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**Geographically varying associations between personality and life satisfaction in the London metropolitan area**

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## **Abstract**

Residential location is thought to influence people's wellbeing, but different individuals may value the same residential areas differently. We examined how life satisfaction and personality traits are geographically distributed within the U.K. London metropolitan area, and how the strength of associations between personality traits and life satisfaction vary by residential location (i.e., personality–neighborhood interactions). Residential area was recorded at the level of postal districts (216 districts, n=56,019 participants). The strength of associations between personality traits and life satisfaction were dependent on neighborhood characteristics. Higher openness to experience was more positively associated with life satisfaction in postal districts with higher average openness to experience, population density and ethnic diversity. Higher agreeableness and conscientiousness were more strongly associated with life satisfaction in postal districts with lower overall levels of life satisfaction. The associations of extraversion and emotional stability were not modified by neighborhood characteristics. These findings suggest that people's life satisfaction depends, at least in part, on the interaction between individual personality and particular features of the places they live.

**Keywords:** Neighborhood, Personality, Life satisfaction, Person–environment

## **Significance Statement**

Recent studies in geographical psychology have demonstrated regional variations in personality—people with similar personality traits are more likely to be found in some regions than others. What is the psychological significance of such spatial clustering? Our study was motivated by the person–environment hypothesis suggesting that the match between people’s personality and neighborhood characteristics is important for people’s life satisfaction. The results showed that personality traits were differently related to life satisfaction in different postal districts of London metropolitan area, and these varying associations were related to specific neighborhood characteristics, such as population density and ethnic heterogeneity. These findings demonstrate how individuals with different personality dispositions derive life satisfaction from different aspects of their social and physical environments.

Where is the best place to live? Numerous “livability” rankings of cities and neighborhoods have been published in academic journals and newspapers (1-4). Such rankings tend to imply that all people would value the same residential areas equally, as places are often ranked by residents’ average happiness or life satisfaction—without considering how these places might match with specific dispositions of individual residents. However, it seems likely that people’s life satisfaction is dependent on the interactions between neighborhood characteristics and individual dispositions (5, 6). For example, a location with high cultural diversity might enhance the lives of residents who are eager to explore new customs and cuisines, but increase the anxiety and discomfort of residents who prefer to live by their own social traditions.

A growing number of studies have shown that personality traits are geographically clustered, and that these personality clusters are correlated with many regional sociocultural factors (6, 7). For example, the west coast of the United States is characterized by higher openness and emotional stability compared to rest of the country, whereas the east coast has lower emotional stability and conscientiousness (7). One important question arising from these findings is whether the geographical clustering of personality represents adaptive patterns discussed above, so that people with certain personality traits are found in specific neighborhoods because these locations provide them the maximal level of happiness taking into account their personality dispositions (6, 8-10). High extraversion, for instance, might be clustered in specific neighborhoods because these neighborhoods provide opportunities of social interaction for individuals with high extraversion (11, 12). Thus, personality provides a psychological measure to test whether and how the person’s dispositions and neighborhood characteristics jointly influence people’s life satisfaction.

In the present study, we used data from over 56,000 individuals living in the metropolitan area of London (UK) to examine the role of personality–neighborhood interactions in predicting people’s life satisfaction. First, we examined how mean levels of life satisfaction and personality traits are spatially distributed across London. While earlier studies have reported geographical

differences in aggregated levels of personality and life satisfaction (6), these studies have not used the relevant spatial statistics to assess the geographical patterns. We used spatial analysis to quantify how strongly life satisfaction and different personality traits are clustered. To further contextualize these geographical patterns, we assessed how the neighborhood mean levels of life satisfaction and personality traits were related to specific neighborhood characteristics derived from the Census and other secondary data sources.

Second, we investigated whether personality traits correlate with life satisfaction differently depending on residential location. This analysis addressed the issue of personality–neighborhood interactions in determining people’s life satisfaction, as the focus was on geographically varying regression slopes between personality traits and life satisfaction. The cultural-fit (or person–environment fit) hypothesis postulates that better match between person and environment leads to higher satisfaction, because the person’s behavior is better in line with the prevailing social norms, and the person’s needs are better fulfilled (13, 14). To test how personality was differently related to life satisfaction in different neighborhoods, we fitted random-effect regression models that allowed personality traits to be differently associated with life satisfaction in different neighborhoods. To examine the specific neighborhood characteristics associated with higher or lower fit with personality traits, the neighborhood-specific regression slopes were then correlated with neighborhood characteristics and mean levels of personality. A positive correlation between the regression slope and mean personality level would indicate an adaptive spatial clustering of personality, so that people with high levels of the trait are living in neighborhoods where the trait is most strongly associated with higher life satisfaction.

Most previous studies have examined psychological differences between relatively large geographical units, such as states and counties (7). To get more detailed measures of people’s residential locations and their surroundings, we determined neighborhoods at the finer resolution of postal districts. Personality was assessed based on the five-factor model comprising of extraversion,

neuroticism, agreeableness, conscientiousness, and openness to experience. Given the lack of previous research on the topic at the small-area spatial scale, we did not have predefined hypotheses of spatial patterns of life satisfaction and personality traits.

## Results

### *Mean-level scores*

**Supplementary Table 1** shows the correlations between personality traits and life satisfaction at the level of individuals and aggregated level of postal districts. Spatial autocorrelations are illustrated in **Supplementary Figure 1**, and they demonstrated that postal districts closer to each other were more similar in mean levels of life satisfaction and personality compared to similarities of postal districts further apart from each other. Openness to experience was the most spatially autocorrelated trait ( $r=0.77$ ), followed by extraversion ( $r=0.45$ ) and life satisfaction ( $r=0.44$ ). These spatial effects extended beyond the first-order neighbors (i.e., neighbors of neighbors, and so on) but decreased linearly with increasing distance. Conscientiousness was the least spatially autocorrelated trait ( $r=0.22$ ), and its autocorrelation did not carry beyond the first-order neighbors; that is, knowing the level of conscientiousness of a postal district was moderately informative of conscientiousness levels of the nearest-neighbors but not informative of conscientiousness of postcodes beyond that. Emotional stability ( $r=0.30$ ) and agreeableness ( $r=0.32$ ) had slightly higher spatial autocorrelations than conscientiousness.

