A SHARED GENETIC BASIS FOR PERSONALITY TRAITS AND LOCAL CORTICAL GREY MATTER STRUCTURE?

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Abstract

Personality traits are key indices of inter-individual variation. Personality is heritable and has been associated with brain structure and function. To date, it is unknown whether the relation between personality and brain macrostructure can be explained by genetic factors. In a large-scale twin sample (Human Connectome Project), we performed genetic correlation analyses to evaluate whether personality traits (NEO-FFI) and local brain structure have a shared genetic basis. We found a genetic overlap between personality traits and local brain structure in 11 of 22 observed phenotypic associations in predominantly frontal cortices. In these regions the proportion of phenotypic covariance accounted for by shared genetic effects was between 82 and 100%. Second, in the case of Agreeableness, Conscientiousness, and Openness, the phenotypic correlation between personality and local brain structure was observed to reflect genetic, more than environmental, factors. These observations indicate that genetic factors influence the relationship between personality traits and local brain structure. Importantly, observed associations between personality traits and cortical thickness did only partially replicate in two independent large-scale samples of unrelated individuals. Taken together, our findings demonstrate that genes impact the relationship between personality and local brain structure, but that phenotypic associations are, to a large extent, non-generalizable. These observations provide a novel perspective on the nature and nurture of the biological basis of personality.

Personality is "an individual's characteristic patterns of thought, emotion, and behavior, together with the psychological mechanisms behind those patterns" [1]. Behavioral science ascertains personality structure using a statistical construct that parcellates the individual variability in goals, cognition, and emotion into independent components [2]. A common personality taxonomy is the Big Five Personality inventory [3-5]. The Five-factor personality structure (NEO- Five-Factor-Inventory – NEO-FFI) [6,7] derives five orthogonal dimensions or traits of Agreeableness (friendly/compassionate vs. challenging/detached), Conscientiousness (efficient/organized vs. easy-going/careless), Extraversion (outgoing/ energetic vs. solitary/reserved), Neuroticism (sensitive/nervous vs. secure/confident), and Openness (inventive/curious vs. consistent/cautious). Personality traits have been related to the quality of social relationships [10], job performance [11], risk for mental disorders [12,13], general health and wellbeing, and reproductive success [8,9].

Personality has both stable and malleable features [14-16] and has been found heritable with approximately 40% of the variance attributable to additive genetic factors [17-22]. Evolutionary causes for variability in personality traits have been suggested to be due to balancing selection, where selection pressures in different directions affect the same traits enabling adaptation to changing environmental demands [16]. Indeed, genome-wide association studies (GWAS) have reported a large number of genetic variants associated with personally traits with each tiny individual effects contributing to the heritability of personality [23-27].

The biological basis of personality has also been studied in relation to macroscale brain structure and function using magnetic resonance imaging (MRI) [28-31]. While various studies found some phenotypic relationship between brain structure and personality traits, findings have been inconsistent [28-31]. For instance, researchers failed to observe significant relations between personality and various markers of brain structure using the largest sample to date [32]. At the same time, using a similarly sized sample including monozygotic and dizygotic twins, Owens and colleagues [33] report significant phenotypic relationships between personality traits and various markers of cortical structure. For example, Owens and colleagues observed associations between Agreeableness, Conscientiousness, Neuroticism, and Openness with morphometry in prefrontal areas.

Phenotypic associations between personality and brain structure may be due to shared genetic factors. Specifically, phenotypic correlation between two traits can be driven by pleiotropy where a gene exerts effects on both traits, or affects trait A which in turn affects trait B. On the other hand, phenotypic correlation between brain structure and personality may also be driven by environmental factors including upbringing, stress, or social influences. Genetic correlation analysis can separate between shared additive genetic and environmental factors by using the genetic similarity between individuals (monozygotic twins have ~100% and dizygotic twins and siblings ~50% genetic similarity). To compute the genetic correlation between two traits the phenotypic correlation is decomposed in genetic and environmental sources of covariance using a maximum likelihood approach in combination with the genetic proximity matrix of the sample [34,35]. Additionally, the heritability of both traits is established to compute the relative contribution of genetic and environmental factors to the phenotypic correlation.

In the current study we combined structural neuroimaging of cortical thickness and behavioral genetics to evaluate whether the phenotypic covariance between personality traits and cortical thickness is associated with shared additive genetic or environmental effects or both. The Human Connectome Project young adult sample is unique in that it provided us with high quality neuroimaging and personality trait (NEO-FFI) data in a large number of twins, siblings, and unrelated individuals. We captured variations in brain morphometry using an atlas-based approach, dividing the cortex in 200 functionally-defined parcels [36,37]. Analysis of heritability and genetic correlation was performed using maximum likelihood variance-decomposition methods using Sequential Oligogenic Linkage Analysis Routines (www.solar-eclipse-genetics.org; Solar Eclipse 8.4.0.). Heritability (h^2) is the total additive genetic variance, and genetic (ρ_g) and environmental (ρ_e) correlations were estimated using bivariate polygenic analyses. To evaluate the existence of a shared genetic basis of personality traits and brain structure we performed multiple analyses. First, we computed the phenotypic correlation between personality traits and local brain structure in the HCP sample and we assessed to what extend significant phenotypic correlations reflected shared genetic, or environmental, processes. In addition, we performed exploratory whole brain analysis to assess whether regions showed significant genetic, or environmental, correlation independent of the strength of phenotypic correlations. Next, to evaluate whether genetic, above and beyond environmental, processes reflect phenotypic correlations between personality traits and local brain structure, we computed the correlation between the proportion of genetic versus environmental contributions to phenotypic associations on the one hand, and phenotypic associations on the other. Last, to assess whether observed associations between personality and local brain structure in the HCP sample were generalizable and reflect phenotypic associations in independent, unrelated, samples, we selected two large-scale samples (Genome superstructure project – GSP (n=926) and enhanced Nathan Kline Institute dataset – eNKI (n=792)) of unrelated individuals in which we computed phenotypic correlations between personality traits and cortical thickness. Here, the primary goal was to evaluate whether significant phenotypic associations between personality traits and local cortical thickness observed in the HCP sample could be replicated in samples of unrelated individuals. Additionally, we explored whether genetic or environmental sources of phenotypic covariance computed in the HCP sample would show a positive relationship with phenotypic associations observed in both independent samples at the whole brain level.

Results

Phenotypic correlation between personality traits and cortical thickness

To assess the relation between personality and macroscale brain structure we first evaluated distribution of behavioral and structural brain measures. Using the Kolmogorov-Smirnov test we found that all personality traits in the HCP sample (n=1106 including 286 MZ-twins and 170 DZ-twins) were conform to normal distributions (KS-score between 0.97 and 1) (Figure 1A). We observed significant phenotypic correlation between all personality traits, with the exception of Openness and Extraversion (Spearman's ρ (ρ_s) = 0.09, p<0.05) and Openness and Neuroticism (ρ_s =0.00) (Figure 1B, Supplementary Table 1). Distribution of cortical thickness values summarized in 200 functionally informed parcels [36] showed highest thickness in anterior insula, and relatively low values in occipital regions (Figure 1B).

Next, we assessed phenotypic correlation between personality traits and cortical thickness parcels. Overall, associations between personality traits and local cortical thickness were weak and ranged between ρ_s -0.15 and 0.15. We observed significant (FDR, corrected for number of parcels, Supplementary Table 2) correlations between Agreeableness, Neuroticism, and Openness and local cortical thickness. Specifically, Agreeableness related negatively to variations in thickness in left lateral and medial prefrontal cortex (FDRq<0.0125). Neuroticism related positively to thickness in dorsolateral frontal areas and left posterior operculum, and negatively to thickness in posterior mid-temporal cortex and occipital regions (FDRq<0.015). Openness related negatively to thickness in bilateral ventrolateral cortex, and positively to left inferior temporal regions, right temporal pole, and right cuneus (FDRq<0.01) (Supplementary

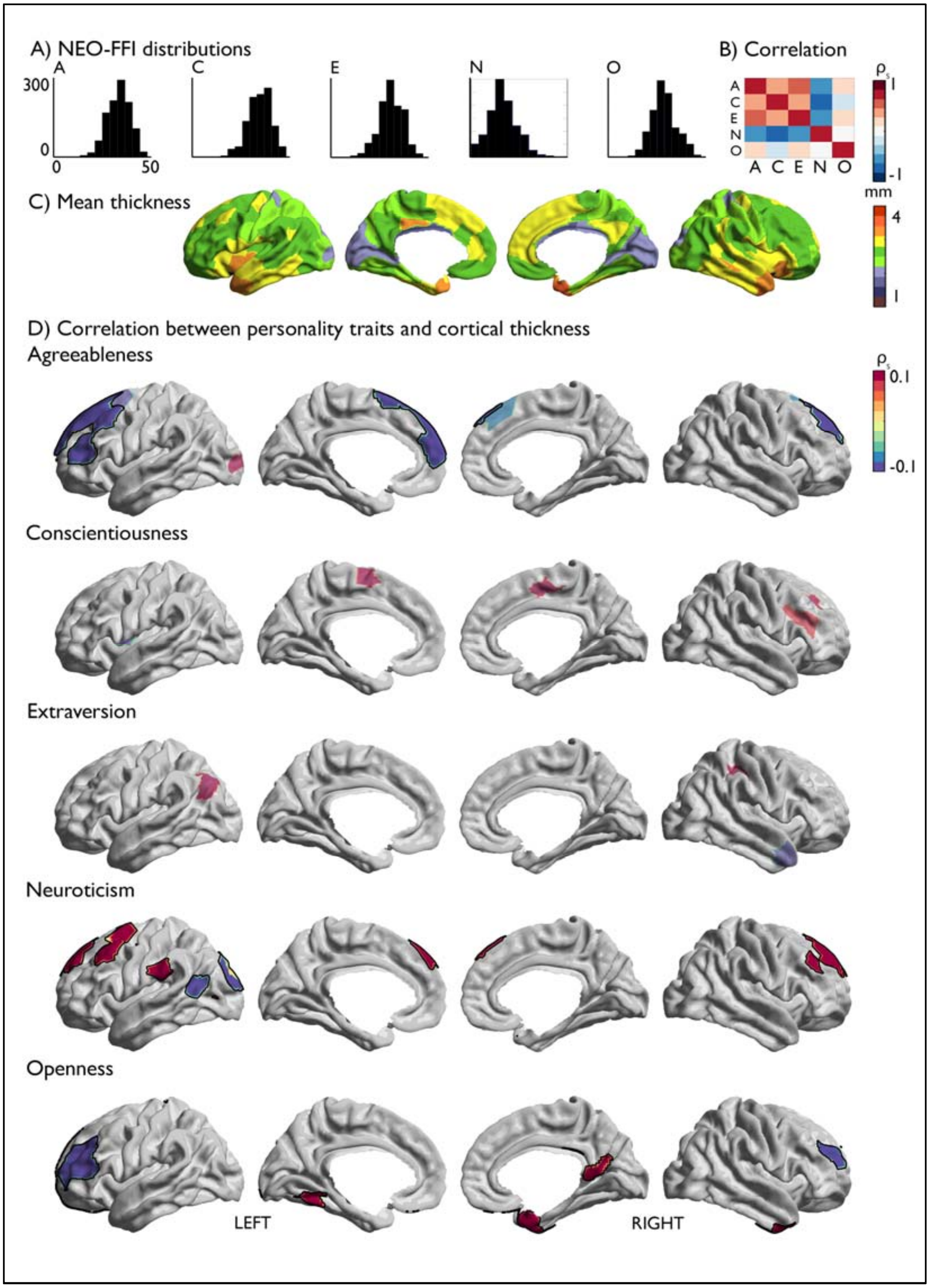

Figure 1. Significant relation between personality traits and local cortical thickness in the full HCP sample. Positive ρ_s between local cortical thickness and each personality trait is displayed in red and negative ρ_s is displayed in blue. Multiple comparisons were accounted for by using FDR corrections at $p<0.05$ correcting for the number of parcels (200), and delineated with black outlines. Uncorrected associations are displayed at $p<0.01$.

Table 2). Agreeableness, Conscientiousness, Neuroticism, and Openness all showed significant correlations with total cognition score (Supplementary Table 3) and associations between personality traits and local brain structure were reduced when controlling for total cognitive score (Supplementary Figure 1). Post-hoc analysis showed that the relation between cortical thickness and personality was partially mediated by intelligence (Supplementary Table 4).

Genetic influence on the relationship between personality traits and local cortical thickness.

Subsequently, we sought to evaluate whether the phenotypic correlations observed in the twin-sample were due to shared genetic or environmental effects on grey matter brain structure and personality traits. All personality traits were significantly heritable in our current sample (Figure 2A, Supplementary Table 5), and we confirmed also cortical thickness to be heritable in our parcel-based approach (Figure 2B, Supplementary Table 6). Next, we assessed genetic correlation analyses between personality traits and cortical structure. Please see supplementary tables 7-11 for tables with genetic and environmental correlations between personality traits and all parcels.

First, we investigated the genetic influence on the phenotypic correlation observed between personality traits and cortical thickness. 11 of 22 previously reported significant (FDRq<0.05) phenotypic correlations in the HCP sample showed genetic correlations at $p<0.05$, and in these regions proportional genetic effects accounted for between 82 to 100% of phenotypic variance (Supplementary Table 12). Specifically, associations between Agreeableness and the parcels in left dorsolateral prefrontal cortex

(*7Networks_LH_Default_PFC_11*, ρ_s =-0.12; ρ_g = -0.36, p<0.004; ρ_e = 0.01, p=ns, $\rho_{ph}g$ = -0.13 (104%), $\rho_{ph}e$ = 0.005 (-4%)), left superior frontal cortex (*7Networks_LH_Default_PFC_13*, ρ_s =-0.11; ρ_g = -0.26, p<0.03; ρ_e = -0.02, p=ns, $\rho_{ph}g$ = -0.10 (87%), $\rho_{ph}e$ = -0.01 (13%)) and right superior frontal regions (*7Networks_RH_Default_PFCm_5*, ρ_s =-0.11; ρ_g = -0.33, p<0.005; ρ_e = 0.03, p=ns, $\rho_{ph}g$ = -0.12 (117%), $\rho_{ph}e$ = 0.02 (-17%)) could be attributed to genetic factors. For Neuroticism, genetic factors could be associated with phenotypic relationships in left frontal eye fields (*7Networks_LH_DorsAttn_FEF_2*, ρ_s =0.10; ρ_g = 0.27, p<0.03; ρ_e = -0.03, p=ns, $\rho_{ph}g$ = 0.10 (120%), $\rho_{ph}e$ = -0.02 (-20%)), right dorsolateral frontal regions (*7Networks_RH_Cont_PFCl_6*, ρ_s =0.10; ρ_g = 0.26, p<0.04; ρ_e = 0.03, p=ns, $\rho_{ph}g$ = 0.09 (82%), $\rho_{ph}e$ = 0.02 (18%)), and right superior prefrontal regions (*7Networks_RH_Default_PFCm_5*, ρ_s =0.12; ρ_g = 0.21, p<0.05; ρ_e = 0.04, p=ns, $\rho_{ph}g$ = 0.09 (79%), $\rho_{ph}e$ = 0.02 (21%)). In the case of Openness, genetic factors could be associated with phenotypic correlations with left inferior temporal regions (*7Networks_LH_Vis_1*, ρ_s =0.10; ρ_g = 0.25, p<0.005; ρ_e = -0.05, p=ns, $\rho_{ph}g$ = 0.12 (125%), $\rho_{ph}e$ = -0.02 (-25%)), left lateral frontal cortex (*7Networks_LH_SalVentAttn_PFCl_1*, ρ_s =-0.11; ρ_g = -0.20, p<0.02; ρ_e = -0.01, p=ns, $\rho_{ph}g$ = -0.10 (94%), $\rho_{ph}e$ = -0.01 (6%)), left frontopolar cortex (*7Networks_LH_Cont_PFCl_3*, ρ_s =-0.12; ρ_g = -0.18, p<0.05; ρ_e = -0.03, p=ns, $\rho_{ph}g$ = -0.08 (87%), $\rho_{ph}e$ = -0.01 (13%)), right temporal pole (*7Networks_RH_Limbic_TempPole_1*, ρ_s =0.11; ρ_g = 0.37, p<0.005; ρ_e = -0.01, p=ns, $\rho_{ph}g$ = 0.12 (102%), $\rho_{ph}e$ = -0.00 (-2%)), and right (pre-)cuneus

(*7Networks_RH_Default_PCC_1*, ρ_s =0.10; ρ_g = 0.19, p<0.05; ρ_e = 0.00, p=ns, $\rho_{ph}g$ = 0.09 (99%), $\rho_{ph}e$ = 0.00 (1%)). 2 of 22 previously reported significant (FDRq<0.05) phenotypic correlations in the HCP sample showed environmental correlations at p<0.05, both in the left dorsolateral frontal cortex, in the case of Agreeableness (*7Networks_LH_Cont_PFCl_4*, ρ_s =-0.12; ρ_g = -0.08, p=ns; ρ_e = -0.12, p=0.04, $\rho_{ph}g$ = -0.02 (20%), $\rho_{ph}e$ = -0.09 (80%)) and for Openness (*7Networks_LH_Cont_PFCl_4*, ρ_s =-0.13; ρ_g = -0.15, p=ns; ρ_e = -0.13, p=0.05, $\rho_{ph}g$ = -0.06 (46%), $\rho_{ph}e$ = -0.07 (54%)).

