positively and negatively worded items per dimension) or include dedicated acquiescence measures, as recommended by Rammstedt et al. [27].

Ninth, the large number of statistical tests conducted (regression coefficients, correlations, interaction terms) increases the risk of Type I error. The marginally significant results ($p < 0.10$) should be interpreted with particular caution, and we encourage replication of these findings before drawing firm conclusions.

6. Toward Personality-Informed Planning: A Research Agenda

An important caveat is warranted: this study measured *stated preferences* for hypothetical facilities, not actual behaviour in built environments. The overall model explains only 4.4% of variance in facility preference; over 95% of the variation is attributable to factors outside our model—habit,

peer influence, proximity, transportation access, and idiosyncratic personal history. Only extraversion's effect on social venue preference (OR = 1.77) approaches a practically meaningful effect size. Furthermore, acquiescence bias correlates strongly with agreeableness and openness ($r > 0.80$), meaning that findings involving these traits may partly reflect response style rather than genuine preference (see Section 5.5). No personality-informed design recommendation has been empirically tested. The conceptual framework below is offered not as prescriptive guidance but as a hypothesis-generating model whose elements require validation through behavioural observation, post-occupancy evaluation, and natural experiments before any incorporation into planning practice.

6.1. A conceptual model for future empirical testing

The finding that personality affects leisure facility preference beyond demographic controls suggests a conceptual model warranting further investigation. At the macro level, the mix of facility types within a 15-minute community life circle could potentially reflect the psychological composition of the local population—for instance, communities with younger, more extraverted populations might benefit from a higher ratio of social venues, while areas with older or more introverted residents might prioritise quieter park zones and contemplative spaces. These are hypotheses to be tested, not prescriptions to be implemented.

6.2. Key research questions for validating the framework

Several questions must be addressed before personality-informed planning could be considered evidence-based:

1. **Stated vs. revealed preference**: Do the personality–facility associations identified here replicate with behavioural data (GPS tracking, facility usage records, observational counts)? The gap between what people say they want and what they actually use is well documented, and stated-preference effects may not survive this translation.
2. **Cross-city replication**: Are the personality profiles associated with each facility type stable across cities with different urban morphologies, climate zones, and cultural contexts, or are they specific to Hangzhou's particular configuration of wealth, green-space coverage, and digital-economy demographics?
3. **The introvert question**: The 12.7% of respondents preferring home-based leisure—characterized by introversion and marginally higher neuroticism—might represent either genuine preference for domestic leisure or a mismatch between these individuals' spatial personality and currently available public facilities. Distinguishing between these explanations requires research designs that can separate preference from constraint.
4. **Measurement feasibility**: Could ultra-short personality assessments (e.g., BFI-10, 10 items) be practically integrated into community planning surveys, and would the resulting personality profiles be sufficiently reliable at the neighbourhood level to inform facility allocation decisions?

6.3. The evidence threshold for personality-informed planning

A critical question is what level of evidence would justify incorporating personality into planning practice. Current planning decisions rely on demo-

graphic indicators—population density, age structure, income distribution—that have decades of validation through built-environment research. Personality-informed planning would need to demonstrate: (a) that personality effects replicate with revealed behavioural data, not just stated preferences; (b) that personality-based facility allocation produces measurably better outcomes (higher utilisation, greater user satisfaction, improved well-being) compared to demographically-driven allocation; and (c) that the incremental benefit of personality assessment outweighs the practical costs of data collection and analysis. The present study provides a starting point—evidence that personality–facility associations exist and are statistically robust—but falls well short of this threshold. The path from "statistically detectable personality effects in survey data" to "actionable planning guidance" requires a sustained programme of behavioural validation, multi-city replication, and cost–benefit analysis that the field has yet to undertake.

7. Conclusion

This study extended the concept of "spatial personality"—originally developed in behavioural ecology to describe consistent individual differences in spatial behaviour [1]—to the domain of human leisure facility choice, testing its relevance in Hangzhou, China (N = 2,000). Two core findings emerged.