While spatial autocorrelations provided estimates of overall clustering across the study area, “hotspot analysis” based on Getis-Ord  $G^*$  estimator identified locations of specific clusters of high and low scores of life satisfaction and personality (**Figure 1**; see **Supplementary Figure 2** for the distribution of raw scores). Openness to experience had the most prominent clustering pattern, with high openness being concentrated in central London (e.g., districts of Islington and King’s Cross) and low levels observed in the outer regions of the metropolitan area. Low conscientiousness was

clustered in the same area as high openness to experience. Clusters of high extraversion and emotional stability were located in southwest of central London (e.g., Wandsworth borough). High levels of life satisfaction were clustered around the same area (e.g., Richmond borough). Pockets of low life satisfaction were observed in northwest, northeast, and south London. Low agreeableness was most strongly clustered around the Westminster borough and central London, where many of the popular tourist attractions are located.

We then examined whether these patterns were associated with neighborhood characteristics by correlating the mean personality scores of the postal districts with neighborhood variables measuring sociodemographic factors, housing and land use within the postal districts (**Table 1**; see **Supplementary Table 1** for extended correlation table). Openness to experience was associated with lower neighborhood income and employment rate, lower voting activity, higher crime rates, and higher proportion of people receiving income and disability support, whereas the reverse correlations with these neighborhood characteristics were observed for life satisfaction. Higher levels of agreeableness were observed in neighborhoods with lower population density and lower housing prices, greater proportion of older people and families with children, and more land area used for domestic gardens and green spaces.

To estimate how strongly personality differences between postal districts were linked to neighborhood characteristics included in the present analysis, we fitted backward stepwise regression models predicting the postal-district level personality traits with all the available neighborhood variables, successively removing variables with  $p > 0.15$  in the regression model. The most predictive combinations of neighborhood variables accounted for 78% of variance in openness to experience, 67% in life satisfaction, 46% in extraversion, 33% in agreeableness, 26% in conscientiousness, and 24% in emotional stability. Details of these models are not shown because the stepwise regression is unlikely to produce the most meaningful results for substantive interpretation; it was used here only to estimate the overall link between personality traits and neighborhood characteristics.

### *Associations between personality and life satisfaction*

The regression model predicting life satisfaction by personality traits, age, and sex was fitted separately for each postal district using multilevel regression models, as described above. This produced a distribution of regression coefficients for each trait: the 95% range across the 216 postal districts was 0.24–0.35 for emotional stability (mean=0.30, sd=0.036), 0.08–0.23 for extraversion (mean=0.17, sd=0.043), 0.07–0.21 for conscientiousness (mean=0.14, sd=0.040), -0.02 to 0.13 for agreeableness (mean=0.06, sd=0.045), and -0.13 to 0.04 for openness to experience (mean=-0.05, sd=0.052). These distributions indicated that the strengths of associations between personality traits and life satisfaction were different in different postal districts. The coefficient distributions are further illustrated in **Supplementary Figure 3**. Maps of the spatially varying regression coefficients are shown in **Supplementary Figures 4 and 5**.

Regression coefficients for the personality traits derived from the above models were then correlated with neighborhood characteristics and average personality scores of the postal districts to examine how the strength of associations between personality traits and life satisfaction were related to specific neighborhood characteristics (**Table 2**; see **Supplementary Table 2** for extended correlation table). The association between openness to experience and life satisfaction was more positive among individuals living in neighborhoods with higher population density, higher house prices, higher proportion of religious and ethnic minorities, lower personal income, and higher unemployment rate. The association was also more positive in postal districts with comparatively high mean openness to experience.

Higher agreeableness and higher conscientiousness were more strongly associated with life satisfaction in postal districts with lower average level of life satisfaction. For conscientiousness, this effect was observed particularly in relation to socioeconomic factors; high conscientiousness was associated with higher life satisfaction especially in postal districts with lower income and



employment rate, higher proportion of individuals receiving income or disability support, and where average levels of conscientiousness and extraversion were low. The association between higher agreeableness and life satisfaction was most prominent in postal districts with more families with children and lower housing prices, and where mean-levels of openness to experience and extraversion were low (**Table 2**). In contrast, the associations of emotional stability and extraversion with life satisfaction were not modified by any of the included neighborhood characteristics.

## **Discussion**

The current results provide several insights into the role of personality and place in affecting people's life satisfaction. First, higher levels of life satisfaction were observed in the most affluent regions of London, while pockets of low life satisfaction were observed in northwest, northeast, and south London, where the proportion of ethnic minorities is the highest. Neighborhood characteristics accounted for two-thirds of life-satisfaction differences between postal districts, indicating a substantial link between sociodemographic factors and average life satisfaction of neighborhoods.

Of the five personality traits, openness to experience showed the highest degree of spatial clustering, and a marked spatial pattern with high openness levels in the urban center and gradually decreasing levels when moving to outer regions of the metropolitan area. Openness was related to a mixture of neighborhood characteristics, including higher population density and higher housing prices, higher ethnic and religious diversity, and higher crime rate. Together these findings are in agreement with studies showing that openness is associated with broad interests and tolerance for alternative lifestyles and ideas (15), and that these dispositions are often thought to characterize residents of densely populated urban areas (16). Interestingly, there was a cluster of low agreeableness in the western central London area that has the highest crime rate, busiest pedestrian traffic (17), and some of the highest housing prices. This could be interpreted to support the popular notion that residents of big cities tend to be less considerate towards other people (18). However, the

potential urban alienation represented by low agreeableness may be narrower in scope, so that it does not encompass the whole city but is restricted only to the urban core of a metropolitan area.

The second part of our analysis examined how associations between personality traits and life satisfaction varied across the postal districts. In agreement with many earlier studies, life satisfaction was most strongly determined by emotional stability and extraversion (19). Our findings indicated that the associations of emotional stability and extraversion with life satisfaction were not at all modified by specific neighborhood characteristics measured in our study. This supports the temperamental hypothesis postulating that emotional stability and extraversion are associated with life satisfaction directly and largely independently of people's environmental circumstances (19-21).

By contrast, the overall inverse association between openness to experience and life satisfaction was weak (19), but this association was most strongly dependent on neighborhood characteristics. Living in a densely populated, ethnically heterogeneous neighborhoods with low proportion of older people and families with children provided the best match for individuals with high openness to experience. In addition, individuals with high openness were more likely to be found in neighborhoods where openness was more positively associated with life satisfaction. Other personality traits did not show such an adaptive pattern. Thus, except for openness, most of the variance in mean-level personality traits may not be adaptively distributed with respect to maximizing people's life satisfaction.