Next, we performed exploratory whole brain analysis of genetic correlations between personality traits and cortical thickness to evaluate whether we could identify regions that showed significant genetic correlation with personality traits. Agreeableness showed genetic correlation (FDRq<0.05, corrected for number of parcels) with cortical thickness in left posterior superior/mid temporal sulcus (*7Networks_LH_Default_Temp_5*, ρ_s =0.03; ρ_g = 0.60, p<0.0005; ρ_e = -0.15, p<0.01), right superior frontal cortex extending to mid cingulate (*7Networks_RH_SalVentAttn_Med_3*, ρ_s =-0.04; ρ_g = -0.55, p<0.0004; ρ_e =0.18, p<0.005), and right dorsolateral frontal cortex (*7Networks_RH_Default_PFCm_6*, ρ_s =-0.02; ρ_g = -0.51, p<0.0006; ρ_e =0.21, p<0.0004). For proportional distributions of genetic and environmental factors contributing to the total phenotypic correlation in these regions see Supplementary Table 13. Quantitative functional decoding using the BrainMap database [38] (Supplementary Figure 1) indicated that the left posterior superior-mid temporal sulcus was related to various forms of language processing (p<0.05), whereas the left superior frontal / mid cingulate parcel was related to action imagination and execution, as well as cognition and perception, and the dorsolateral prefrontal cortex was found implicated in tasks involving memory and reasoning. Second, we observed a genetic correlation between Extraversion and left TPJ thickness (*7Networks_LH_Default_Temp_9*,

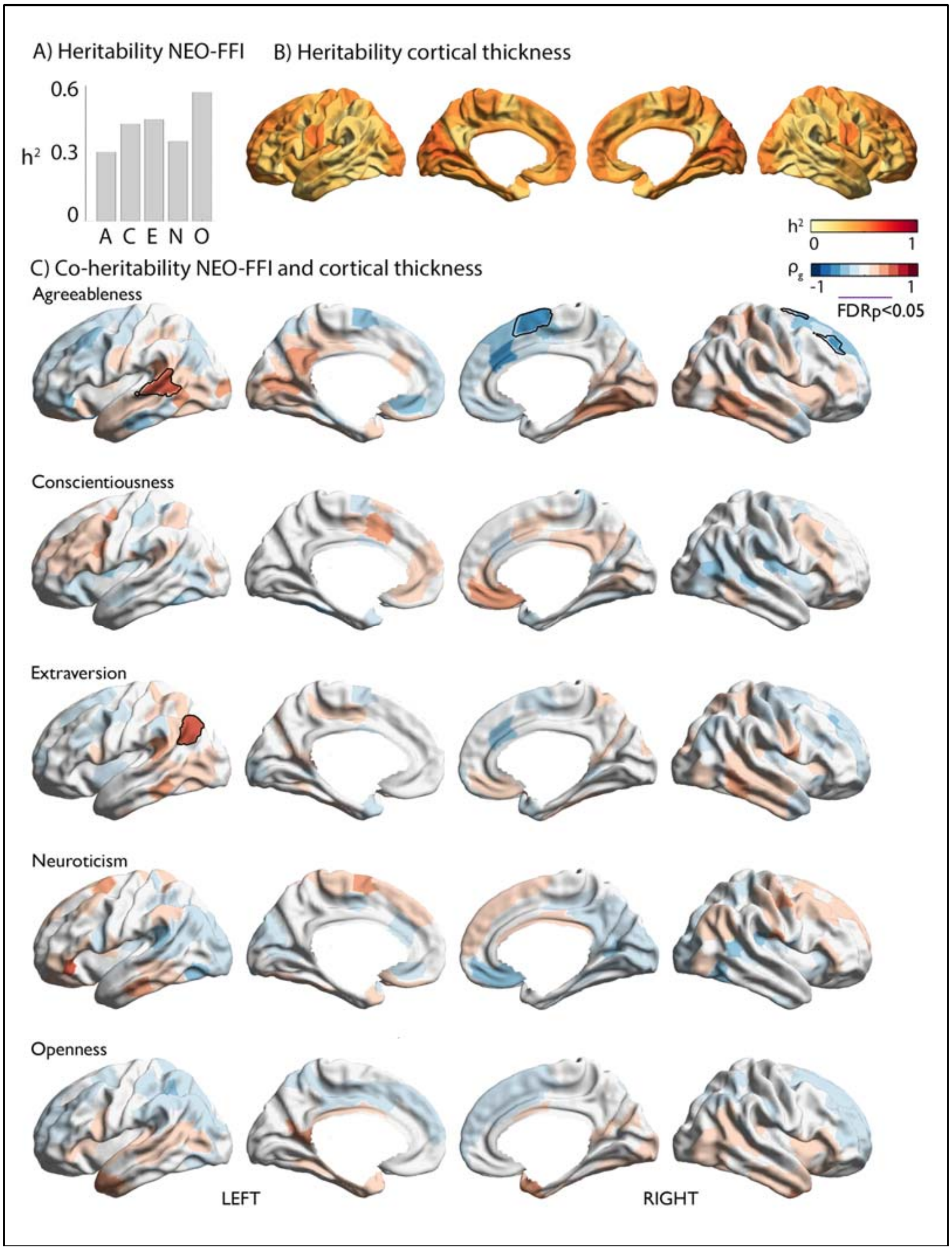

Figure 2. Genetic correlation between personality traits and cortical thickness. Upper panel depicts the heritability of A) personality and B) cortical thickness, see Supplementary Table 5 and 6 for exact heritability values. Lower panels are genetic correlation between cortical thickness and personality traits, red values indicate positive associations whereas blue values indicate negative genetic correlation between parcel-

wise thickness and personality traits. Findings at FDRq<0.05 are outlined in black. Table 7 - 11 for exact genetic correlation values

ρ_s =0.1, p<0.001; ρ_g = 0.49 p<0.00005; ρ_e = -0.11, p<0.05). Functional decoding linked the TPJ with cognitive and social cognitive processing (p<0.05) as well as reasoning and language (Supplementary Figure 2). Lastly, though we observed significant genetic correlation between intelligence (total cognitive score) and Agreeableness, Conscientiousness, Neuroticism, and Openness (Supplementary Table 3), genetic correlations between personality and cortical thickness remained similar when controlling for intelligence (Supplementary Figure 3), though genetic associations between Agreeableness and cortical thickness did not survive FDR corrections. We did not observe significant environmental correlations between cortical thickness and personality traits (Supplementary Figure 4).

Robustness and replication of associations between personality traits and local cortical thickness.

As we assessed phenotypic, genetic, and environmental correlations between personality traits and local cortical thickness, we sought to further evaluate the robustness of our observations. First, we evaluated whether the contribution of genetic factors relative to environmental factors positively related to phenotypic correlations in the HCP sample or rather the other way around. We observed significant positive association between the relative contribution of genetic factors with respect to the contribution of environmental factors ($\rho_{ph}g/\rho_{ph}e$) and the phenotypic correlation for Agreeableness (ρ_s = 0.20, p<0.004), Conscientiousness (ρ_s = 0.18, p<0.01), and Openness (ρ_s = 0.31, p<0.001), and in lesser extend Neuroticism (ρ_s = 0.15, p<0.05), but not for Extraversion (ρ_s = 0.06, p>0.1) (Supplementary table 15, Supplementary Figure 5). For all personality traits except Openness (ρ_{ph}g vs ρ_{ph}: ρ_s = 0.71, p<0.0001), we observed both significant associations between ρ_{ph}g and phenotypic correlations (0.48<ρ_{ph}g vs ρ_{ph} <0.60) as well as between ρ_{ph}e and phenotypic correlations (0.2<ρ_{ph}e vs ρ_{ph} <0.31) (Supplemental Figure 6, Supplementary Table 15).

Next, we evaluated whether the genetic contributions to the phenotypic correlation in our main sample (HCP) could also be associated with phenotypic correlations in independent samples. Our hypothesis was that genetic sources of phenotypic variance might be comparable across different independent samples, even if environmental sources of phenotypic covariance differ between samples. To perform these analyses, we selected two large-scale independent samples of unrelated individuals from the GSP sample (n=926), and eNKI sample (n=792). We observed few consistent cortical thickness – personality trait relationships across samples in regions that showed significant phenotypic associations with personality in the twin HCP dataset (Supplementary Table 2). In case of Neuroticism we could replicate a positive association with thickness of left frontal eye fields and right dorsolateral prefrontal cortex for GSP (p<0.05) but not eNKI. In case of Openness we could replicate a negative association with bilateral dorsolateral prefrontal cortex in eNKI (p<0.05), but not GSP. (See Supplementary results for whole brain phenotypic associations between personality traits and cortical thickness in the GSP and eNKI samples). Significant genetic correlations (based on Figure 2) were not consistently associated with phenotypic correlations in the GSP and eNKI samples (Supplementary Table 16). However, when evaluating whole brain patterns of associations between local brain structure and personality traits, we observed that whole brain patterns of phenotypic correlation between Openness, but no other personality trait, and local brain structure correlated with whole brain phenotypic correlational patterns in both GSP ($\rho_s = 0.43$, $p<0.001$) and eNKI ($\rho_s = 0.21$, $p<0.005$) samples (Supplementary Table 17 and 18, Supplementary Figure 7). This association was also reflected in genetic (GSP: $\rho_s = 0.35$, $p<0.001$; eNKI: $\rho_s = 0.19$, $p<0.01$), but not environmental (GSP: $\rho_s = 0.08$, $p>0.2$; eNKI: $\rho_s = -0.08$, $p>0.2$) correlation patterns.

Discussion

Personality and macroscale brain structure are both heritable, raising the question whether phenotypic relationships between personality and brain structure are driven by shared additive genetic effects or rather by non-genetic processes. In the current study, we used the large scale and openly available HCP dataset which included monozygotic and dizygotic twins to study the genetic correlation between local brain structure and personality traits. First, we identified phenotypic associations between personality traits and local brain structure. Agreeableness had negative associations with local thickness of regions in bilateral frontal cortices, Neuroticism showed positive associations with local thickness of superior frontal cortices and left supramarginal gyrus, and Openness showed negative associations with local thickness of bilateral lateral frontal cortices as well as positive associations with left inferior temporal regions, right temporal pole, and right pre-cuneus. In line with previous studies, personality traits and local cortical thickness were significantly heritable in the current sample. Half (11/22) of the regions that were observed to show significant phenotypic correlations showed genetic correlations at $p<0.05$. The proportional contribution of genetic effects was considerably larger than the contribution of environmental effects (82-100% vs 0-12%) in these areas. In exploratory whole brain analysis of genetic correlations, we additionally identified genetic associations between Agreeableness and local structure of the posterior-mid temporal, midcingulate, and dorsolateral frontal cortices, and between Extraversion temporoparietal junction. Follow-up analyses indicated that at the whole brain level genetic, relative to environmental components, showed a positive relationship with phenotypic correlation patterns for Agreeableness, Conscientiousness, and Openness. Together, these observations suggest that shared genetic mechanisms contribute to the association between personality traits and local brain structure.

To evaluate whether observed associations between personality traits and local brain structure were generalizable to other samples, we additionally studied phenotypic correlations between personality traits and brain structure in two independent samples of unrelated individuals (GSP and eNKI). Here, we could only partially replicate phenotypic associations between personality and local brain structure in regions that showed significant phenotypic associations in the HCP sample. Only whole brain patterns of phenotypic correlations between Openness and local brain structure were consistently comparable across samples. Interestingly, phenotypic associations between Openness and local thickness in GSP and eNKI showed positive association with genetic, but not environmental, correlations in the HCP sample.

In the current work we assessed the genetic basis of the association between personality and cortical thickness using compressed surface-based MRI data based on the parcellation scheme of Schaefer et al. Using compressed features of structural MRI has been suggested to both improve signal-to-noise of brain measures (cf. Eickhoff et al.[37] and Genon et al.[39]), and optimize analysis scalability. The Schaefer parcellation is derived using functional MRI data from ~1500 subjects and integrates local approaches detecting abrupt transitions in functional connectivity patterns and global approaches that cluster similar functional connectivity patterns [36]. Indeed, a combination of within-area micro circuitry, proxied by brain morphometry, and between-area connectivity enables each area to perform a unique set of computations [40]. Therefore, a parcellation approach that considers both local and global connectivity might benefit structural image analysis, as it reduces signal-to-noise both within and across individuals and makes control for multiple comparisons more straightforward [39]. Based on the findings in our study, we suggest our approach might be a fruitful first exploratory step to investigate the genetic relation between brain structure and behavior, and locate mechanisms of interest. Future studies can subsequently verify these results by exploring more specific genetic mechanisms, as well as neuroanatomical features.

Though we could establish phenotypic correlations between personality traits and local cortical thickness, associations were weak and phenotypic correlations ranged between Spearman's ρ -0.15 and 0.15. In the HCP dataset phenotypic correspondences between predominantly frontal regions and personality traits of Agreeableness, Neuroticism, and Openness have been previously reported using a non-parcel-based method by Owens and colleagues [33]. Frontal cortices have been previously reported to be functionally involved in a number of tasks involving higher cognitive functioning, such as executive functioning, metacognition and social cognition [41-46]. We extend previously reported phenotypic observations by showing that these phenotypic relationships between personality and local cortical thickness are driven, in part, by shared additive genetic effects rather than environmental factors alone. The contribution of genetic effects on phenotypic correlations is dependent on the heritability of each of the correlated markers. In our sample, between 30 % and 60 % (on average 42 %) of variance in personality traits was explained by additive genetic factors. This is in line with previous studies using twin and family samples [19] as well as genome-wide approaches [25]. A recent meta-analysis [21] confirmed that on average 40 % of the variance in personality traits is of genetic origin. Also, conform previous studies [47-51], we observe high (h2 > 0.4) heritability of cortical thickness, with highest values in primary sensory areas. Heritability patterns follow previously described patterns with relatively strong genetic influence on cortical thickness in unimodal cortices, whereas variance in association cortices is on average less influenced by genetic factors [47-54].

In addition to establishing the genetic and environmental contribution to phenotypic correlations between personality traits and local brain structure in the HCP sample, we performed exploratory whole-brain analysis of genetic correlation between personality traits and local cortical structure. We observed a significant genetic correlation between Agreeableness, and Extraversion, and local brain structure in functionally meaningful regions. The genetic relationship between Agreeableness and regions involved in higher-order reasoning is in line with theoretical accounts that the ability to reflect on ones actions is essential for being able to be cooperative and prosocial [55]. In case of Extraversion we observed similar functional specificity. Extraversion was genetically associated with thickness of the temporo-parietal junction (TPJ). Regions in the TPJ have repeatedly been associated with both social cognition and language [56-59]. At the same time, these correlations were not consistently mirrored by phenotypic correlations both within sample as well as in two independent samples, questioning the robustness of these local observations. Indeed, regions that showed genetic correlations at FDR-corrected thresholds were outliers, as typical values of genetic correlation ranged between -0.4 and 0.4. Concurrent, we observed that, at whole brain level, the degree of phenotypic correlation corresponds to relative contribution of genetic, rather than environmental, effects for Agreeableness, Conscientiousness, and Openness. The correspondence between phenotypic and genetic correlations within the HCP sample is in line with Cheverud's conjuncture [60]. This conjuncture asserts the use of phenotypic correlations as proxies for genetic correlations and has been confirmed in other human traits [60]. Observed genetic correlations between cortical thickness and personality traits in the HCP sample might be due to mediated pleiotropy (a gene affects A which affects B). There are various ways in which a genetic process would affect the relationship between personality and grey matter macrostructure. On the one hand, it could be a genetic factor affects grey matter macrostructure and associated function and, as a consequence, personality. On the other hand, it could be that genetic variation affects brain function which in turn modulates both macroscale structure as well as personality, or a genetic mechanism affects an unknown biological factor which in turn affects personality and brain structure. Importantly, recent literature on gene-environment interactions, as well as epigenetics, suggest bidirectional links between neurobiology and environment, via for example methylation and gene expression [61,62].

We could not robustly replicate phenotypic associations between personality traits and local brain structure observed in HCP in two independent samples. Only the spatial distribution of phenotypic correlations between Openness and local cortical thickness, and associated genetic components, in the HCP sample was robustly related to phenotypic spatial distribution in the two replication samples. Openness had highest heritability in the HCP sample (58%), indicating that the largest proportion of variance in

Openness can be attributed to additive genetic mechanisms. Assuming that genetic correlation patterns of the personality traits observed in the HCP sample are meaningful, there are various explanations for lack of association between genetic correlation and phenotypic correlation out of sample. First, we found that intelligence partially mediated the phenotypic relationship between personality traits and local brain structure in the HCP sample. This observation provides evidence for an interplay between intelligence, personality, and macroscale grey matter structure in the HCP sample. Previous studies have shown a genetic relation between general intelligence and personality [63-65], as well as to specific traits such as Openness [66] and Extraversion [67]. In the HCP sample the average intelligence is high (total cognitive score: 122), and all personality traits, except Extraversion, show a genetic correlation with intelligence. Intelligence is highly heritable, and has been shown to have a genetic correlation with cortical thickness [68,69]. It is possible associations between personality traits and cortical thickness are enhanced in the HCP sample because of the latter's close relation to intelligence. Indeed, when controlling for intelligence, personality-brain associations were reduced. Notably, the GSP sample has also been reported to of above average intelligence [70], but also in this sample, we were not able to replicate focal personality – brain associations. In general, though our samples all were from WEIRD (Western, educated, industrialized, rich, and democratic) populations [71], it might be that personality traits probed are not comparable across samples due to challenges to reliably operationalize personality, and that confounding environmental and noise effects may vary across sample. For example, it has been reported that overall the GSP sample had an abnormal high distribution of negative affect, comparable to clinical populations [70]. Also, the age-range of the eNKI sample is much broader than the age-range of the HCP and GSP samples. Both cortical thickness and personality traits change across the lifespan [15,54,72,73] and previous work has reported associations between cortical thickness change and personality [74]. Furthermore, as only 40% of personality variance was observed heritable, which indicates that 60% of variance couldn't be attributed to additive genetic effects. Environment, such as family environment, peer-groups, and stress have been reported to influence personality [75,76] and also cortical thickness, and associated behavior, has been reported to change as a consequence of social training in adulthood[77]. Though genetic and gene by environment effects are not to be excluded in this context, is likely such environmental mechanisms further shape the relation between personality traits and brain structure, above and beyond direct additive genetic effects.