First, Big Five personality traits explain significant incremental variance in leisure facility preferences beyond demographic controls (LR test: $\chi^2 = 133.58$, df = 20, $p < 0.001$; $\Delta R^2 = 0.022$), as evidenced by the persistence of significant personality coefficients after controlling for age, gender, education, and income. However, acquiescence bias—the tendency to agree with

all Likert items regardless of content—correlates strongly with most personality dimensions ($r = 0.74$–0.84), precluding statistical separation of trait content from response style; we therefore interpret the agreeableness and openness findings with particular caution. The extraversion–introversion axis, which correlates moderately with acquiescence ($r = 0.74$) but substantially less than agreeableness ($r = 0.84$), represents the most robust personality signal in the data, though it too may contain a response-style component.

Second, four of five facility types exhibit personality-differentiated profiles, though only two rest on methodologically robust ground. Social venues attract extraverts ($\beta = 0.572$, OR = 1.77, 95% CI: 1.45–2.17) and home-based leisure is associated with introversion ($\beta = -0.386$, OR = 0.68, 95% CI: 0.56–0.83)—both driven by the extraversion–introversion axis, which is the least confounded personality dimension with acquiescence bias ($r = 0.74$). Cultural spaces attract those high in openness ($\beta = 0.237$, OR = 1.27, 95% CI: 1.07–1.50), but this finding should be treated as preliminary evidence given openness's strong correlation with acquiescence ($r = 0.80$) that precludes separation of genuine trait effects from response style. Parks show a high-agreeableness pattern that likely reflects acquiescent responding rather than genuine spatial preference. Sports facilities, by contrast, are driven by gender ($\beta = 0.686$, OR = 1.99) rather than personality, identifying an important boundary condition for the spatial personality concept.

These findings suggest—but do not establish—that facility-type allocation could potentially benefit from accounting for the psychological composition of local populations. The path from these preliminary associations to actionable planning guidance requires multi-city comparisons with revealed-

preference behavioural data, longitudinal designs, instruments with balanced keying to control acquiescence, and cost–benefit analysis of personality-informed versus demographically-informed facility allocation.

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Appendix A. Education and Income Coefficients (Model 2)

Table A.4 reports the full education and income coefficients from Model 2 (personality + demographics), with parks and green spaces as the reference category. The education reference category is middle school (junior high), which represents the lowest completed education level in the sample that still allows meaningful comparison across groups; the income reference is 100,000–200,000 yuan, the modal income band. All education and income coefficients are non-significant except for one: respondents from households earning less than 10,000 yuan were more likely to prefer social venues over parks ($\beta = 1.233$, $p = 0.021$), likely reflecting the young, single demographic that also prefers social spaces.

Table A.4: Education and income coefficients from Model 2 (multinomial logistic regression, parks as reference). Reference categories: middle school (education), 100,000–200,000 yuan (income).

Category	Variable	β	p	Sig.
Cultural spaces				
	Doctoral degree	−0.327	0.621	
	Primary school	0.021	0.977	
	Bachelor's degree	0.467	0.170	
	Master's degree	−0.215	0.583	
	Senior high school	0.386	0.271	
	Income <100k yuan	0.144	0.368	
	Income 200–300k yuan	0.165	0.325	
	Income 300–500k yuan	−0.091	0.704	
	Income ≥500k yuan	−0.066	0.853	
	Income <10k yuan	0.350	0.565	
Social venues				
	Doctoral degree	0.256	0.667	
	Primary school	−0.605	0.596	
	Bachelor's degree	0.248	0.500	
	Master's degree	−0.488	0.254	
	Senior high school	0.329	0.388	
	Income <100k yuan	0.002	0.989	
	Income 200–300k yuan	−0.067	0.723	
	Income 300–500k yuan	−0.031	0.904	
	Income ≥500k yuan	0.314	0.354	
	Income <10k yuan	1.233	0.021	*
Sports facilities				
	Doctoral degree	−0.058	0.932	
	Primary school	−0.176	0.836	
	Bachelor's degree	0.146	0.690	
	Master's degree	−0.214	0.615	
	Senior high school	0.390	0.296	
	Income <100k yuan	−0.029	0.880	
	Income 200–300k yuan	−0.131	0.519	
	Income 300–500k yuan	−0.086	0.752	
	Income ≥500k yuan	−0.281	0.508	
	Income <10k yuan	−1.050	0.332	

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Spatial Personality and Leisure Facility Choice: How Big Five Traits Are Associated with Public Recreation Preferences in Hangzhou, China

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