Higher agreeableness and conscientiousness were stronger predictors of life satisfaction in neighborhoods with lower levels of life satisfaction, suggesting that these personality traits are more important determinants of life satisfaction for individuals living in less favorable environmental circumstances. It has been suggested that agreeableness and conscientiousness are associated with life satisfaction mainly via instrumental mechanisms (19). That is, individuals with higher agreeableness and conscientiousness tend to manage their life decisions so that these decisions lead to higher life satisfaction (e.g., fewer conflicts with other people, more careful planning ahead), and

their associations with life satisfaction are therefore more dependent on external circumstances (19, 22-24). In more affluent neighborhoods, life satisfaction may be less determined by individual differences in agreeableness and conscientiousness, because these neighborhoods provide a higher overall level of instrumental support and resources for life satisfaction (25, 26).

On a more general level, the findings suggest two rather different spatial constellations of personality. High openness to experience and extraversion seemed to characterize very urban neighborhoods, whereas high agreeableness and conscientiousness characterized more suburban neighborhoods, as indicated by neighborhood correlates. Openness to experience was related to life satisfaction more positively in postal districts with higher extraversion, lower agreeableness, and lower conscientiousness. Agreeableness and conscientiousness were less positively associated with life satisfaction in postal districts with higher mean extraversion and, for agreeableness, higher mean level of openness to experience. These correlations between mean levels and regression slopes of the two personality constellations suggest a possible adaptive pattern in which higher agreeableness and conscientiousness are less likely to be found in neighborhoods with high extraversion and openness to experience, because these neighborhoods provide less life satisfaction for individuals with high agreeableness and conscientiousness.

The main strengths of the present study include a large sample size, a fine-grain geographical resolution in determining participants' residential location at the level of postal districts, the use of spatial statistics to assess the degree of clustering, and assessment of not only mean levels of neighborhood personality but the spatially varying associations between personality and life satisfaction. The analysis was limited by cross-sectional data. Neighborhood personality differences may emerge via people's selective mobility, but also via socialization processes (6). Another limitation is that the sample was self-selected and therefore not completely representative of the general population, which may have biased some of the results. Also, we did not examine the interactions between psychological and sociodemographic factors in determining residential

choices. It is clear that personality alone cannot determine where people live, because factors such as socioeconomic status, age, ethnicity, and family status are important determinants of residential mobility. Longitudinal data are needed to determine the dynamics of selection effects and the sociodemographic constraints on those effects (10, 27, 28). It is also important to test which of the present patterns can be observed in other geographical scales and other countries.

In conclusion, the present study extends the burgeoning field of geographical psychology (29) by demonstrating how life satisfaction and personality traits can be differentially distributed and spatially clustered within a metropolitan area. The analysis of personality–neighborhood interactions showed that openness to experience, agreeableness, and conscientiousness were differently associated with life satisfaction of individuals depending on their residential location and specific characteristics of those locations. Thus, finding the best place to live depends on the match between individual dispositions and neighborhood characteristics.

## **Methods**

### *Participants*

Participants were from the Big Personality Test online survey advertised and hosted by the British Broadcasting Corporation (BBC) on its Lab UK website (<https://ssl.bbc.co.uk/labuk/experiments/personality/>). The survey collected information on psychological characteristics, childhood experiences, and sociodemographic factors. Completion of the survey took approximately 30 minutes. Data were collected between 2009 and 2011 with a total sample of 588,014 participants covering Great Britain. The present sample included 56,019 individuals who lived in the Greater London metropolitan area. Mean age was 33.2 (SD=12.2) and 36.7% were men. **Supplementary Table 3** provides additional sociodemographic details about the sample.

## *Measures*

*Life satisfaction* was measured with the Satisfaction With Life Scale (30) consisting of five items rated on a 7-point scale (1=strongly disagree, 7=strongly agree). Cronbach's internal consistency estimate was 0.91 in the present sample, and other psychometric properties of the scale have been shown to be good as well (31). *Personality* was assessed with the 44-item Big Five Inventory (32), each item rated on a 5-point scale (1=strongly disagree, 5=strongly agree). The internal consistency estimates were 0.85 for extraversion, 0.76 for agreeableness, 0.83 for conscientiousness, 0.83 for neuroticism, and 0.80 for openness to experience. *Residential location* was self-reported by the participants and was coded at the resolution of postcode districts (e.g., BR5, WC1, SE13). There were 216 postal districts included in the present analysis. The boundaries and numbers of participants of by postal districts are shown in **Supplementary Figure 6**. Data on *neighborhood characteristics* were derived from the London Ward Atlas (<http://data.london.gov.uk/datastore/package/ward-profiles-and-atlas>) in which sociodemographic information from the Census and other information on land use and housing have been recorded at the level of administrative wards. London area included in the present analysis covered 647 wards, so in most cases a single postcode district was covered by more than one ward. We transferred the ward-level data to postal districts by overlaying the centroids of the wards on the postal district areas. The neighborhood characteristics for a postal district were then determined as the averaged values on each variable over the wards whose centroids fell within the postal district borders. The resulting correlations between personality scores and neighborhood characteristics were similar but slightly lower when postcodes were assigned data from only the 1 ward that was closest to the postcode (as measured by the distance between postcode and ward area centroids; data not shown), indicating that the averaging procedure yielded more accurate estimates for neighborhood characteristics.

## *Statistical analysis*

To reduce the role of sampling error in calculating average scores of personality and life satisfaction of postal districts, a random-intercept multilevel linear regression model was fitted for each of the traits, adjusted for age and sex. The empirical Bayes predictions from these models were used in subsequent analyses. Using random-intercept model predictions rather than raw mean scores had the effect of shrinking extreme values towards the overall mean in postal districts with fewer participants and greater individual-level variance, thus producing more robust estimates.

Random-effect linear regression was also used to determine the spatially varying associations between personality traits and life satisfaction. Preliminary analysis indicated that random-slope regressions including all the postal districts in a single model attenuated postal-district differences in the slopes excessively. Therefore, instead of carrying out a single random-slope regression over the total London area for each of the traits, a separate random-slope multilevel regression model was fitted for each postal district by including data from the postal district of interest and its nearest neighbors (i.e., postal districts with a shared boundary based on queen's adjacency rule). The regression coefficients between personality traits and life satisfaction were determined as the empirical Bayes predictions for the coefficients from these 216 models. The random-slope regressions allowed each postal district to "borrow strength" from its neighbors in estimating the regression coefficients more precisely. Separate models were fitted for each personality trait so that one trait in turn was assigned a random effect, adjusted for age, sex, and the other 4 personality traits.