Taken together, our observations put forward the hypothesis that both genetic and environmental factors influence shared variance between personality and local structural grey matter anatomy. Future studies on the nature and nurture of personality could benefit from combining cross-sectional with longitudinal set-ups, enabling the analysis of the dynamic relation between brain structure and function, and personality. It is of note that our study on the shared genetic basis of personality and brain structure was made possible by the open HCP, GSP, and eNKI neuroimaging repositories. These initiatives offer cognitive neuroimaging communities an unparalleled access to large datasets for the investigation of the brain basis of individual difference. They have also enabled us to highlight variability across samples and validation experiments to verify stability of our observations. Notably, the use of multiple datasets enabled us to test robustness of positive findings, and highlighted lack of consistency in local correspondences between personality and brain structure. Given that reproducibility is increasingly important, our study illustrates the advantages of open data to increase understanding of complex traits.

Materials and methods

HCP sample:

Participants and study design

For our analysis we used the publicly available data from the Human Connectome Project S1200 release (HCP; http://www.humanconnectome.org/), which comprised data from 1206 individuals (656 females), 298 MZ twins, 188 DZ twins, and 720 singletons, with mean age 28.8 years (SD = 3.7, range = 22–37). We included individuals for whom the scans and data had been released (humanconnectome.org) after passing the HCP quality control and assurance standards [78]. The full set of inclusion and exclusion criteria are described elsewhere [79,80]. In short, the primary participant pool comes from healthy individuals born in Missouri to families that include twins, based on data from the Missouri Department of Health and Senior Services Bureau of Vital Records. Additional recruiting efforts were used to ensure participants broadly reflect ethnic and racial composition of the U.S. population. Healthy is broadly defined, in order to gain a sample generally representative of the population at large. Sibships with individuals having severe neurodevelopmental disorders (e.g., autism), documented neuropsychiatric disorders (e.g. schizophrenia or depression) or neurologic disorders (e.g. Parkinson's disease) are excluded, as well as individuals with diabetes or high blood pressure. Twins born prior 34 weeks of gestation and non-twins born prior 37 weeks of gestation are excluded as well. After removing individuals with missing structural imaging or behavioral data our sample consisted of 1106 individuals (including 286 MZ-twins and 170 DZ-twins) with mean age of 28.8 years (SD =3.7, range =22-37). See further Table 1.

Structural imaging processing

MRI protocols of the HCP are previously described [79,80]. The pipeline used to obtain the Freesurfer-segmentation is described in detail in a previous article [79] and is recommended for the HCP-data. In short, the pre-processing steps included co-registration of T1 and T2 scans, B1 (bias field) correction, and segmentation and surface reconstruction to estimate cortical thickness. The HCP structural pipelines use Freesurfer 5.1 software (http://surfer.nmr.mgh.harvard.edu/) [81-84] plus a series of customized steps that combine information from T_1w as well as T_2w scans for more accurate white and pial surfaces [79].

Behavioral assessment

The NEO-FFI personality traits were assessed using the NEO-Five-Factors-Inventory (NEO-FFI)[85]. The NEO-FFI is composed of a subset of 60-items extracted from the full-length 240-item NEO-PI-R. For each item, participants reported their level of agreement on a 5-point Likert scale, from strongly disagree to strongly agree. The NEO instruments have been previously validated in USA and several other countries [86]. See further Table 1.

As a proxy for IQ we used the NIH Toolbox Cognition [87], 'total composite score'. The Cognitive Function Composite score is derived by averaging the normalized scores of each of the Fluid and Crystallized cognition measures, then deriving scale scores based on this new distribution. Higher scores indicate higher levels of cognitive functioning. Participant score is normed to those in the entire NIH Toolbox Normative Sample (18 and older), regardless of age or any other variable, where a score of 100 indicates performance that was at the national average and a score of 115 or 85, indicates performance 1 SD above or below the national average. See further Table 1.

Measure	**n**	**mean±SD (range)**
Males/Females	506/600	-
Age	1106	28.8±3.7 (22-36)
Intelligence (Composite score)	1089	121.9±14.6 (84.6-153.4)
Agreeableness	1106	33.5±5.8
Conscientiousness	1106	34.5±5.9
Extraversion	1106	30.7±6
Neuroticism	1106	16.6±7.4
Openness	1106	28.3±6.2

Table 1. Behavioral characteristics of the HCP sample. Behavioral characteristics for gender, age, intelligence as well as the NEO-FFI scores in the HCP sample.

GSP sample

Participants and study design

To evaluate the cross-sample reproducibility of observations we additionally investigated the association between personality and local cortical brain structure in the Brain Genomics Superstruct Project (GSP) [70]. In short, between 2008 and 2012 young adults (ages 18 to 35) with normal or corrected-to-normal vision were recruited from the Boston community to participate in the GSP. The 1,570 individuals included in the release of [70] were selected from a larger databased of individuals who participated in the ongoing GSP data collection initiative. Participants included well-educated individuals with relatively high IQs (many of the college age students are from local colleges with a small fraction coming from Harvard itself). Participants provided written informed consent in accordance with guidelines established by the Partners Health Care Institutional Review Board and the Harvard University Committee on the Use of Human Subjects in Research (See Supplementary Appendix A in [70]).

Structural imaging processing

All imaging data were collected on matched 3T Tim Trio scanners (Siemens Healthcare, Erlangen, Germany) at Harvard University and Massachusetts General Hospital using the vendor-supplied 12-channel phased-array head coil. Structural data included a high-resolution (1.2mm isotropic) multi-echo T1-weighted magnetization-prepared gradient-echo image (multi-echo MPRAGE23, see further: [70]). The low participant burden resulting from the use of multi-echo MPRAGE anatomical scans makes this sequence well suited for high-throughput studies. The morphometric features derived through conventional 6-min 1mm MPRAGE and the 2-min 1.2mm multi-echo MPRAGE are highly consistent (r2>0.9 for most structures) suggesting that rapid acquisition multi-echo MPRAGE can be used for many purposes in place of longer anatomical scans without degradation of the quantitative morphometric estimates. All T1 scans pre-processed using the Freesurfer software library (http://surfer.nmr.mgh.harvard.edu/) version 6.0.0 [81-84]. Next, the individual cortical thickness maps were standardized to fsaverage5 for further analysis. Cortical thickness maps were visually inspected (S.L.V.) for inaccuracies.

Behavioral markers.

The NEO-FFI personality traits were assessed using the NEO-Five-Factors-Inventory (NEO-PI-R)[88], the full-length 240-item NEO-PI-R. For each item, participants reported their level of agreement on a 5-point Likert scale, from strongly disagree to strongly agree. The NEO instruments have been previously validated in USA and several other countries [86]. As a proxy for IQ we used the estimated IQ derived through the OPIE3 formula [89]. Reported values are in integers and binned. It is of note that distribution of IQ values is positively skewed relative to the general population and that many personality traits, including negative affect and Neuroticism were observed to have distribution that would be expected of a clinically-screened population-based sample [70]. See further Table 2.

Measure	**n**	**mean±SD (range)**
Males/Females	536/390	-
Age	926	21.6±3.9 (19-35)
Estimated IQ	892	108.7±8.1 (77-129)
Agreeableness	926	32.0±6.6
Conscientiousness	926	31.7±7.2
Extraversion	926	30.7±6.5
Neuroticism	926	20.3±8.8
Openness	926	31.6±6.1

Table 2. Behavioral characteristics of the GSP sample. Behavioral characteristics for gender, age, intelligence as well as the NEO-FFI scores in the GSP sample.

eNKI sample:

Participants and study design

To evaluate the cross-sample reproducibility of observations we additionally investigated correspondence between personality and cortical brain structure in the enhanced Nathan Kline Institute-Rockland Sample (NKI). The sample was made available by the Nathan-Kline Institute (NKY, NY, USA), as part of the '*enhanced NKI-Rockland sample*' (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3472598/). In short, eNKI was designed to yield a community-ascertained, lifespan sample in which age, ethnicity, and socioeconomic status are representative of Rockland County, New York, U.S.A. ZIP-code based recruitment and enrollments efforts were being used to avoid over-representation of any portion of the community. Participants below 6 years were excluded to balance data losses with scientific yield, as well as participants above the age of 85, as chronic illness was observed to dramatically increase after this age. All approvals regarding human subjects' studies were sought following NKI procedures. Scans were acquired from the International Neuroimaging Data Sharing Initiative (INDI) online database http://fcon_1000.projects.nitrc.org/indi/enhanced/studies.html For our phenotypic analyses, we selected individuals with complete personality and imaging data. Our sample for phenotypic correlations consisted of 792 (494 females) individuals with mean age of 41.1 years (SD =20.3, range =12-85). Please see Table 3 for demographic characteristics.

Structural imaging processing

3D magnetization-prepared rapid gradient-echo imaging (3D MP-RAGE) structural scans[90] were acquired using a 3.0 T Siemens Trio scanner with TR=2500 ms, TE=3.5 ms, Bandwidth=190 Hz/Px, field of view=256 × 256 mm, flip angle=8°, voxel size=1.0 × 1.0 × 1.0 mm. More details on image acquisition are available at http://fcon_1000.projects.nitrc.org/indi/enhanced/studies.html. All T1 scans were pre-processed using the Freesurfer software library (http://surfer.nmr.mgh.harvard.edu/) version 6.0.0 [81-84]. Next, the individual cortical thickness maps were standardized to fsaverage5 for further analysis. Cortical thickness segmentations were visually inspected for anatomical errors (S.L.V.).

Behavioral markers.

The NEO-FFI personality traits were assessed using the NEO-FFI3[85]. The NEO-FFI-3 is a 60-item psychological personality inventory that assesses based on the five-factor model: Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Participants are asked to select the response that best represents their opinion on a 5-point scale: 0-Strongly Agree, 1-Agree, 2-Neutral, 3-Disagree, 4-Strongly Disagree. The NEO instruments have been previously validated in USA and several other countries[86].

For intelligence we used the Wechsler Abbreviated Scale of Intelligence (WASI-II)[91], full scale IQ. The WASI is a general intelligence, or IQ test designed to assess specific and overall cognitive capabilities and is individually administered to children, adolescents and adults (ages 6-89). It is a battery of four subtests: Vocabulary (31-item), Block Design (13-item), Similarities (24-item) and Matrix Reasoning (30-item). In addition to assessing general, or Full Scale, intelligence, the WASI is also designed to provide estimates of Verbal and Performance intelligence consistent with other Wechsler tests. Specifically, the four subtests comprise the full scale and yield the Full Scale IQ (FSIQ-4), see further Table 3.

Measure	**n**	**mean±SD (range)**
Males/Females	298/494	-
Age	792	41.1±20.3 (12-85)
Intelligence (WASI)	792	101.9±13.3 (65-141)
Agreeableness	792	34.3±6.0
Conscientiousness	792	33.9±7.4
Extraversion	792	30.0±6.4
Neuroticism	792	18.5±8.1
Openness	792	31.9±6.3

Table 3. Behavioral characteristics of the eNKI sample. Behavioral characteristics for gender, age, intelligence as well as the NEO-FFI scores in the eNKI sample.

Parcellation approach

In all three samples, we used a parcellation scheme [36] based on the combination of a local gradient approach and a global similarity approach using a gradient-weighted Markov Random models. The parcellation has been extensively evaluated with regards to stability and convergence with histological mapping and alternative parcellations. In the context of the current study, we focus on the granularity of 200 parcels, as averaging will improve signal-to-noise. 200 parcels are close to granularity used in Enigma (Desikan-atlas, 68 parcels) while at the same time providing more anatomical detail in functionally heterogeneous regions such as parietal and frontal cortex. In order to improve signal-to-noise and improve analysis speed, we opted to average unsmoothed structural data within each parcel. Thus, cortical thickness of each ROI was estimated as the trimmed mean (10 percent trim).

Phenotypic correlation analysis.

For our phenotypic analysis between local cortical thickness and personality traits we performed Spearman's correlation analysis, controlling for the same variables as in the genetic analysis, namely age, sex, age × sex interaction, age^2, age^2 × sex interaction, as well as global thickness effects when investigating brain structure. Results were corrected for multiple comparisons using Benjamin-Hochberg FDR [92] at whole-brain analysis, where we corrected for number of analysis within the current step and report FDR thresholds. When investigating behavior or in post-hoc brain analysis, we corrected for number of analysis x ROIs. Post-hoc we also controlled for a proxy for intelligence, total cognitive score [87] or comparable measures in the GSP [89] and eNKI samples[91].

Heritability and genetic correlation analysis

To investigate the heritability and genetic correlation of brain structure and personality traits, we analyzed 200 parcels of cortical thickness, as well as personality trait score of each subject in a twin-based heritability analysis. As in previous studies [93], the quantitative genetic analyses were conducted using Sequential Oligogenic Linkage Analysis Routines (SOLAR) [34]. SOLAR uses maximum likelihood variance-decomposition methods to determine the relative importance of familial and environmental influences on a phenotype by modeling the covariance among family members as a function of genetic proximity. This approach can handle pedigrees of arbitrary size and complexity and thus, is optimally efficient with regard to extracting maximal genetic information. To ensure that our traits, behavioral as well as of cortical thickness parcels, conform to the assumptions of normality, an inverse normal transformation was applied for all behavioral and neuroimaging traits[93].

Heritability (h^2) represents the portion of the phenotypic variance (σ^2_p) accounted for by the total additive genetic variance (σ^2_g), i.e., $h^2 = \sigma^2_g/\sigma^2_p$. Phenotypes exhibiting stronger covariances between genetically more similar individuals than between genetically less similar individuals have higher heritability. Heritability analyses were conducted with simultaneous estimation for the effects of potential covariates. For this study, we included covariates including age, sex, age × sex interaction, age^2, age^2 × sex interaction. Post-hoc we also controlled for a proxy for intelligence, total cognitive score[87]. When investigating cortical thickness, we additionally controlled for global thickness effects (mean cortical thickness).

To determine if variations in personality and brain structure were influenced by the same genetic factors, genetic correlation analyses were conducted. More formally, bivariate polygenic analyses were performed to estimate genetic (ρ_g) and environmental (ρ_e) correlations, based on the phenotypic correlation (ρ_p), between brain structure and personality with the following formula: $\rho_p = \rho_g\sqrt{(h^2_1 h^2_2)} + \rho_e\sqrt{[(1 - h^2_1)(1 - h^2_2)]}$, where h^2_1 and h^2_2 are the heritability's of the parcel-based cortical thickness and the various behavioral traits. The significance of these correlations was tested by comparing the log likelihood for two restricted models (with either ρ_g or ρ_e constrained to be equal to 0) against the log likelihood for the model in which these parameters were estimated. A significant genetic correlation (corrected for multiple comparisons using Benjamin-Hochberg FDR [92]) is evidence suggesting that (a proportion of) both phenotypes are influenced by a gene or set of genes [35].

To compute the contribution of genetic effects relative to the phenotypic correlation, we computed the contribution of the genetic path to the phenotypic correlation ($\sqrt{h^2_1} \times \rho_g \times \sqrt{h^2_2}$) ($\rho_{ph}g$) divided by the phenotypic correlation. For the relative contribution of environmental correlation to the phenotypic correlation we computed ($\sqrt{1-h^2_1} \times \rho_e \times \sqrt{1-h^2_2}$) ($\rho_{ph}e$) divided by the phenotypic correlation[94].

Functional decoding

All significant parcels were in a last step functionally characterized using the Behavioral Domain meta-data from the BrainMap database using forward inference (http://www.brainmap.org[95,96]). To do so, volumetric counterparts of the surface-based parcels were identified. In particular, we identified those meta-data labels (describing the computed contrast [behavioral domain]) that were significantly more likely than chance to result in activation of a given parcel[29,38,39]. That is, functions were attributed to the identified neurogenetic effects by quantitatively determining which types of experiments are associated with activation in the respective parcellation region. Significance was established using a binomial test ($p < 0.05$, corrected for multiple comparisons using false discovery rate (FDR)).

Mediation analysis

In short, mediation analysis is an important tool in the behavioral sciences for investigating the role of intermediate variables that lie in the path between a treatment and an outcome variable. The influence of the intermediate variable on the outcome is often explored using a linear structural equation model (LSEM), with model coefficients interpreted as possible effects. In the current work, we performed single-level mediation analysis combined with bootstrap-based significant testing using the function 'mediation.m' from the Mediation toolbox download from https://github.com/canlab/MediationToolbox [97,98]. We controlled for effects of global thickness, age and gender, and used ranked variables of personality traits, intelligence and local brain structure.

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Supplementary results

Phenotypic correlation between personality traits and local brain structure in two large-scale samples of unrelated individuals.

To assess whether the phenotypic correlation between personality and cortical thickness is replicable across samples we selected unrelated individuals from the GSP sample (n=926) and eNKI sample (n=792). We correlated each personality trait with cortical thickness at each parcel, which we corrected for multiple comparisons using FDRq<0.05 (controlling for the number of parcels). Though distributions of cortical thickness and personality traits were comparable across samples (Supplementary Figure 8), we did not find significant relationships between personality traits and parcel-wise cortical thickness in any of the samples (Supplementary Figure 9). Also, trend-level (p<0.01) relationships between personality traits and cortical thickness showed little overlap across samples (Supplementary Figure 9).

Phenotypic and genetic correlation between personality traits.