The spatial clustering of personality and life satisfaction was assessed with Moran's  $I$  spatial autocorrelation coefficient and with Getis-Ord  $G^*$  local clustering method (33). Moran's  $I$  tests the overall level of spatial autocorrelation across the study area, that is, whether postal districts close together are more similar to each other than postal districts further apart. Higher positive values indicate greater clustering of similar postal districts. The  $G^*$  estimate is used to locate specific clusters of high and low values in areas that have high (or low) value *and* that also have neighbors

with high (or low) values in the outcome of interest. This allows one to identify the concentration of “hot-spots” in the study region. The  $G^*$  estimates can be interpreted as z-scores, with values above 1.96 and below -1.96 indicating statistically significant clustering. The spatial analysis was performed using the *spdep* package of R 2.15.2 statistical software (34).

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**Table 1.** Selected sociodemographic correlates of mean-level scores of personality and life satisfaction of postal districts.

	<b>E</b>	<b>S</b>	<b>A</b>	<b>C</b>	<b>O</b>	<b>LS</b>
<b>Population structure</b>						
% Older people (65+)	-30		29	31	-58	25
% Couple households with children	-48	-20	40		-68	-26
% Lone-parent households		-17		-34	20	-60
Fertility rate	-31		26		-22	-51
Mortality rate		-24		-22		-33
Population density	42		-33	-26	61	
% Christian religion	-15			34	-43	37
% White ethnic background				36	-31	60
<b>Physical environment &amp; Housing</b>						
Mean house price	42	27	-31		42	44
% Domestic Buildings	36		-20	-14	45	
% Domestic Gardens	-24	-16	28	16	-47	
% Non-Domestic Buildings	24		-34		51	
% Greenspaces	-23		24		-39	14
<b>Social indicators</b>						
Turnout Borough election	-15		30	18	-37	34
Total crime rate			-29		34	
Income rank		15		39	-34	59
Employment rate rank			16	39	-44	48

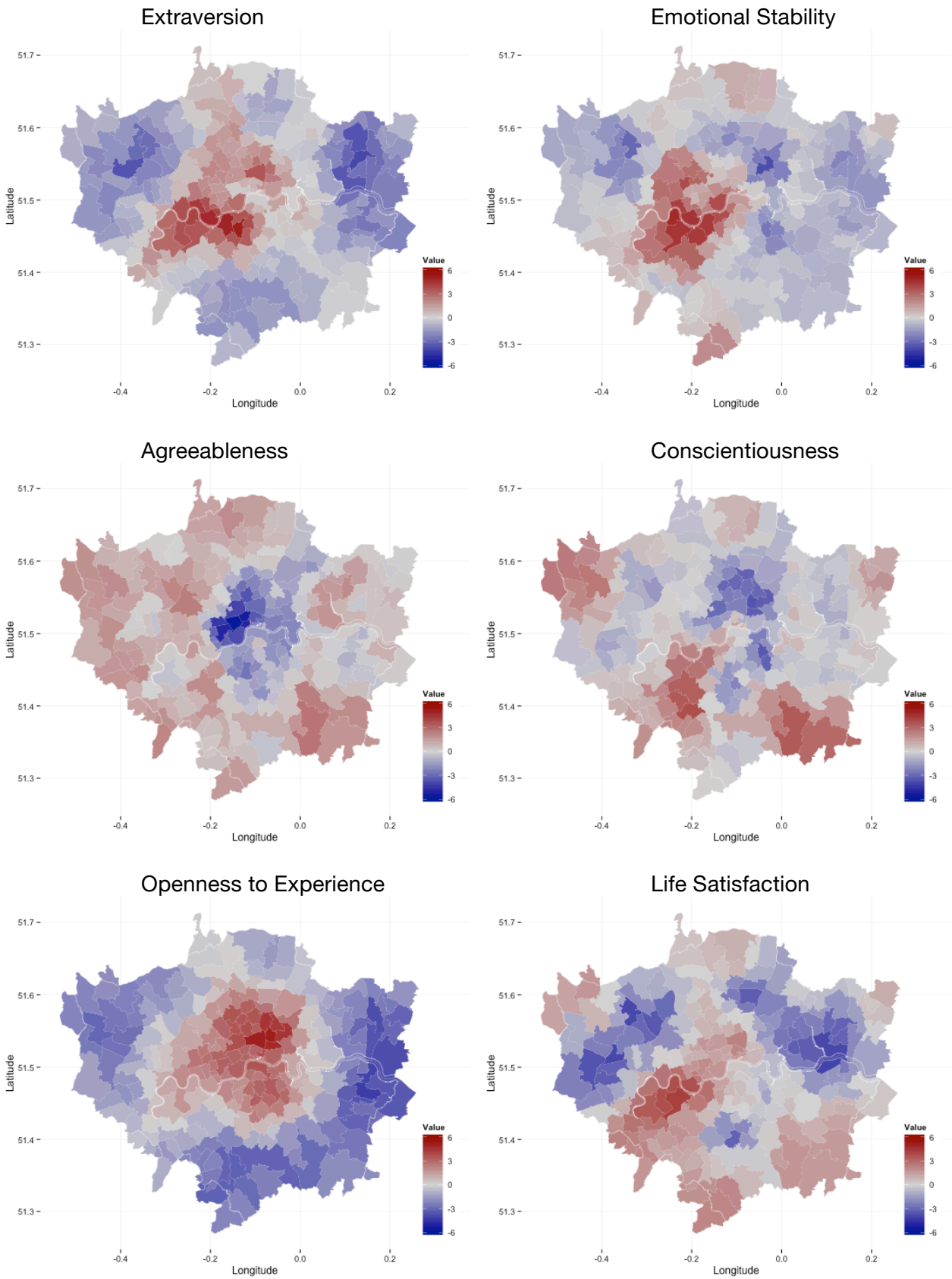
Note: Correlations are reported as  $r * 100$ . All correlations with absolute value  $\geq 14$  are statistically significant ( $n=216$  postal districts) and only these correlations are shown. The full correlation table is shown in Supplementary Table 2. E=Extraversion, S=Emotional stability (low Neuroticism), A=Agreeableness, C=Conscientiousness, O=Openness to Experience, LS=Life satisfaction

**Table 2.** Selected sociodemographic and personality correlates of regression slopes of personality scores predicting life satisfaction in different postcode districts.