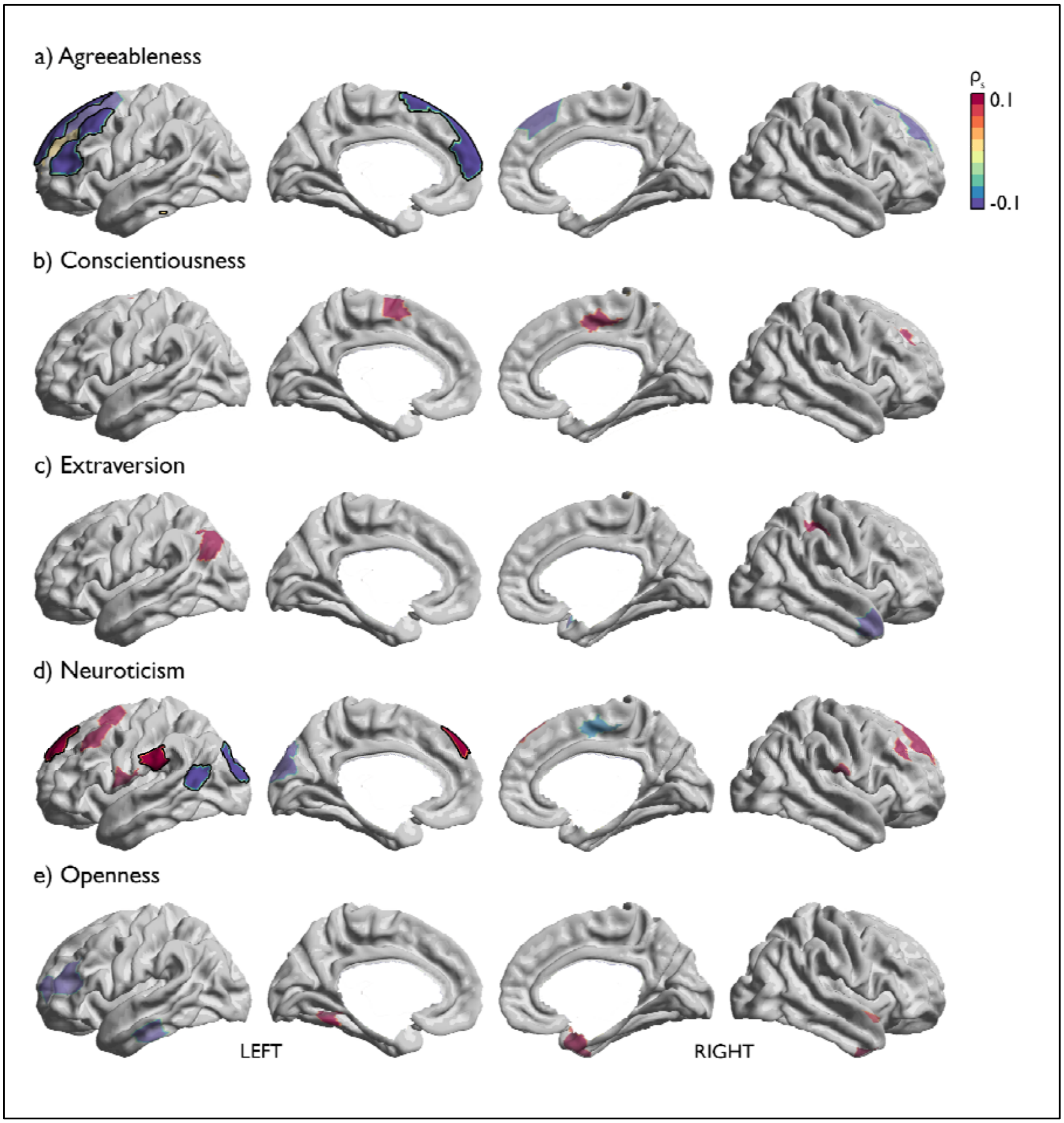
We also evaluated whether the phenotypic correlations observed between personality traits in HCP could reflect shared genetic or environmental processes (Supplementary Table 19 and 20). We observed significant genetic correlation between Extraversion and Agreeableness (ρ_g = 0.38) and Extraversion and Conscientiousness (ρ_g = 0.33). Significant environmental correlations were observed between Agreeableness and Conscientiousness (ρ_e = 0.32), Agreeableness and Extraversion (ρ_e = 0.26), Agreeableness and Neuroticism (ρ_e = -0.41), Conscientiousness and Extraversion (ρ_e =

0.24), Conscientiousness and Neuroticism (ρ_e = -0.51), and Extraversion and Neuroticism (ρ_e = -0.39).

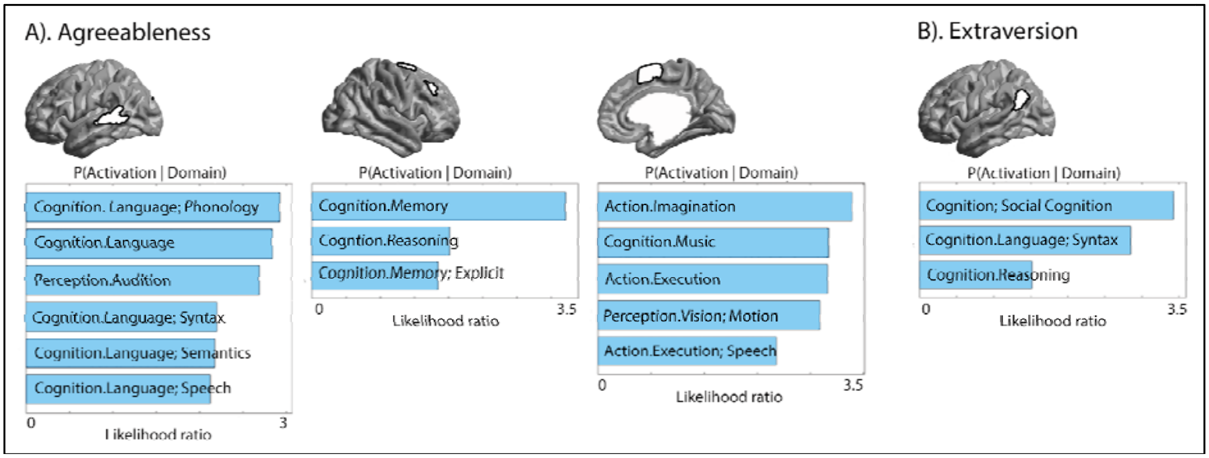
Replication analysis in significant phenotypic correlations when controlling for IQ

To evaluate whether replication would be possible when controlling for IQ, we reran phenotypic analysis in GSP and eNKI while controlling for IQ in the model and evaluated phenotypic correlations within the FDRq<0.05 ROIs derived from the HCP sample (when controlling for IQ). None of the ROIs showed a relationship (p<0.05) with the respective personality trait (Supplementary table 21).

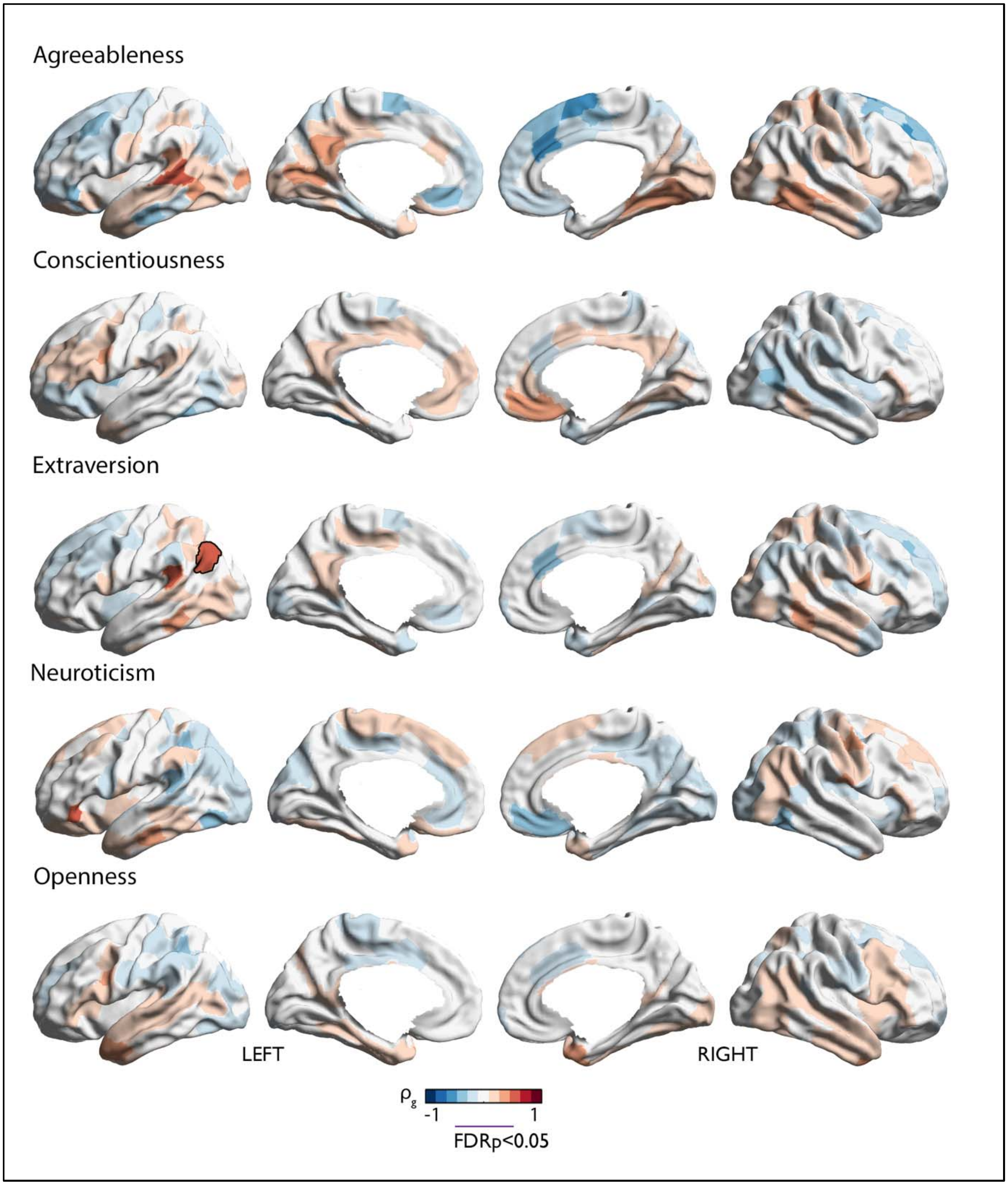
Supplementary Figures



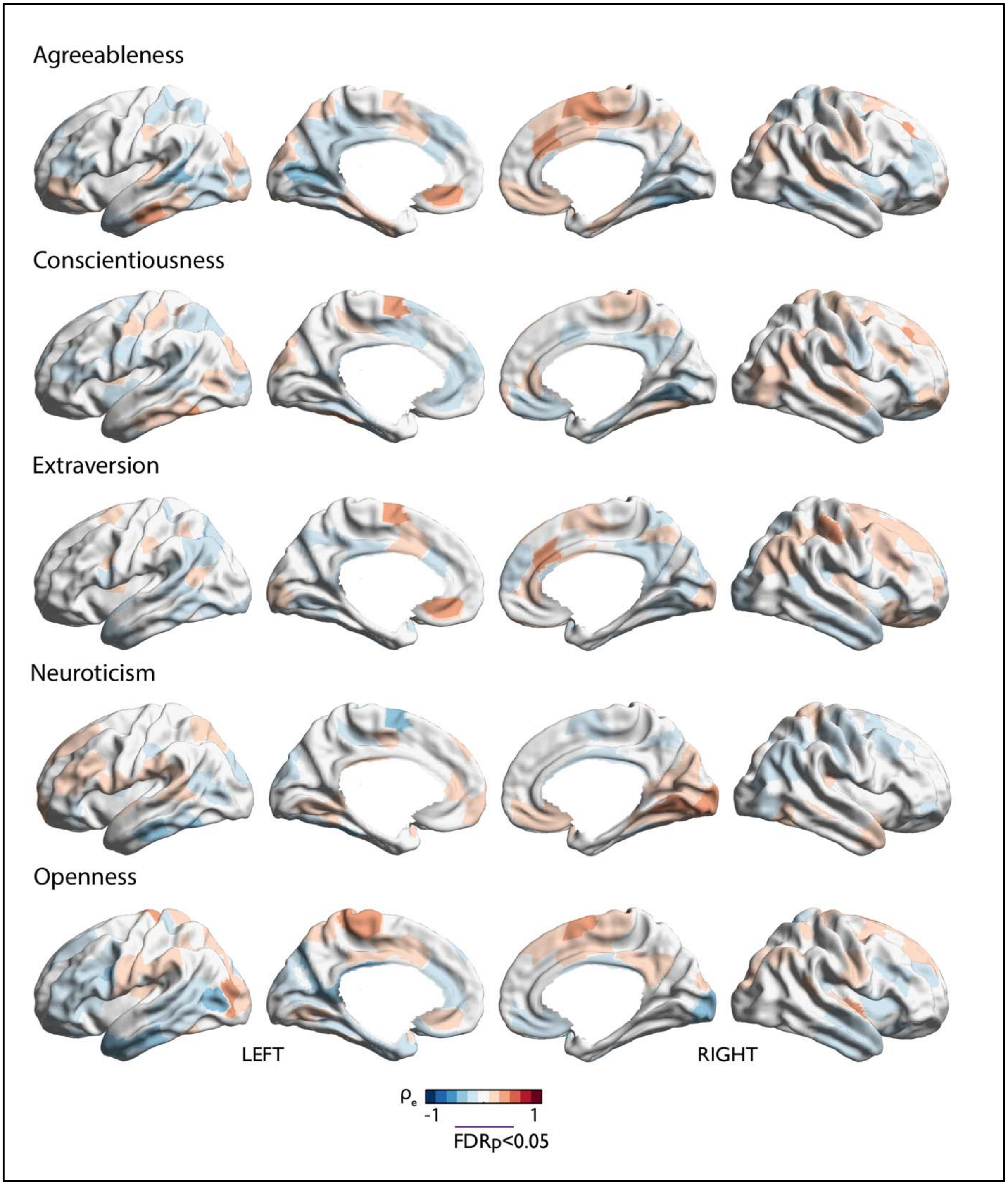
Supplementary Fig 1. Significant relation between personality traits and local cortical thickness in the full HCP sample correcting for IQ. IQ is based on the 'total cognitive score' of the HCP. Positive ρ_s between local cortical thickness and personality trait is displayed in red and negative ρ_s is displayed in blue. Multiple comparisons were accounted for by using FDR corrections at $p<0.05$ correcting for the number of parcels (200), and delineated with black outlines. Trend-level associations are displayed at $p<0.01$



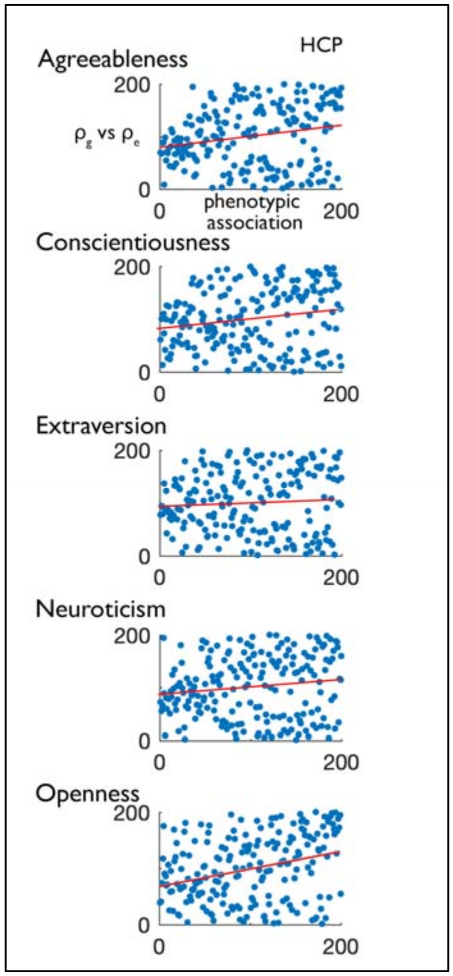
Supplementary Fig 2. Genetic correlates between cortical thickness and personality traits functionally relate to (socio-) cognitive and language processing. Quantitative functional decomposition of neurogenetic markers of personality traits based on the FDR-corrected clusters of genetic relationships of Figure 2.



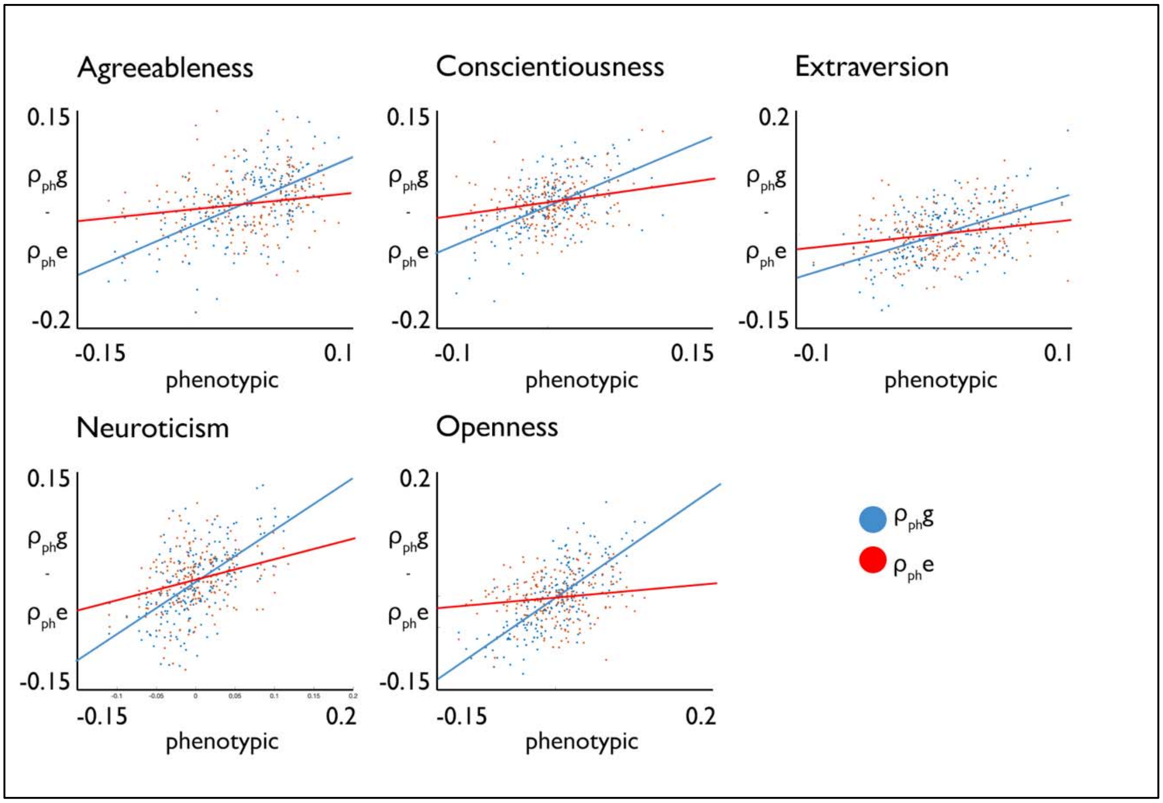
Supplementary Fig 3. Genetic correlations between personality traits and cortical thickness controlled for total cognitive score. Red values indicate positive genetic correlation whereas blue values indicate negative genetic correlation between parcel-wise cortical thickness and personality traits. Findings at FDRq<0.05 are outlined in black.



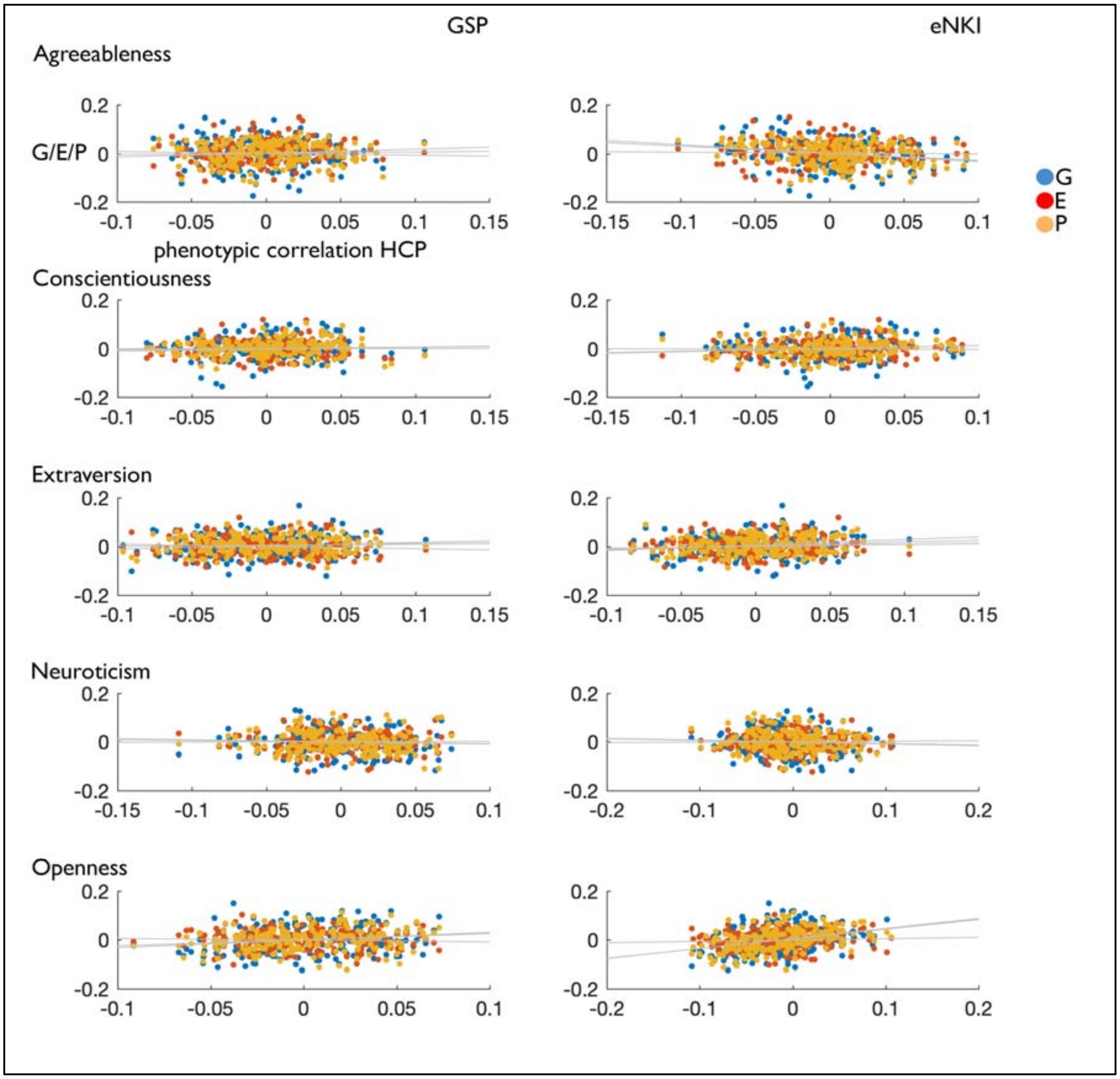
Supplementary Fig 4. Environmental correlations between personality traits and cortical thickness. Red values indicate positive environmental correlation whereas blue values indicate negative environmental correlation between parcel-wise thickness and personality traits. Findings at FDRq<0.05 are outlined in black.



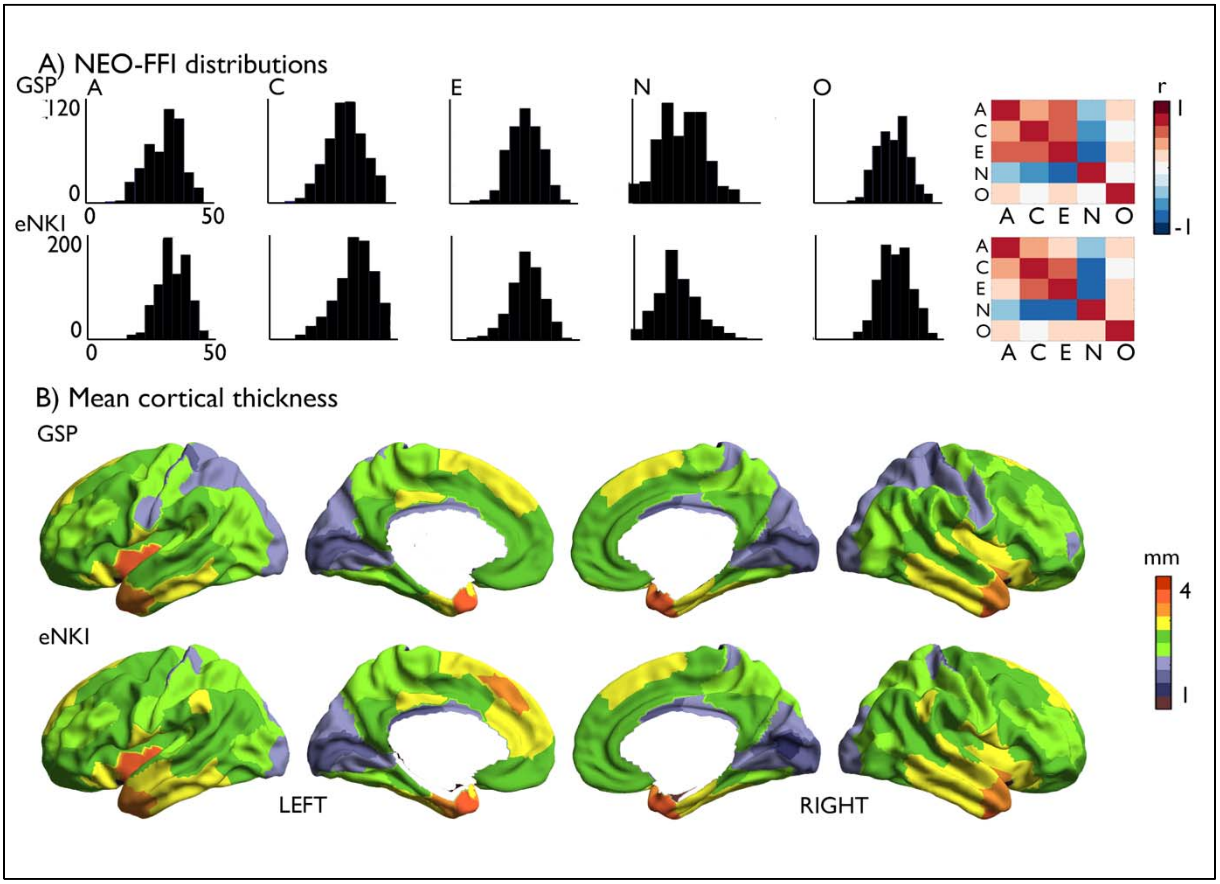
Supplementary Fig 5. Correlation between cortex-wide spatial distributions of phenotypic correlation and (ρ_{ph}g/ρ_{ph}e) in HCP. Scatterplots of the correlation between the ranked phenotypic correlation between personality traits and cortical thickness (X-axis) and ranked contribution of ρ_{ph}g (genetic contribution to phenotypic correlation) relative to ρ_{ph}e (environmental contribution to phenotypic correlation) (Y-axis).



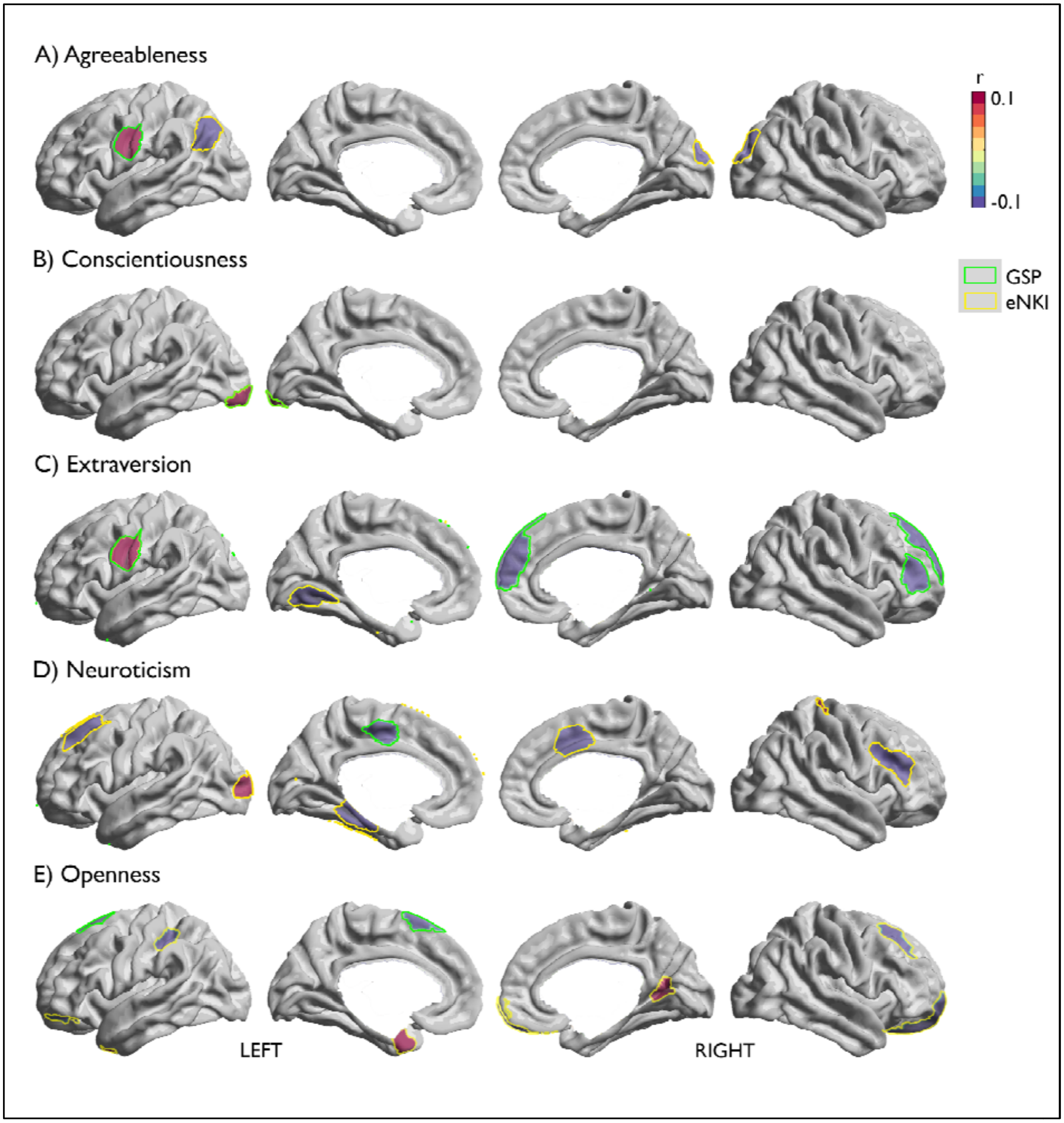
Supplementary Fig 6. Correlation between cortex-wide spatial distributions of phenotypic correlation and ρ_{ph}g versus phenotypic correlation and ρ_{ph}e in HCP. Scatterplots of the correlation between the phenotypic correlation between personality traits and cortical thickness (X-axis) and ρ_{ph}g (genetic contribution to phenotypic correlation) in blue (Y-axis) as well as between phenotypic correlation between personality traits and cortical thickness (X-axis) and ρ_{ph}e (environmental contribution to phenotypic correlation) to the phenotypic correlation between personality traits and cortical thickness (in red) (Y-axis).



Supplementary Fig 7. Correlation between cortex-wide spatial distributions of phenotypic/genetic/environmental correlations between personality traits and local structure in HCP and phenotypic correlation between personality traits and local structure in GSP/eNKI. Scatterplots of the correlation between spatial patterns of phenotypic (P, yellow), genetic (G, $\rho_{ph}g$, blue) and environmental (E, $\rho_{ph}e$, red) correlation between personality traits and cortical thickness (X-axis), and phenotypic correlation between personality traits and cortical thickness (Y-axis) in the GSP sample (left) and eNKI sample (right). See further Supplementary table 17 and 18.



Supplementary Fig 8. Distribution of NEO-FFI scores, their intercorrelation, and parcel-wise cortical thickness in two unrelated samples. A). Distributions of NEO-FFI scores in two unrelated samples (GSP; eNKI). B). Intercorrelation of personality trait scores in each sample. C). Distribution of mean parcel-wise thickness in mm in the two unrelated samples.



Supplementary Fig 9. Phenotypic relationship between cortical thickness and personality in two unrelated sample. Findings in each sample are displayed at p<0.01, positive Spearman's ρ is displayed in red, whereas negative Spearman's ρ is displayed in blue. Findings are outlined with specific color per sample (green=GSP, yellow= eNKI). Multiple comparisons were accounted for by using FDRp<0.05 correcting for the number of parcels (200).

Supplementary Tables

Personality trait	A	C	E	N	O
Agreeableness	1				
Conscientiousness	0.22 **				
Extraversion	0.29 **	0.26 **			
Neuroticism	-0.33 **	-0.42 **	-0.35 **		
Openness	0.11 **	-0.10 **	0.09 *	0.00	

Supplementary Table 1. Phenotypic correlation of personality traits in HCP. Phenotypic correlation across personality traits. A=Agreeableness, C=Conscientiousness, E=Extraversion, N=Neuroticism, O=Openness. ** indicates corrected at FDRq<0.05, controlled for number of analysis (10), * indicates p<0.05.

Agreeableness	HCP	GSP	eNKI
7Networks_LH_Cont_PFCl_4	-0.11**	0.04	-0.02
7Networks_LH_Default_PFC_7	-0.11**	0.02	0.01
7Networks_LH_Default_PFC_9	-0.12**	-0.01	0.05
7Networks_LH_Default_PFC_11	-0.12**	-0.01	-0.03
7Networks_LH_Default_PFC_12	-0.10**	0.08 *	0.01
7Networks_LH_Default_PFC_13	-0.11**	-0.02	-0.01
7Networks_RH_Default_PFCm_5	-0.11**	-0.06	0.04

Neuroticism	HCP	GSP	eNKI
7Networks_LH_Vis_14	-0.11**	0.07 *	-0.01
7Networks_LH_DorsAttn_FEF_2	0.10**	0.07 *	0.00
7Networks_LH_SalVentAttn_ParOper_2	0.10**	-0.03	0.01
7Networks_LH_Default_Temp_6	-0.11**	0.06	-0.01
7Networks_LH_Default_PFC_9	0.11**	0.03	-0.02
7Networks_LH_Default_PFC_11	0.10**	0.00	-0.05
7Networks_RH_Cont_PFCl_6	0.10**	0.07 *	-0.03
7Networks_RH_Default_PFCm_5	0.12**	-0.01	-0.04

Openness	HCP	GSP	eNKI
7Networks_LH_Vis_1	0.10**	0.05	-0.01
7Networks_LH_SalVentAttn_PFCl_1	-0.11**	0.02	-0.06
7Networks_LH_Cont_PFCl_3	-0.11**	0.01	-0.07 *
7Networks_LH_Cont_PFCl_4	-0.12**	0.02	-0.01
7Networks_RH_Limbic_TempPole_1	0.11**	0.02	0.00
7Networks_RH_Cont_PFCl_5	-0.10**	0.05	-0.09 *
7Networks_RH_Default_PCC_1	0.10**	-0.03	-0.00

Supplementary Table 2. Phenotypic correlations in parcels with FDR-corrected association between personality traits and local brain structure in HCP and independent samples (GSP and eNKI). Robustness of phenotypic association (Spearman's ρ) between parcels that showed significant (FDRq<0.05) phenotypic correlation in the HCP sample and the corresponding personality trait. ** indicates FDRq<0.05 (corrected for number of ROIs per personality trait), whereas * indicates p<0.05. ROIs all showed significant associations with personality traits in the whole brain analysis of the HCP sample. Nevertheless, all relationships are marked as ** for clarity. Nomenclature of the regions is based on the official parcel names of the Schaefer 200 – 7 networks parcel solution.