	<b>E</b>	<b>S</b>	<b>A</b>	<b>C</b>	<b>O</b>
<b>Population structure</b>					
% Older people (65+)				-23	-27
% Couple households with children			24		-35
% Lone-parent households				25	
Fertility rate			24		
Mortality rate				19	
Population density					33
% Christian religion					-25
% White ethnic background			-17	-14	-22
<b>Physical environment &amp; Housing</b>					
Mean house price			-22	-17	19
% Domestic Buildings					25
% Domestic Gardens			14		-21
% Non-Domestic Buildings					27
% Greenspaces					-22
<b>Social indicators</b>					
Turnout Borough election				-22	-17
Total crime rate					15
Income rank				-22	-17
Employment rate rank				-23	-20
<b>Psychological variables</b>					
Extraversion			-16	-18	20
Emotional stability					
Agreeableness					-13
Conscientiousness				-19	-16
Openness to experience			-18		47
Life satisfaction			-27	-30	

Note: Correlations are reported as  $r * 100$ . All correlations with absolute value  $\geq 14$  are statistically significant ( $n=216$  postcode districts) and only these are shown. The full correlation table is shown in Supplementary Table 3.

E=Extraversion, S=Emotional stability (low Neuroticism), A=Agreeableness, C=Conscientiousness, O=Openness to Experience



**Figure 1.** Clustering of high (red) and low (blue) values of personality traits and life satisfaction. Values are Getis-Ord  $G^*$  estimates with values above 1.96 and below -1.96 indicating statistically significant clustering. The outline of the Thames River running through London is shown in white.

# **Geographically varying associations between personality and life satisfaction in the London metropolitan area**

*Online Supplementary Material*

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**Table 1.** Correlations between personality traits and life satisfaction at the level of postal districts (lower left triangle, n=216) and individuals (upper right triangle, n=56,019).

	1	2	3	4	5	6
1 Extraversion	-	0.32	0.14	0.13	0.22	0.28
2 Emotional stability	0.46	-	0.32	0.23	0.06	0.38
3 Agreeableness	-0.14	0.17	-	0.23	0.05	0.20
4 Conscientiousness	0.01	0.38	0.34	-	-0.01	0.24
5 Openness to Experience	0.57	0.10	-0.38	-0.36	-	0.00
6 Life satisfaction	0.45	0.45	0.00	0.37	0.14	-

Note: For postal districts, all correlations with  $|r| \geq 0.14$  are statistically significant ( $p < 0.05$ ). For individuals, all correlations are significant.

**Supplementary Table 1.** Sociodemographic correlates of mean-level scores of personality and life satisfaction of postcode districts.

	<b>E</b>	<b>S</b>	<b>A</b>	<b>C</b>	<b>O</b>	<b>LS</b>
<b>Population structure</b>						
% Children	-31	-17	24	-14	-23	-52
% Older people (65+)	-30	-5	29	31	-58	25
% Couple households with children	-48	-20	40	11	-68	-26
% Lone-parent households	-7	-17	-4	-34	20	-60
Fertility rate	-31	-13	26	-9	-22	-51
Mortality rate	-10	-24	0	-22	4	-33
Population density	42	13	-33	-26	61	-4
% Christian religion	-15	9	8	34	-43	37
% White ethnic background	-1	13	2	36	-31	60
<b>Physical environment &amp; Housing</b>						
Mean house price	42	27	-31	5	42	44
% Domestic Buildings	36	10	-20	-14	45	-4
% Domestic Gardens	-24	-16	28	16	-47	-8
% Non-Domestic Buildings	24	11	-34	-12	51	5
% Roads	36	12	-39	-19	61	-4
% Railways	9	6	-5	-17	30	-13
% Paths	18	5	-33	-18	37	-7
% Greenspaces	-23	-5	24	10	-39	14
% Water	-1	12	-8	8	6	3
<b>Social indicators</b>						
Turnout Borough election	-15	-3	30	18	-37	34
Total crime rate	6	1	-29	-8	34	-2
Income rank	-3	15	9	39	-34	59
Employment rate rank	-13	11	16	39	-44	48
% receiving work incapability support	1	-11	-11	-37	33	-50
% receiving income support	3	-12	-14	-38	36	-53
<b>Occupational structure</b>						
Agriculture, mining, and utilities	-3	-12	2	-3	0	-13
Manufacturing	-31	-22	8	-10	-19	-37
Construction	-32	-15	19	11	-44	-1
Retail, Wholesale and Motor Trades	-20	-10	21	3	-26	-25
Transport & storage	-16	-9	9	-4	-13	-30
Accommodation & food services	28	19	-11	7	16	26
Information & communication	25	26	-12	0	19	31
Financial & insurance	2	4	-14	8	14	12
Property	32	7	-18	-5	40	11
Professional, scientific & technical	31	27	-19	9	30	48
Business administration & support services	-1	5	-10	4	-5	2
Public administration & defence	5	8	0	-12	14	-21
Education	-16	-13	4	-4	-16	-12
Health	1	-15	8	-4	3	-4
Arts, entertainment, recreation & other services	19	17	2	-6	15	28

Note: Correlations are reported as  $r * 100$ . All correlations with absolute value  $\geq 14$  are statistically significant ( $n=216$  postcode districts).

E=Extraversion, S=Emotional stability (low Neuroticism), A=Agreeableness, C=Conscientiousness, O=Openness to Experience, LS=Life satisfaction



**Supplementary Table 2.** Sociodemographic correlates of regression slopes of personality scores predicting life satisfaction in different postcode districts.