Intelligence (h2r=0.75)	**Spearmans ρ**	ρ_g	ρ_e	**GSP**	**eNKI**
Agreeableness	0.10 **	0.31(0.09) **	-0.09(0.07)	0.04	0.02
Conscientiousness	-0.11 **	-0.26(0.07) **	0.11(0.07)	-0.01	-0.09*
Extraversion	-0.03	-0.06(0.07)	0.01(0.07)	-0.08*	-0.10**
Neuroticism	-0.11 **	-0.22(0.08) **	0.01(0.07)	-0.08*	-0.02
Openness	0.24 **	0.37(0.06) **	-0.002(0.07)	0.12**	0.28**

Supplementary Table 3. Phenotypic and genetic correlation between personality traits and intelligence. Phenotypic correlation, genetic correlation (and standard error) and environmental correlation (and standard error) between intelligence (total cognitive score) and personality traits in HCP, as well as phenotypic correlation between personality traits and intelligence in GSP and eNKI samples. ** indicates a Spearman's ρ-value FDRq<0.05 (controlled for number of analysis), whereas * indicates p<0.05.

	X > M	**M > Y**	**X > Y unmediated**	**X > Y**	**X > Y mediated**
7Networks_LH_Cont_PFCl_4					
mean	4,1927	-0,0728	-3,95	-4,2537	-0,3037
std	1,3378	0,0277	1,2262	1,2307	0,1537
p	0,0007	0,0071	0,0015	0,0009	0,0162
7Networks_LH_Default_PFC_7					
mean	4,1641	-0,1137	-3,465	-3,9369	-0,4719
std	1,332	0,0318	1,3845	1,3912	0,2018
p	0,0023	0,0003	0,0129	0,0041	0,005
7Networks_LH_Default_PFC_9					
mean	4,1891	-0,0924	-3,9936	-4,38	-0,3864
std	1,3401	0,0312	1,374	1,3812	0,1825
p	0,004	0,0029	0,0014	0,0003	0,0131
7Networks_LH_Default_PFC_11					
mean	4,1476	-0,1819	-4,7158	-5,4693	-0,7535
std	1,3647	0,0294	1,3357	1,3523	0,2773
p	0,0014	0,0003	0,0002	0,0003	0,003
7Networks_LH_Default_PFC_12					
mean	4,1476	-0,0836	-2,8679	-3,2146	-0,3466
std	1,3306	0,0282	1,3769	1,3866	0,1653
p	0,002	0,0044	0,0364	0,0227	0,0131
7Networks_LH_Default_PFC_13					
mean	4,2008	-0,0715	-3,95	-4,2472	-0,2972
std	1,3327	0,0306	1,3694	1,3723	0,1592
p	0,0027	0,0205	0,0012	0,0007	0,0432
7Networks_RH_Default_PFCm_5					
mean	4,1516	-0,1474	-3,2194	-3,8306	-0,6112

std	1,3437	0,0293	1,3178	1,3424	0,234
p	0,0009	0,0003	0,0129	0,0039	0,0021

Supplementary Table 4a. Mediation of phenotypic relationship of Agreeableness with cortical thickness by intelligence (total cognitive score) in HCP. For each mediation test the relation between personality and intelligence (X > M), intelligence and brain (M > Y), relationship between personality and brain unmediated (residual), relationship between personality > brain, and mediated relationship between personality and brain (X>M * M>Y). Nomenclature of the regions is based on the official parcel names of the Schaefer 200 – 7 networks parcel solution.

7Networks_LH_Vis_14					
mean	-3,4579	-0,0164	-3,6376	-3,5826	0,055
std	1,0132	0,0308	0,9672	0,9621	0,1111
p	0,0019	0,5795	0,0002	0,0002	0,5324
7Networks_LH_DorsAttn_FEF_2					
mean	-3,4821	-0,0758	2,8688	3,1337	0,2649
std	1,0069	0,031	1,0646	1,0658	0,1376
p	0,0003	0,0162	0,0074	0,0038	0,0107
7Networks_LH_SalVentAttn_ParOper_2					
mean	-3,4836	0,0713	3,2862	3,0383	-0,2479
std	1,018	0,0287	1,0193	1,0116	0,1258
p	0,0003	0,0131	0,0004	0,0028	0,0213
7Networks_LH_Default_Temp_6					
mean	-3,4613	0,069	-2,79	-3,028	-0,238
std	1,0095	0,0303	1,0612	1,057	0,128
p	0,0017	0,0228	0,0063	0,003	0,0412
7Networks_LH_Default_PFC_9					
mean	-3,4868	-0,0906	3,426	3,7433	0,3173
std	1,005	0,0309	1,0523	1,0506	0,1481
p	0,0008	0,0041	0,0003	0,0003	0,0033
7Networks_LH_Default_PFC_11					
mean	-3,4751	-0,1853	2,2229	2,8674	0,6445
std	1,0102	0,03	1,0431	1,0576	0,2171
p	0,0006	0,0004	0,0382	0,0119	0,0005
7Networks_RH_Cont_PFCl_6					
mean	-3,4729	-0,087	3,1641	3,4667	0,3026
std	1,0009	0,0306	1,0333	1,0331	0,1419
p	0,0003	0,0041	0,002	0,0005	0,0025
7Networks_RH_Default_PFCm_5					
mean	-3,491	-0,1449	3,0807	3,5878	0,5071

std	1,0269	0,0292	1,0248	1,0284	0,1864
p	0,0006	0,0003	0,0014	0,0007	0,0004

Supplementary Table 4b. Mediation of phenotypic relationship of Neuroticism with cortical thickness by intelligence (total cognitive score) in HCP. For each mediation test the relation between personality and intelligence (X > M), intelligence and brain (M > Y), relationship between personality and brain unmediated (residual), relationship between personality > brain, and mediated relationship between personality and brain (X>M * M>Y). Nomenclature of the regions is based on the official parcel names of the Schaefer 200 – 7 networks parcel solution.

7Networks_LH_Vis_1					
mean	9,5516	0,07	2,9474	3,6178	0,6703
std	1,1722	0,0328	1,4448	1,4028	0,3298
p	0,0004	0,0281	0,0451	0,014	0,024
7Networks_LH_SalVentAttn_PFCl_1					
mean	9,555	-0,1021	-2,6757	-3,6512	-0,9755
std	1,173	0,0309	1,2662	1,2363	0,3206
p	0,0005	0,001	0,0315	0,0035	0,0013
7Networks_LH_Cont_PFCl_3					
mean	9,5113	-0,0457	-3,5776	-4,0116	-0,4341
std	1,1724	0,0295	1,3229	1,3032	0,2865
p	0,0003	0,1136	0,0083	0,0034	0,1318
7Networks_LH_Cont_PFCl_4					
mean	9,5422	-0,056	-4,2244	-4,757	-0,5326
std	1,1536	0,0276	1,1796	1,1658	0,2702
p	0,0004	0,0437	0,0003	0,0003	0,0496
7Networks_RH_Limbic_TempPole_1					
mean	9,5439	0,0853	4,4995	5,3135	0,814
std	1,1616	0,0346	1,4554	1,4421	0,3461
p	0,0004	0,0162	0,0017	0,0004	0,0131
7Networks_RH_Cont_PFCl_5					
mean	9,5311	-0,091	-3,0622	-3,9291	-0,8669
std	1,1608	0,0314	1,2414	1,2225	0,3194
p	0,0004	0,002	0,0129	0,0015	0,0025
7Networks_RH_Default_PCC_1					
mean	9,5402	0,1268	2,448	3,657	1,2089
std	1,1672	0,0333	1,4864	1,4742	0,3505
p	0,0004	0,0004	0,0954	0,014	0,0002

Supplementary Table 4c. Mediation of phenotypic relationship of Openness with cortical thickness by intelligence (total cognitive score) in HCP. For each mediation test the relation between personality and intelligence (X > M), intelligence and brain (M

> Y), relationship between personality and brain unmediated (residual), relationship between personality > brain, and mediated relationship between personality and brain (X>M * M>Y). Nomenclature of the regions is based on the official parcel names of the Schaefer 200 – 7 networks parcel solution.

Personality trait	**H^2**	**SE**	**p**
Agreeableness	0.29	0.07	0.0000
Conscientiousness	0.43	0.06	0.0000
Extraversion	0.43	0.05	0.0000
Neuroticism	0.37	0.06	0.0000
Openness	0.58	0.05	0.0000

Supplementary Table 5. Heritability of personality traits. Heritability of personality traits computed using Solar 8.4.0. Here we report heritability values, standard error, as well as p-values (displayed at 10^{-4} accuracy).

ROIS	**H^2**	**SE**	**p**
7Networks_LH_Vis_1	0.3960	0.0506	0.0000
7Networks_LH_Vis_2	0.3280	0.0555	0.0000
7Networks_LH_Vis_3	0.1523	0.0586	0.0036
7Networks_LH_Vis_4	0.4836	0.0439	0.0000
7Networks_LH_Vis_5	0.4083	0.0522	0.0000
7Networks_LH_Vis_6	0.4480	0.0501	0.0000
7Networks_LH_Vis_7	0.4963	0.0470	0.0000
7Networks_LH_Vis_8	0.2402	0.0513	0.0000
7Networks_LH_Vis_9	0.4775	0.0471	0.0000
7Networks_LH_Vis_10	0.5194	0.0463	0.0000
7Networks_LH_Vis_11	0.3290	0.0522	0.0000
7Networks_LH_Vis_12	0.4718	0.0516	0.0000
7Networks_LH_Vis_13	0.5551	0.0466	0.0000
7Networks_LH_Vis_14	0.4452	0.0519	0.0000
7Networks_LH_SomMot_1	0.4736	0.0497	0.0000
7Networks_LH_SomMot_2	0.2755	0.0555	0.0000
7Networks_LH_SomMot_3	0.5145	0.0480	0.0000
7Networks_LH_SomMot_4	0.3997	0.0531	0.0000
7Networks_LH_SomMot_5	0.2452	0.0547	0.0000
7Networks_LH_SomMot_6	0.5276	0.0462	0.0000
7Networks_LH_SomMot_7	0.2888	0.0575	0.0000
7Networks_LH_SomMot_8	0.2808	0.0589	0.0000
7Networks_LH_SomMot_9	0.3392	0.0544	0.0000

7Networks_LH_SomMot_10	0.5155	0.0479	0.0000
7Networks_LH_SomMot_11	0.2151	0.0550	0.0000
7Networks_LH_SomMot_12	0.3585	0.0543	0.0000
7Networks_LH_SomMot_13	0.3296	0.0584	0.0000
7Networks_LH_SomMot_14	0.3638	0.0514	0.0000
7Networks_LH_SomMot_15	0.4356	0.0492	0.0000
7Networks_LH_SomMot_16	0.4002	0.0578	0.0000
7Networks_LH_DorsAttn_Post_1	0.3267	0.0586	0.0000
7Networks_LH_DorsAttn_Post_2	0.2151	0.0535	0.0000
7Networks_LH_DorsAttn_Post_3	0.3442	0.0544	0.0000
7Networks_LH_DorsAttn_Post_4	0.3499	0.0561	0.0000
7Networks_LH_DorsAttn_Post_5	0.2148	0.0550	0.0000
7Networks_LH_DorsAttn_Post_6	0.2283	0.0590	0.0000
7Networks_LH_DorsAttn_Post_7	0.4602	0.0527	0.0000
7Networks_LH_DorsAttn_Post_8	0.3059	0.0551	0.0000
7Networks_LH_DorsAttn_Post_9	0.4502	0.0506	0.0000
7Networks_LH_DorsAttn_Post_10	0.4682	0.0529	0.0000
7Networks_LH_DorsAttn_FEF_1	0.2673	0.0550	0.0000
7Networks_LH_DorsAttn_FEF_2	0.3613	0.0562	0.0000
7Networks_LH_DorsAttn_PrCv_1	0.1866	0.0585	0.0005
7Networks_LH_SalVentAttn_ParOper_1	0.1303	0.0574	0.0096
7Networks_LH_SalVentAttn_ParOper_2	0.2800	0.0527	0.0000
7Networks_LH_SalVentAttn_ParOper_3	0.2185	0.0581	0.0000
7Networks_LH_SalVentAttn_FrOper_1	0.3500	0.0537	0.0000
7Networks_LH_SalVentAttn_FrOper_2	0.4083	0.0535	0.0000
7Networks_LH_SalVentAttn_FrOper_3	0.4316	0.0528	0.0000
7Networks_LH_SalVentAttn_FrOper_4	0.2426	0.0610	0.0000
7Networks_LH_SalVentAttn_PFCl_1	0.4391	0.0476	0.0000
7Networks_LH_SalVentAttn_Med_1	0.3362	0.0589	0.0000
7Networks_LH_SalVentAttn_Med_2	0.3337	0.0577	0.0000
7Networks_LH_SalVentAttn_Med_3	0.2462	0.0571	0.0000
7Networks_LH_Limbic_OFC_1	0.2963	0.0532	0.0000
7Networks_LH_Limbic_OFC_2	0.3585	0.0556	0.0000
7Networks_LH_Limbic_TempPole_1	0.3385	0.0583	0.0000
7Networks_LH_Limbic_TempPole_2	0.3692	0.0498	0.0000
7Networks_LH_Limbic_TempPole_3	0.2432	0.0529	0.0000

7Networks_LH_Limbic_TempPole_4	0.4492	0.0520	0.0000
7Networks_LH_Cont_Par_1	0.2170	0.0570	0.0000
7Networks_LH_Cont_Par_2	0.2715	0.0536	0.0000
7Networks_LH_Cont_Par_3	0.0448	0.0556	0.2068
7Networks_LH_Cont_Temp_1	0.1930	0.0574	0.0003
7Networks_LH_Cont_PFCl_1	0.2604	0.0512	0.0000
7Networks_LH_Cont_PFCl_2	0.2964	0.0557	0.0000
7Networks_LH_Cont_PFCl_3	0.3926	0.0532	0.0000
7Networks_LH_Cont_PFCl_4	0.2659	0.0547	0.0000
7Networks_LH_Cont_PFCl_5	0.4091	0.0501	0.0000
7Networks_LH_Cont_PFCl_6	0.2063	0.0572	0.0001
7Networks_LH_Cont_pCun_1	0.3744	0.0516	0.0000
7Networks_LH_Cont_Cing_1	0.5313	0.0487	0.0000
7Networks_LH_Cont_Cing_2	0.3678	0.0568	0.0000
7Networks_LH_Default_Temp_1	0.2854	0.0595	0.0000
7Networks_LH_Default_Temp_2	0.2831	0.0547	0.0000
7Networks_LH_Default_Temp_3	0.3428	0.0543	0.0000
7Networks_LH_Default_Temp_4	0.1930	0.0585	0.0004
7Networks_LH_Default_Temp_5	0.2131	0.0585	0.0001
7Networks_LH_Default_Temp_6	0.2821	0.0539	0.0000
7Networks_LH_Default_Temp_7	0.3019	0.0572	0.0000
7Networks_LH_Default_Temp_8	0.2422	0.0561	0.0000
7Networks_LH_Default_Temp_9	0.2643	0.0520	0.0000
7Networks_LH_Default_PFC_1	0.3635	0.0525	0.0000
7Networks_LH_Default_PFC_2	0.2708	0.0581	0.0000
7Networks_LH_Default_PFC_3	0.1493	0.0560	0.0032
7Networks_LH_Default_PFC_4	0.5135	0.0459	0.0000
7Networks_LH_Default_PFC_5	0.3168	0.0578	0.0000
7Networks_LH_Default_PFC_6	0.3310	0.0538	0.0000
7Networks_LH_Default_PFC_7	0.5053	0.0483	0.0000
7Networks_LH_Default_PFC_8	0.3889	0.0572	0.0000
7Networks_LH_Default_PFC_9	0.4656	0.0478	0.0000
7Networks_LH_Default_PFC_10	0.3767	0.0515	0.0000
7Networks_LH_Default_PFC_11	0.4263	0.0481	0.0000
7Networks_LH_Default_PFC_12	0.4694	0.0486	0.0000
7Networks_LH_Default_PFC_13	0.4649	0.0493	0.0000

7Networks_LH_Default_PCC_1	0.3913	0.0550	0.0000
7Networks_LH_Default_PCC_2	0.2794	0.0537	0.0000
7Networks_LH_Default_PCC_3	0.3900	0.0539	0.0000
7Networks_LH_Default_PCC_4	0.3922	0.0556	0.0000
7Networks_LH_Default_PHC_1	0.4640	0.0536	0.0000
7Networks_RH_Vis_1	0.3649	0.0531	0.0000
7Networks_RH_Vis_2	0.3496	0.0569	0.0000
7Networks_RH_Vis_3	0.3773	0.0566	0.0000
7Networks_RH_Vis_4	0.5840	0.0417	0.0000
7Networks_RH_Vis_5	0.2794	0.0551	0.0000
7Networks_RH_Vis_6	0.4662	0.0502	0.0000
7Networks_RH_Vis_7	0.5079	0.0463	0.0000
7Networks_RH_Vis_8	0.4341	0.0539	0.0000
7Networks_RH_Vis_9	0.5773	0.0433	0.0000
7Networks_RH_Vis_10	0.4768	0.0535	0.0000
7Networks_RH_Vis_11	0.2379	0.0536	0.0000
7Networks_RH_Vis_12	0.5188	0.0479	0.0000
7Networks_RH_Vis_13	0.4779	0.0490	0.0000
7Networks_RH_Vis_14	0.4356	0.0522	0.0000
7Networks_RH_Vis_15	0.2731	0.0558	0.0000
7Networks_RH_SomMot_1	0.4370	0.0532	0.0000
7Networks_RH_SomMot_2	0.3421	0.0590	0.0000
7Networks_RH_SomMot_3	0.3498	0.0573	0.0000
7Networks_RH_SomMot_4	0.3403	0.0554	0.0000
7Networks_RH_SomMot_5	0.1911	0.0576	0.0003
7Networks_RH_SomMot_6	0.2971	0.0572	0.0000
7Networks_RH_SomMot_7	0.4346	0.0501	0.0000
7Networks_RH_SomMot_8	0.1921	0.0546	0.0001
7Networks_RH_SomMot_9	0.3351	0.0603	0.0000
7Networks_RH_SomMot_10	0.1718	0.0602	0.0016
7Networks_RH_SomMot_11	0.3010	0.0532	0.0000
7Networks_RH_SomMot_12	0.4576	0.0501	0.0000
7Networks_RH_SomMot_13	0.3075	0.0531	0.0000
7Networks_RH_SomMot_14	0.3848	0.0524	0.0000
7Networks_RH_SomMot_15	0.3496	0.0590	0.0000
7Networks_RH_SomMot_16	0.2815	0.0593	0.0000

7Networks_RH_SomMot_17	0.4880	0.0494	0.0000
7Networks_RH_SomMot_18	0.3781	0.0504	0.0000
7Networks_RH_SomMot_19	0.4382	0.0534	0.0000
7Networks_RH_DorsAttn_Post_1	0.2420	0.0563	0.0000
7Networks_RH_DorsAttn_Post_2	0.2431	0.0565	0.0000
7Networks_RH_DorsAttn_Post_3	0.3086	0.0533	0.0000
7Networks_RH_DorsAttn_Post_4	0.2197	0.0572	0.0000
7Networks_RH_DorsAttn_Post_5	0.1940	0.0576	0.0002
7Networks_RH_DorsAttn_Post_6	0.3929	0.0523	0.0000
7Networks_RH_DorsAttn_Post_7	0.1424	0.0564	0.0047
7Networks_RH_DorsAttn_Post_8	0.3550	0.0542	0.0000
7Networks_RH_DorsAttn_Post_9	0.3334	0.0539	0.0000
7Networks_RH_DorsAttn_Post_10	0.4139	0.0513	0.0000
7Networks_RH_DorsAttn_FEF_1	0.3090	0.0586	0.0000
7Networks_RH_DorsAttn_FEF_2	0.2329	0.0569	0.0000
7Networks_RH_DorsAttn_PrCv_1	0.3154	0.0553	0.0000
7Networks_RH_SalVentAttn_TempOccPar_1	0.2310	0.0572	0.0000
7Networks_RH_SalVentAttn_TempOccPar_2	0.1702	0.0549	0.0008
7Networks_RH_SalVentAttn_TempOccPar_3	0.2479	0.0547	0.0000
7Networks_RH_SalVentAttn_PrC_1	0.1571	0.0568	0.0022
7Networks_RH_SalVentAttn_FrOper_1	0.2728	0.0570	0.0000
7Networks_RH_SalVentAttn_FrOper_2	0.5003	0.0520	0.0000
7Networks_RH_SalVentAttn_FrOper_3	0.3183	0.0530	0.0000
7Networks_RH_SalVentAttn_FrOper_4	0.2536	0.0567	0.0000
7Networks_RH_SalVentAttn_Med_1	0.2638	0.0558	0.0000
7Networks_RH_SalVentAttn_Med_2	0.4131	0.0515	0.0000
7Networks_RH_SalVentAttn_Med_3	0.3440	0.0594	0.0000
7Networks_RH_Limbic_OFC_1	0.4121	0.0566	0.0000
7Networks_RH_Limbic_OFC_2	0.3526	0.0496	0.0000
7Networks_RH_Limbic_OFC_3	0.3785	0.0545	0.0000
7Networks_RH_Limbic_TempPole_1	0.1799	0.0560	0.0005
7Networks_RH_Limbic_TempPole_2	0.3495	0.0556	0.0000
7Networks_RH_Limbic_TempPole_3	0.5059	0.0498	0.0000
7Networks_RH_Cont_Par_1	0.1538	0.0562	0.0021
7Networks_RH_Cont_Par_2	0.1959	0.0554	0.0001
7Networks_RH_Cont_Par_3	0.1328	0.0566	0.0081

7Networks_RH_Cont_Temp_1	0.2258	0.0600	0.0000
7Networks_RH_Cont_PFCv_1	0.2109	0.0579	0.0001
7Networks_RH_Cont_PFCl_1	0.2699	0.0546	0.0000
7Networks_RH_Cont_PFCl_2	0.3055	0.0549	0.0000
7Networks_RH_Cont_PFCl_3	0.3266	0.0515	0.0000
7Networks_RH_Cont_PFCl_4	0.4177	0.0506	0.0000
7Networks_RH_Cont_PFCl_5	0.3271	0.0519	0.0000
7Networks_RH_Cont_PFCl_6	0.3110	0.0512	0.0000
7Networks_RH_Cont_PFCl_7	0.3489	0.0573	0.0000
7Networks_RH_Cont_pCun_1	0.2582	0.0545	0.0000
7Networks_RH_Cont_PFCmp_1	0.4633	0.0479	0.0000
7Networks_RH_Cont_PFCmp_2	0.4163	0.0537	0.0000
7Networks_RH_Cont_PFCmp_3	0.2755	0.0573	0.0000
7Networks_RH_Cont_PFCmp_4	0.4503	0.0546	0.0000
7Networks_RH_Default_Par_1	0.2263	0.0589	0.0000
7Networks_RH_Default_Par_2	0.2045	0.0563	0.0001
7Networks_RH_Default_Par_3	0.1980	0.0561	0.0001
7Networks_RH_Default_Temp_1	0.3255	0.0543	0.0000
7Networks_RH_Default_Temp_2	0.3169	0.0556	0.0000
7Networks_RH_Default_Temp_3	0.4308	0.0562	0.0000
7Networks_RH_Default_Temp_4	0.2967	0.0533	0.0000
7Networks_RH_Default_Temp_5	0.2504	0.0595	0.0000
7Networks_RH_Default_PFCv_1	0.3596	0.0550	0.0000
7Networks_RH_Default_PFCm_1	0.2831	0.0532	0.0000
7Networks_RH_Default_PFCm_2	0.2488	0.0552	0.0000
7Networks_RH_Default_PFCm_3	0.3565	0.0609	0.0000
7Networks_RH_Default_PFCm_4	0.5538	0.0463	0.0000
7Networks_RH_Default_PFCm_5	0.4769	0.0474	0.0000
7Networks_RH_Default_PFCm_6	0.3159	0.0539	0.0000
7Networks_RH_Default_PFCm_7	0.1779	0.0539	0.0003
7Networks_RH_Default_PCC_1	0.3857	0.0577	0.0000
7Networks_RH_Default_PCC_2	0.4159	0.0549	0.0000
7Networks_RH_Default_PCC_3	0.2319	0.0547	0.0000

Supplementary Table 6. Heritability of cortical thickness. Heritability of cortical thickness calculated using solar 8.4.0. regions are named according to the Schaefer 200 atlas, based on 7-networks. Here we report heritability values, standard errors (SE), and p-values. All regions were significantly heritable at FDRq<0.05, with the exception of *7Networks_LH_Cont_Par_3,* which is highlighted in yellow. Nomenclature of the regions is based on the official parcel names of the Schaefer 200 – 7 networks parcel solution.

ROI	ρ_e	p	ρ_g	p
7Networks_LH_Vis_1	-0,079052	0,19729	0,18676	0,14884
7Networks_LH_Vis_2	0,012668	0,83697	0,063927	0,66213
7Networks_LH_Vis_3	-0,065285	0,26767	0,16731	0,44393
7Networks_LH_Vis_4	-0,11466	0,061538	0,2425	0,034865
7Networks_LH_Vis_5	0,075226	0,23203	-0,0003708	0,99701
7Networks_LH_Vis_6	-0,062598	0,32606	0,020191	0,87028
7Networks_LH_Vis_7	-0,0004927	0,99382	0,1427	0,21894
7Networks_LH_Vis_8	-0,057216	0,31688	0,14571	0,35828
7Networks_LH_Vis_9	-0,050569	0,42351	0,28583	0,014601
7Networks_LH_Vis_10	-0,18542	0,0039403	0,35907	0,0013726
7Networks_LH_Vis_11	0,055302	0,35692	0,036676	0,79524
7Networks_LH_Vis_12	-0,058799	0,37029	0,15021	0,2271
7Networks_LH_Vis_13	0,054723	0,42117	0,033513	0,76768
7Networks_LH_Vis_14	0,097218	0,1308	0,026523	0,83438
7Networks_LH_SomMot_1	0,025695	0,69266	0,0049152	0,96785
7Networks_LH_SomMot_2	0,081928	0,17203	0,018946	0,90512
7Networks_LH_SomMot_3	0,031826	0,63064	0,077473	0,5073
7Networks_LH_SomMot_4	0,011344	0,85787	-0,048262	0,71566
7Networks_LH_SomMot_5	-0,019742	0,73747	-0,025311	0,87739
7Networks_LH_SomMot_6	0,0066233	0,91986	0,12049	0,29016
7Networks_LH_SomMot_7	0,015863	0,79591	-0,18177	0,25798
7Networks_LH_SomMot_8	-0,033367	0,58906	0,0038403	0,98099
7Networks_LH_SomMot_9	-0,048875	0,42583	0,046745	0,74453
7Networks_LH_SomMot_10	0,035033	0,59616	0,096343	0,41044
7Networks_LH_SomMot_11	-0,05484	0,34707	-0,0005635	0,99748
7Networks_LH_SomMot_12	-0,0072036	0,90763	-0,1773	0,21072
7Networks_LH_SomMot_13	-0,063163	0,31636	0,039682	0,79395
7Networks_LH_SomMot_14	0,0032122	0,95786	-0,12451	0,35643
7Networks_LH_SomMot_15	-0,03197	0,6117	0,034414	0,78044
7Networks_LH_SomMot_16	0,059943	0,3715	-0,099077	0,47536
7Networks_LH_DorsAttn_Post_1	-0,05155	0,4141	0,12269	0,41534
7Networks_LH_DorsAttn_Post_2	-0,083855	0,14368	0,27419	0,11542
7Networks_LH_DorsAttn_Post_3	-0,059709	0,33232	0,12045	0,3938
7Networks_LH_DorsAttn_Post_4	0,06774	0,27799	0,074927	0,60125
7Networks_LH_DorsAttn_Post_5	-0,024555	0,67318	0,14005	0,42657
7Networks_LH_DorsAttn_Post_6	-0,025155	0,67756	0,15936	0,36807
7Networks_LH_DorsAttn_Post_7	0,011903	0,85534	-0,24582	0,048949
7Networks_LH_DorsAttn_Post_8	-0,072651	0,23102	-0,053424	0,72122

7Networks_LH_DorsAttn_Post_9	0,063859	0,32607	-0,26818	0,025986
7Networks_LH_DorsAttn_Post_10	0,026982	0,68308	-0,071597	0,56751
7Networks_LH_DorsAttn_FEF_1	-0,039598	0,50895	-0,012733	0,93624
7Networks_LH_DorsAttn_FEF_2	0,0066935	0,91562	-0,25164	0,073418
7Networks_LH_DorsAttn_PrCv_1	0,015117	0,79866	-0,22564	0,2397
7Networks_LH_SalVentAttn_ParOper_1	-0,0025321	0,96536	0,32611	0,14177
7Networks_LH_SalVentAttn_ParOper_2	0,032171	0,5844	-0,0705	0,64219
7Networks_LH_SalVentAttn_ParOper_3	0,0063434	0,91621	-0,009796	0,9559
7Networks_LH_SalVentAttn_FrOper_1	0,0027538	0,96426	0,0071485	0,95907
7Networks_LH_SalVentAttn_FrOper_2	0,040815	0,5263	0,038533	0,77339
7Networks_LH_SalVentAttn_FrOper_3	-0,002797	0,96532	0,10839	0,39938
7Networks_LH_SalVentAttn_FrOper_4	0,0055092	0,92869	-0,078883	0,6509
7Networks_LH_SalVentAttn_PFCl_1	0,02871	0,64372	-0,1678	0,16588
7Networks_LH_SalVentAttn_Med_1	0,0555	0,38128	-0,036957	0,80586
7Networks_LH_SalVentAttn_Med_2	-0,046889	0,45594	0,1865	0,20748
7Networks_LH_SalVentAttn_Med_3	0,11748	0,051188	-0,358	0,034025
7Networks_LH_Limbic_OFC_1	0,10849	0,065906	-0,27566	0,062208
7Networks_LH_Limbic_OFC_2	-0,0020436	0,97408	0,098323	0,49165
7Networks_LH_Limbic_TempPole_1	0,064778	0,30702	-0,038212	0,79566
7Networks_LH_Limbic_TempPole_2	-0,0096495	0,87326	0,091728	0,49251
7Networks_LH_Limbic_TempPole_3	-0,0067672	0,90693	0,10621	0,50931
7Networks_LH_Limbic_TempPole_4	0,0095145	0,88315	-0,0074987	0,95256
7Networks_LH_Cont_Par_1	0,014026	0,81303	-0,044135	0,80398
7Networks_LH_Cont_Par_2	0,037755	0,52275	-0,17838	0,24893
7Networks_LH_Cont_Par_3	-0,02525	0,6534	0,37426	0,32587
7Networks_LH_Cont_Temp_1	0,084383	0,15001	-0,14186	0,44977
7Networks_LH_Cont_PFCl_1	0,022654	0,69314	0,075481	0,62386
7Networks_LH_Cont_PFCl_2	0,052698	0,38374	-0,22256	0,14458
7Networks_LH_Cont_PFCl_3	-0,0023602	0,97009	-0,044528	0,73868
7Networks_LH_Cont_PFCl_4	-0,12144	0,040379	-0,080271	0,61394
7Networks_LH_Cont_PFCl_5	-0,041619	0,50252	-0,12044	0,34663
7Networks_LH_Cont_PFCl_6	-0,010749	0,85558	-0,095273	0,60287
7Networks_LH_Cont_pCun_1	-0,016957	0,78178	-0,098956	0,4593
7Networks_LH_Cont_Cing_1	-0,079363	0,24079	0,017564	0,881
7Networks_LH_Cont_Cing_2	0,0075894	0,90506	-0,08263	0,55828
7Networks_LH_Default_Temp_1	-0,069696	0,26057	0,25444	0,11437
7Networks_LH_Default_Temp_2	0,16512	0,0050416	-0,2983	0,055193
7Networks_LH_Default_Temp_3	0,0001054	0,99805	0,19144	0,17682
7Networks_LH_Default_Temp_4	0,043015	0,46868	0,13858	0,4665

7Networks_LH_Default_Temp_5	-0,15362	0,011314	0,59788	0,0004934
7Networks_LH_Default_Temp_6	-0,040484	0,49612	0,18066	0,23753
7Networks_LH_Default_Temp_7	-0,0061987	0,91969	-0,098815	0,52125
7Networks_LH_Default_Temp_8	-0,058035	0,33503	0,19464	0,23756
7Networks_LH_Default_Temp_9	0,0012862	0,9823	-0,094239	0,54007
7Networks_LH_Default_PFC_1	-0,026717	0,66231	0,13345	0,32796
7Networks_LH_Default_PFC_2	0,14148	0,019489	-0,28872	0,077282
7Networks_LH_Default_PFC_3	0,097464	0,088585	-0,39062	0,061042
7Networks_LH_Default_PFC_4	0,033147	0,60829	-0,17588	0,12119
7Networks_LH_Default_PFC_5	-0,10377	0,095584	-0,017451	0,90815
7Networks_LH_Default_PFC_6	-0,018674	0,75928	-0,023309	0,87077
7Networks_LH_Default_PFC_7	-0,013331	0,83922	-0,22214	0,061045
7Networks_LH_Default_PFC_8	-0,045787	0,47826	0,11445	0,41756
7Networks_LH_Default_PFC_9	-0,048351	0,44487	-0,21022	0,078581
7Networks_LH_Default_PFC_10	-0,046104	0,45976	-0,039388	0,77116
7Networks_LH_Default_PFC_11	0,0078701	0,89816	-0,35606	0,0037521
7Networks_LH_Default_PFC_12	-0,039602	0,53482	-0,16614	0,16671
7Networks_LH_Default_PFC_13	-0,0231	0,71745	-0,2591	0,033329
7Networks_LH_Default_PCC_1	-0,095588	0,13269	0,15406	0,27152
7Networks_LH_Default_PCC_2	-0,099767	0,092117	0,30689	0,044508
7Networks_LH_Default_PCC_3	-0,064521	0,30722	0,099199	0,46033
7Networks_LH_Default_PCC_4	-0,053317	0,40417	0,12529	0,36301
7Networks_LH_Default_PHC_1	0,06492	0,32866	-0,11549	0,36047
7Networks_RH_Vis_1	0,01526	0,80482	0,16498	0,23323
7Networks_RH_Vis_2	-0,040559	0,51608	0,3075	0,0359
7Networks_RH_Vis_3	-0,1453	0,021953	0,33979	0,015079
7Networks_RH_Vis_4	-0,12988	0,049683	0,31992	0,0028168
7Networks_RH_Vis_5	0,033343	0,57817	0,013407	0,93125
7Networks_RH_Vis_6	-0,0071607	0,91131	0,1408	0,25239
7Networks_RH_Vis_7	-0,12116	0,060626	0,049553	0,66559
7Networks_RH_Vis_8	-0,040656	0,52823	0,20938	0,10582
7Networks_RH_Vis_9	-0,080138	0,22911	0,26415	0,016985
7Networks_RH_Vis_10	-0,028164	0,67088	0,1684	0,1765
7Networks_RH_Vis_11	0,025049	0,66596	0,1055	0,52108
7Networks_RH_Vis_12	0,035559	0,59216	0,1063	0,36182
7Networks_RH_Vis_13	0,04067	0,52977	0,074824	0,53406
7Networks_RH_Vis_14	0,07806	0,22609	-0,26922	0,03158
7Networks_RH_Vis_15	0,078028	0,19353	-0,024067	0,87919
7Networks_RH_SomMot_1	0,11893	0,066284	-0,090136	0,48669