	<b>E</b>	<b>S</b>	<b>A</b>	<b>C</b>	<b>O</b>
<b>Population structure</b>					
% Children	-8	3	27	14	-15
% Older people (65+)	2	5	-6	-23	-27
% Couple households with children	-2	-2	24	-4	-35
% Lone-parent households	-6	2	13	25	11
Fertility rate	-8	0	24	10	-7
Mortality rate	-5	1	11	19	-2
Population density	-4	2	-5	13	33
% Christian religion	-1	4	-8	-3	-25
% White ethnic background	-1	6	-17	-14	-22
<b>Physical environment &amp; Housing</b>					
Mean house price	4	-4	-22	-17	19
% Domestic Buildings	-10	-3	-1	6	25
% Domestic Gardens	-5	0	14	-9	-21
% Non-Domestic Buildings	3	3	-13	8	27
% Roads	-7	4	-10	8	34
% Railways	8	-2	-2	0	21
% Paths	-4	-9	-4	5	25
% Greenspaces	4	2	-1	-8	-22
% Water	8	-9	-2	2	-8
<b>Social indicators</b>					
Turnout Borough election	2	-1	7	-22	-17
Total crime rate	0	4	-9	4	15
Income rank	7	1	-8	-22	-17
Employment rate rank	1	1	-1	-23	-20
% receiving work incapability support	-8	6	5	28	13
% receiving income support	-10	4	6	27	17
<b>Occupational structure</b>					
Agriculture, mining, and utilities	20	-4	3	12	-3
Manufacturing	11	-13	24	22	-5
Construction	2	-5	-6	-3	-23
Retail, Wholesale and Motor Trades	-2	-9	14	1	-16
Transport & storage	0	-5	18	11	-20
Accommodation & food services	0	4	-9	-10	12
Information & communication	1	0	-6	-4	7
Financial & insurance	-2	-3	-14	-2	9
Property	-10	-6	-14	-10	25
Professional, scientific & technical	15	4	-18	-17	14
Business administration & support services	-2	4	0	-1	-2
Public administration & defence	10	14	8	10	13
Education	-15	7	4	-6	-9
Health	-1	3	-3	8	1
Arts, entertainment, recreation & other services	-12	-4	-6	-11	14

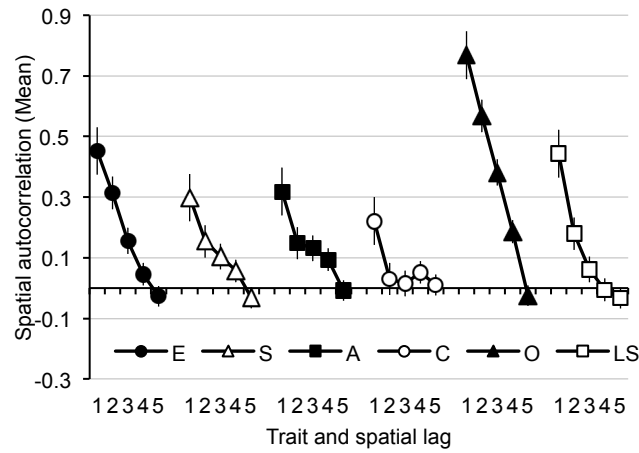
Note: Correlations are reported as  $r * 100$ . All correlations with absolute value  $\geq 14$  are statistically significant ( $n=216$  postcode districts).

E=Extraversion, S=Emotional stability (low Neuroticism), A=Agreeableness, C=Conscientiousness, O=Openness to Experience, LS=Life satisfaction

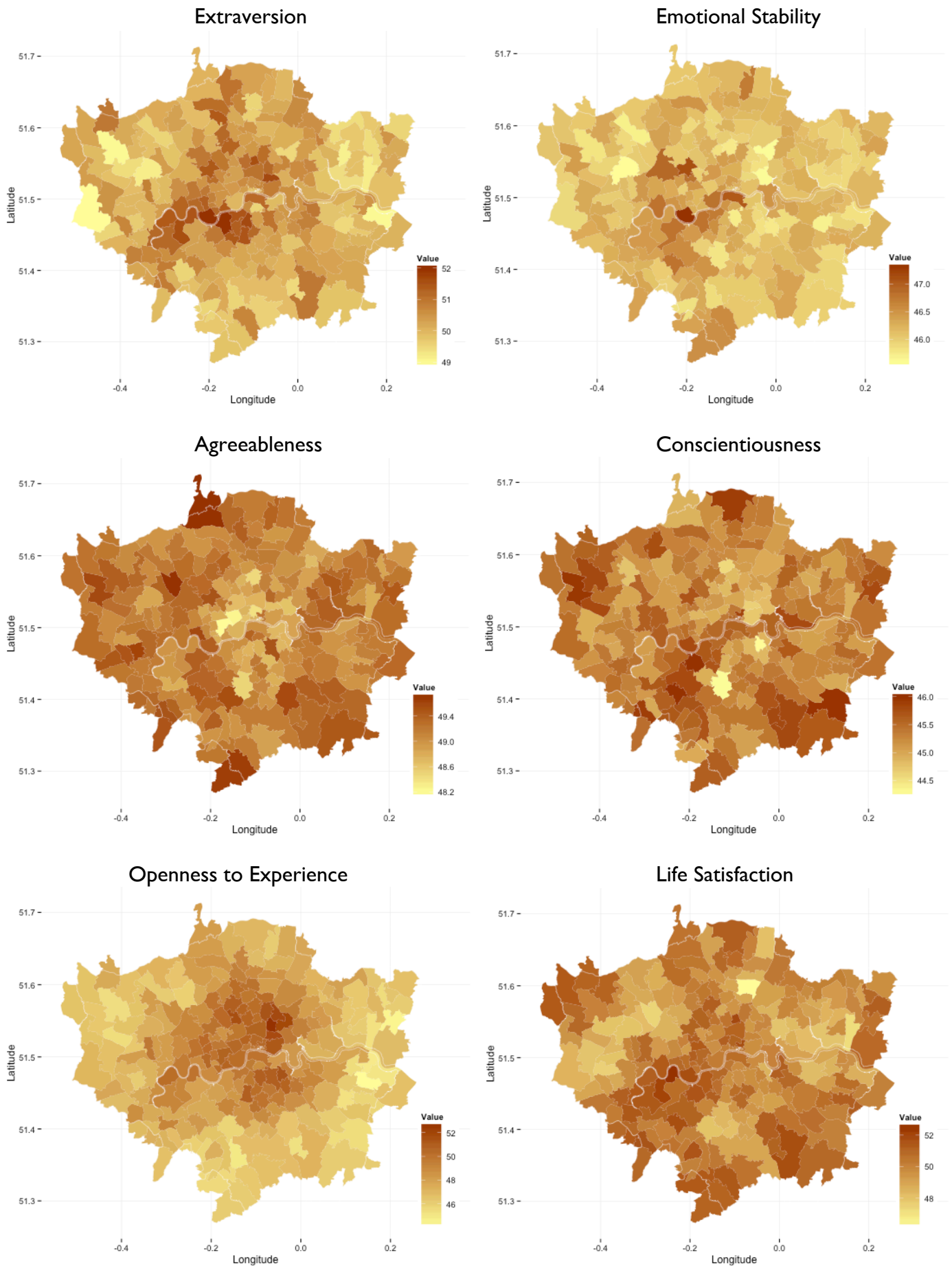
Supplementary Table 3. Descriptive statistics of the sample

Variable	Mean (SD) or Percentage
Sex (%)	
Women	63.3
Men	36.7
Age	33.2 (12.2)
Ethnic group (%)	
White	74.0
Other	26.0
Relationship status (%)	
Not in a relationship	34.2
Married	27.3
Living together	19.2
Not married or living together	19.3
Education (%)	
A-levels or less	25.9
Undergraduate degree	34.5
Postgraduate degree	22.6
Currently studying	17.0
Total gross income of household (%)	
<£10,000	6.8
£10,000-£19,999	10.1
£20,000-£29,999	16.0
£30,000-£39,999	12.9
£40,000-£49,999	8.4
£50,000-£74,999	11.0
>£50,000	12.1
Personality (BFI-44)	
Extraversion	26.4 (6.5)
Neuroticism	23.7 (6.5)
Agreeableness	33.2 (5.6)
Conscientiousness	32.3 (6.4)
Openness to Experience	37.9 (6.3)
Life satisfaction	23.3 (7.1)

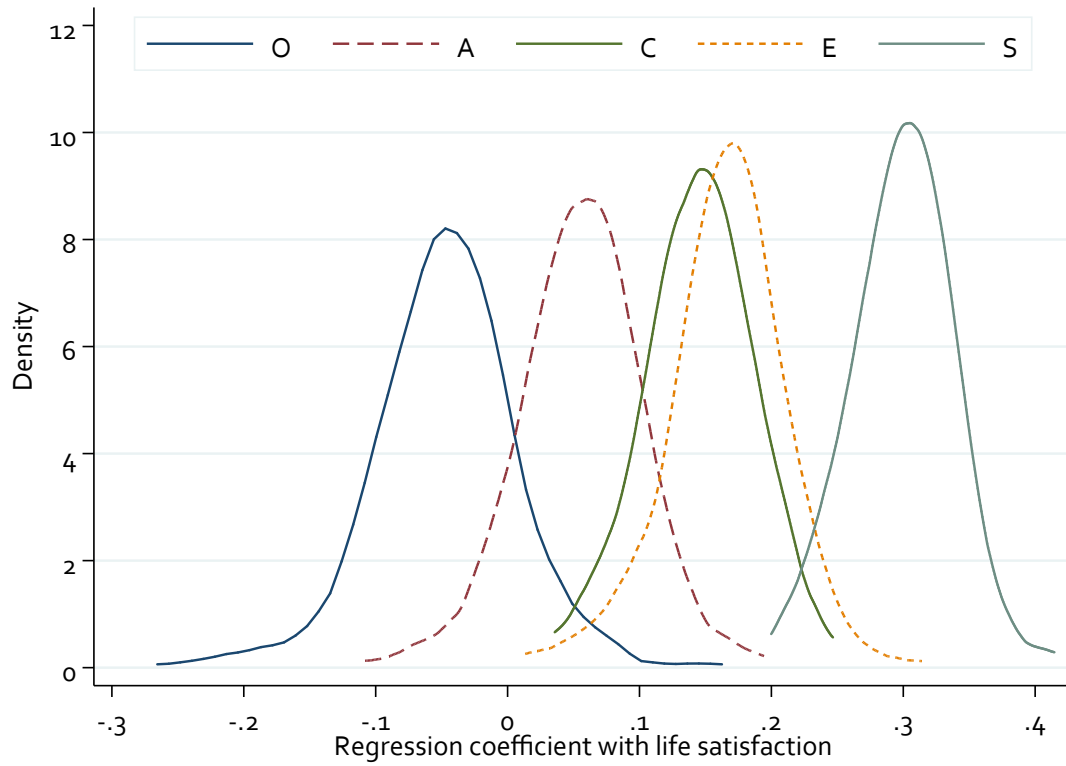
n=56,019



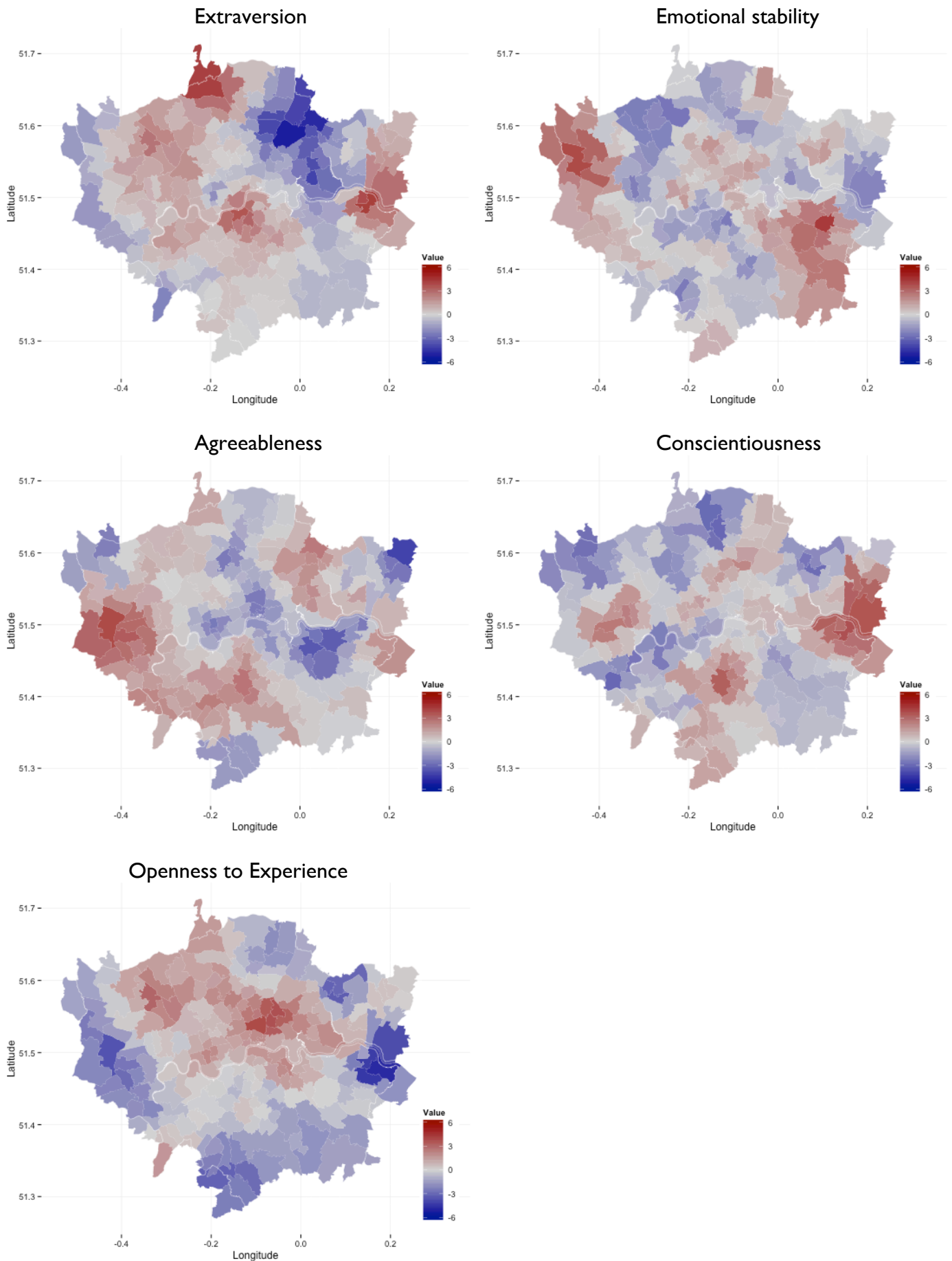
**Supplementary Figure 1.** Spatial autocorrelations for average scores of personality traits and life satisfaction across 216 postal districts of London metropolitan areas at different spatial lags. Spatial autocorrelations were calculated using Moran’s I coefficient with queen’s adjacency matrix of the neighboring districts. E=extraversion, S=emotional stability, A=agreeableness, C=conscientiousness, O=openness, LS=life satisfaction. The numbers on the x-axis denote spatial lag distances (1=autocorrelation with neighbors, 2=autocorrelation with neighbors of neighbors, etc.). Error bars are 95% confidence intervals.



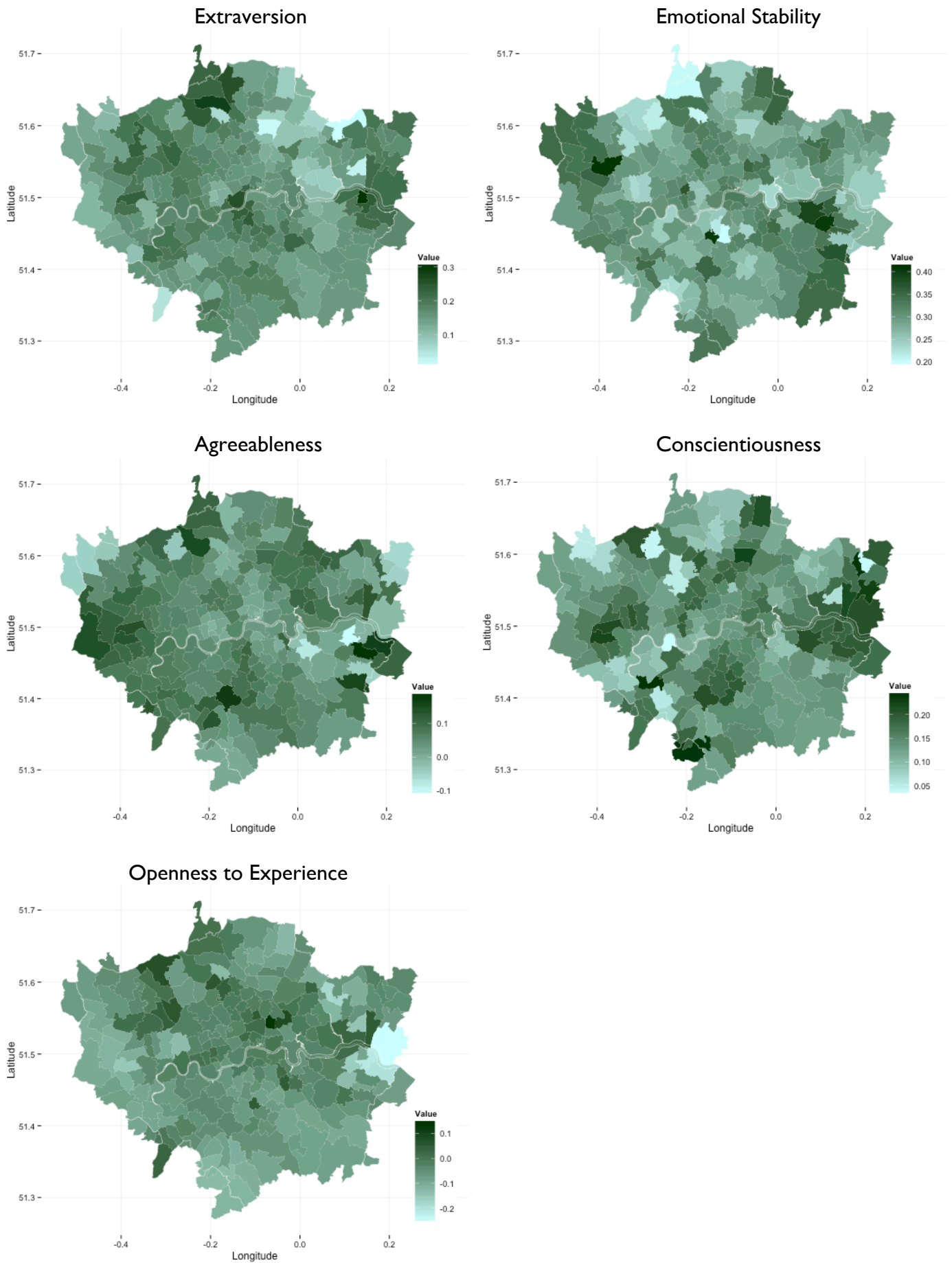
**Supplementary Figure 2.** Mean-level scores of personality and life satisfaction of postal districts in Greater London. All traits are standardized as T-scores (mean=50, sd=10). Notice the differences in scales of different traits.



**Supplementary Figure 3.** Distributions of regression coefficients for personality traits in predicting life satisfaction in different postal districts.



**Supplementary Figure 4.** Spatial clustering of high (red) and low (blue) values of regression coefficients for personality traits in predicting life satisfaction. Values are  $G^*$  estimates of Getis-Ord analysis, with values above 1.96 and below -1.96 indicating statistically significant clustering.



**Supplementary Figure 5.** Spatial distribution of raw regression slopes of personality traits in predicting life satisfaction in different postal districts. Notice the differences in scales of different traits.