7Networks_RH_SomMot_2	0,097147	0,12609	-0,022086	0,88268
7Networks_RH_SomMot_3	-0,0080235	0,89874	0,08856	0,54096
7Networks_RH_SomMot_4	0,029742	0,63395	0,14224	0,32241
7Networks_RH_SomMot_5	0,0098532	0,86777	0,18981	0,31908
7Networks_RH_SomMot_6	0,028825	0,63982	-0,073608	0,63328
7Networks_RH_SomMot_7	0,052779	0,40199	0,14991	0,22949
7Networks_RH_SomMot_8	0,13449	0,019246	-0,22895	0,21083
7Networks_RH_SomMot_9	0,010379	0,87072	0,19935	0,18581
7Networks_RH_SomMot_10	0,077136	0,19962	-0,043387	0,83579
7Networks_RH_SomMot_11	0,19243	0,0011463	-0,31677	0,031319
7Networks_RH_SomMot_12	0,064576	0,31419	0,075429	0,54191
7Networks_RH_SomMot_13	-0,015987	0,78848	0,12894	0,37851
7Networks_RH_SomMot_14	-0,034907	0,5747	-0,093961	0,48366
7Networks_RH_SomMot_15	-0,11791	0,06322	0,27408	0,059718
7Networks_RH_SomMot_16	0,0019755	0,9746	0,0013636	0,99314
7Networks_RH_SomMot_17	-0,01335	0,8384	0,019774	0,86923
7Networks_RH_SomMot_18	0,069773	0,25036	-0,088504	0,49984
7Networks_RH_SomMot_19	0,13469	0,038284	-0,21184	0,10014
7Networks_RH_DorsAttn_Post_1	-0,05627	0,34214	0,34532	0,042578
7Networks_RH_DorsAttn_Post_2	0,0057328	0,92329	0,13699	0,41797
7Networks_RH_DorsAttn_Post_3	0,097877	0,1024	-0,054596	0,70936
7Networks_RH_DorsAttn_Post_4	-0,039292	0,50859	0,11921	0,50315
7Networks_RH_DorsAttn_Post_5	0,031397	0,59703	0,15275	0,41654
7Networks_RH_DorsAttn_Post_6	0,079684	0,20391	-0,21119	0,1034
7Networks_RH_DorsAttn_Post_7	-0,0195	0,73558	-0,02258	0,91652
7Networks_RH_DorsAttn_Post_8	-0,10281	0,10431	0,22073	0,10718
7Networks_RH_DorsAttn_Post_9	0,021472	0,72434	-0,11398	0,42314
7Networks_RH_DorsAttn_Post_10	-0,047737	0,44655	0,061705	0,6305
7Networks_RH_DorsAttn_FEF_1	-0,087941	0,16012	0,08259	0,58942
7Networks_RH_DorsAttn_FEF_2	0,059472	0,31442	-0,35923	0,03744
7Networks_RH_DorsAttn_PrCv_1	-0,023558	0,69956	-0,085148	0,56629
7Networks_RH_SalVentAttn_TempOccPar_1	-0,0030163	0,95955	0,24926	0,14885
7Networks_RH_SalVentAttn_TempOccPar_2	0,06984	0,22222	-0,10182	0,60233
7Networks_RH_SalVentAttn_TempOccPar_3	0,014644	0,80411	0,12575	0,43957
7Networks_RH_SalVentAttn_PrC_1	-0,032073	0,58046	-0,17922	0,38742
7Networks_RH_SalVentAttn_FrOper_1	0,073802	0,21908	-0,24837	0,12224
7Networks_RH_SalVentAttn_FrOper_2	0,033102	0,62273	-0,058355	0,63411
7Networks_RH_SalVentAttn_FrOper_3	-0,017422	0,77187	0,16148	0,26407
7Networks_RH_SalVentAttn_FrOper_4	-0,047879	0,42419	0,15661	0,34801

7Networks_RH_SalVentAttn_Med_1	0,081997	0,17022	-0,1724	0,28292
7Networks_RH_SalVentAttn_Med_2	0,056308	0,36997	0,0088976	0,94468
7Networks_RH_SalVentAttn_Med_3	0,18492	0,0028243	-0,55335	0,0004109
7Networks_RH_Limbic_OFC_1	0,000525	0,99352	0,08355	0,53641
7Networks_RH_Limbic_OFC_2	0,016288	0,78382	0,070742	0,59627
7Networks_RH_Limbic_OFC_3	0,093422	0,13691	-0,20322	0,13794
7Networks_RH_Limbic_TempPole_1	0,025827	0,65655	0,061589	0,74812
7Networks_RH_Limbic_TempPole_2	-0,019268	0,75829	0,18356	0,19993
7Networks_RH_Limbic_TempPole_3	0,074456	0,26554	-0,031963	0,78812
7Networks_RH_Cont_Par_1	0,013852	0,81185	-0,084165	0,68608
7Networks_RH_Cont_Par_2	0,072785	0,21067	-0,069621	0,70206
7Networks_RH_Cont_Par_3	0,050633	0,38055	-0,18529	0,402
7Networks_RH_Cont_Temp_1	-0,089824	0,13905	0,35894	0,05401
7Networks_RH_Cont_PFCv_1	-0,045812	0,44105	0,19838	0,28585
7Networks_RH_Cont_PFCl_1	0,042174	0,47755	0,045826	0,77041
7Networks_RH_Cont_PFCl_2	-0,014437	0,81156	0,032326	0,82868
7Networks_RH_Cont_PFCl_3	-0,12094	0,04088	0,13941	0,32564
7Networks_RH_Cont_PFCl_4	0,024286	0,69911	-0,059137	0,6466
7Networks_RH_Cont_PFCl_5	-0,051934	0,38582	-0,069729	0,62116
7Networks_RH_Cont_PFCl_6	-0,0091309	0,87687	-0,046093	0,74684
7Networks_RH_Cont_PFCl_7	0,01624	0,79713	-0,069193	0,63339
7Networks_RH_Cont_pCun_1	-0,062743	0,28735	0,17131	0,28731
7Networks_RH_Cont_PFCmp_1	-0,064961	0,30436	0,039802	0,74008
7Networks_RH_Cont_PFCmp_2	0,048745	0,44644	-0,14787	0,25835
7Networks_RH_Cont_PFCmp_3	0,14451	0,016821	-0,48906	0,0023123
7Networks_RH_Cont_PFCmp_4	0,046628	0,47516	-0,30197	0,019916
7Networks_RH_Default_Par_1	0,095142	0,11799	-0,075421	0,66797
7Networks_RH_Default_Par_2	0,044959	0,44645	0,059015	0,74643
7Networks_RH_Default_Par_3	-0,026585	0,64961	-0,062762	0,73235
7Networks_RH_Default_Temp_1	0,028678	0,63731	-0,12972	0,36886
7Networks_RH_Default_Temp_2	-0,03071	0,61712	0,1155	0,43617
7Networks_RH_Default_Temp_3	-0,052706	0,42281	0,16048	0,23618
7Networks_RH_Default_Temp_4	-0,094782	0,10756	0,28412	0,063133
7Networks_RH_Default_Temp_5	0,12176	0,047406	-0,049152	0,77162
7Networks_RH_Default_PFCv_1	-0,063573	0,30782	0,015555	0,91186
7Networks_RH_Default_PFCm_1	0,087377	0,13796	-0,09607	0,52614
7Networks_RH_Default_PFCm_2	0,025903	0,66185	-0,026321	0,87224
7Networks_RH_Default_PFCm_3	-0,047054	0,47151	0,0038185	0,97947
7Networks_RH_Default_PFCm_4	0,003877	0,95457	-0,13584	0,22847

7Networks_RH_Default_PFCm_5	0,029688	0,64304	-0,33171	0,0049967
7Networks_RH_Default_PFCm_6	0,21399	0,0003541	-0,50618	0,0005788
7Networks_RH_Default_PFCm_7	-0,0080771	0,88762	-0,12891	0,49347
7Networks_RH_Default_PCC_1	-0,12127	0,057177	0,22042	0,12134
7Networks_RH_Default_PCC_2	-0,035063	0,5869	0,076935	0,56602
7Networks_RH_Default_PCC_3	0,082602	0,15637	-0,076839	0,64896

Supplementary Table 7. Genetic and environmental correlation between Agreeableness and cortical thickness in HCP. Genetic correlation between Agreeableness and local cortical thickness calculated using solar 8.4.0. Regions are named according to the Schaefer 200 atlas, based on 7-networks. Here we report environmental correlation (ρ_e) and genetic correlation (ρ_g) and the associated p-values.

ROI name	ρ_e	**p**	ρ_g	**p**
7Networks_LH_Vis_1	-0.077319	0.21739	0.031867	0.76213
7Networks_LH_Vis_2	0.020231	0.74679	-0.021573	0.85557
7Networks_LH_Vis_3	-0.019318	0.74977	-0.16548	0.33899
7Networks_LH_Vis_4	0.030785	0.62362	-0.037492	0.68262
7Networks_LH_Vis_5	-0.045422	0.47837	-0.0060919	0.95433
7Networks_LH_Vis_6	0.0020273	0.975	-0.0084422	0.93314
7Networks_LH_Vis_7	0.018961	0.77164	0.023085	0.80733
7Networks_LH_Vis_8	0.061134	0.29104	-0.10968	0.40093
7Networks_LH_Vis_9	-0.052112	0.42324	0.086626	0.36478
7Networks_LH_Vis_10	-0.0001018	0.99887	-0.023673	0.7997
7Networks_LH_Vis_11	0.019588	0.75194	0.11301	0.32772
7Networks_LH_Vis_12	-0.010871	0.87054	-0.017826	0.85943
7Networks_LH_Vis_13	0.051006	0.45749	0.021795	0.813
7Networks_LH_Vis_14	0.097985	0.13338	-0.013031	0.89892
7Networks_LH_SomMot_1	-0.022766	0.72929	-0.0059826	0.95069
7Networks_LH_SomMot_2	-0.0047647	0.93819	0.037657	0.76946
7Networks_LH_SomMot_3	-0.034172	0.60967	-0.092592	0.32895
7Networks_LH_SomMot_4	-0.040704	0.52632	-0.047306	0.66143
7Networks_LH_SomMot_5	-0.09301	0.12396	0.12071	0.36274
7Networks_LH_SomMot_6	-0.061314	0.35693	0.0008657	0.99243
7Networks_LH_SomMot_7	0.051566	0.41174	-0.0005182	0.99643
7Networks_LH_SomMot_8	-0.064761	0.30999	0.18022	0.1665
7Networks_LH_SomMot_9	0.067279	0.28354	-0.14346	0.21244
7Networks_LH_SomMot_10	-0.0019795	0.97631	-0.1657	0.079732
7Networks_LH_SomMot_11	0.045638	0.44984	-0.11944	0.39923
7Networks_LH_SomMot_12	0.030527	0.62916	-0.0062447	0.95609

7Networks_LH_SomMot_13	0.014934	0.81601	-0.019287	0.87374
7Networks_LH_SomMot_14	-0.062096	0.31446	0.063622	0.56204
7Networks_LH_SomMot_15	-0.014165	0.82361	-0.087766	0.38355
7Networks_LH_SomMot_16	0.10419	0.11947	-0.13423	0.22497
7Networks_LH_DorsAttn_Post_1	0.16223	0.0097636	-0.41593	0.0006824
7Networks_LH_DorsAttn_Post_2	0.0079147	0.8933	-0.028017	0.8417
7Networks_LH_DorsAttn_Post_3	-0.0016595	0.97895	0.052246	0.65202
7Networks_LH_DorsAttn_Post_4	0.018212	0.77597	-0.045804	0.69585
7Networks_LH_DorsAttn_Post_5	0.0090312	0.88023	0.046217	0.74586
7Networks_LH_DorsAttn_Post_6	-0.050747	0.41443	0.14445	0.31342
7Networks_LH_DorsAttn_Post_7	-0.062537	0.34788	0.061882	0.54495
7Networks_LH_DorsAttn_Post_8	-0.082318	0.18385	0.11137	0.36049
7Networks_LH_DorsAttn_Post_9	-0.033359	0.60768	0.012096	0.90459
7Networks_LH_DorsAttn_Post_10	0.0044846	0.94713	-0.023911	0.81669
7Networks_LH_DorsAttn_FEF_1	-0.11762	0.054424	0.27643	0.029121
7Networks_LH_DorsAttn_FEF_2	0.037359	0.56248	0.0037484	0.974
7Networks_LH_DorsAttn_PrCv_1	-0.0906	0.132	0.35233	0.026929
7Networks_LH_SalVentAttn_ParOper_1	-0.082851	0.16615	0.13334	0.47023
7Networks_LH_SalVentAttn_ParOper_2	-0.0074933	0.90029	-0.11113	0.36781
7Networks_LH_SalVentAttn_ParOper_3	-0.0144	0.81558	0.011076	0.93966
7Networks_LH_SalVentAttn_FrOper_1	-0.068857	0.27057	-0.045872	0.68752
7Networks_LH_SalVentAttn_FrOper_2	0.04249	0.5115	-0.1597	0.13611
7Networks_LH_SalVentAttn_FrOper_3	0.07889	0.22347	-0.33271	0.0013496
7Networks_LH_SalVentAttn_FrOper_4	-0.016992	0.78685	0.20297	0.15611
7Networks_LH_SalVentAttn_PFCl_1	-0.03721	0.55386	0.17134	0.079832
7Networks_LH_SalVentAttn_Med_1	-0.054133	0.40252	0.2731	0.025194
7Networks_LH_SalVentAttn_Med_2	0.046377	0.46887	-0.01192	0.92117
7Networks_LH_SalVentAttn_Med_3	0.1825	0.0031986	-0.12789	0.35265
7Networks_LH_Limbic_OFC_1	0.026823	0.65874	0.063344	0.60155
7Networks_LH_Limbic_OFC_2	0.017305	0.78904	-0.016377	0.88751
7Networks_LH_Limbic_TempPole_1	-0.039704	0.53917	0.038064	0.75364
7Networks_LH_Limbic_TempPole_2	-0.058372	0.3406	0.021006	0.8443
7Networks_LH_Limbic_TempPole_3	-0.011536	0.84501	-0.11831	0.36935
7Networks_LH_Limbic_TempPole_4	-0.037723	0.56597	0.029318	0.77513
7Networks_LH_Cont_Par_1	-0.027188	0.6545	0.084068	0.56199
7Networks_LH_Cont_Par_2	-0.12694	0.033798	0.16236	0.20299
7Networks_LH_Cont_Par_3	-0.053117	0.35935	0.18933	0.53464

7Networks_LH_Cont_Temp_1	0.055774	0.35649	0.0015069	0.99194
7Networks_LH_Cont_PFCl_1	0.018594	0.75069	0.023251	0.85269
7Networks_LH_Cont_PFCl_2	0.0060743	0.92192	-0.084399	0.49749
7Networks_LH_Cont_PFCl_3	0.0021952	0.97253	0.080574	0.45774
7Networks_LH_Cont_PFCl_4	-0.09488	0.12077	0.22866	0.070802
7Networks_LH_Cont_PFCl_5	-0.001802	0.9771	0.21568	0.035678
7Networks_LH_Cont_PFCl_6	-0.043499	0.4709	0.26095	0.075109
7Networks_LH_Cont_pCun_1	-0.0087962	0.88796	0.016218	0.88139
7Networks_LH_Cont_Cing_1	-0.063993	0.35004	0.070036	0.46001
7Networks_LH_Cont_Cing_2	0.034948	0.5915	-0.13962	0.2225
7Networks_LH_Default_Temp_1	-0.010139	0.87328	0.044788	0.73194
7Networks_LH_Default_Temp_2	0.098493	0.10614	-0.036615	0.77177
7Networks_LH_Default_Temp_3	0.01818	0.77103	-0.095804	0.40463
7Networks_LH_Default_Temp_4	-0.029639	0.62657	-0.020403	0.89475
7Networks_LH_Default_Temp_5	-0.091016	0.13879	-0.041834	0.77842
7Networks_LH_Default_Temp_6	0.031056	0.60835	-0.099433	0.42615
7Networks_LH_Default_Temp_7	-0.023026	0.71442	0.015706	0.90017
7Networks_LH_Default_Temp_8	-0.082184	0.17506	0.21425	0.12269
7Networks_LH_Default_Temp_9	-0.014934	0.80074	0.03788	0.76324
7Networks_LH_Default_PFC_1	0.024343	0.69604	-0.14245	0.20001
7Networks_LH_Default_PFC_2	-0.056921	0.36862	0.22041	0.091025
7Networks_LH_Default_PFC_3	-0.036084	0.53982	-0.1038	0.54295
7Networks_LH_Default_PFC_4	-0.019404	0.76718	0.034188	0.71211
7Networks_LH_Default_PFC_5	-0.10294	0.10452	0.19727	0.10704
7Networks_LH_Default_PFC_6	-0.064973	0.29716	0.15564	0.17843
7Networks_LH_Default_PFC_7	-0.057612	0.38418	0.13196	0.16699
7Networks_LH_Default_PFC_8	0.043272	0.51197	-0.02326	0.83834
7Networks_LH_Default_PFC_9	-0.042367	0.50986	0.043037	0.66124
7Networks_LH_Default_PFC_10	0.0052061	0.93367	0.04063	0.7078
7Networks_LH_Default_PFC_11	0.0036174	0.9536	0.18172	0.069187
7Networks_LH_Default_PFC_12	-0.0028771	0.96396	0.012089	0.90156
7Networks_LH_Default_PFC_13	-0.056134	0.38584	0.09851	0.31969
7Networks_LH_Default_PCC_1	-0.055093	0.3967	0.060109	0.58533
7Networks_LH_Default_PCC_2	-0.030578	0.61521	0.078073	0.53121
7Networks_LH_Default_PCC_3	-0.037161	0.56301	0.037023	0.73463
7Networks_LH_Default_PCC_4	-0.010899	0.8678	-0.046364	0.67889
7Networks_LH_Default_PHC_1	-0.08159	0.22444	0.073602	0.48017
7Networks_RH_Vis_1	0.057201	0.36663	-0.10737	0.33181
7Networks_RH_Vis_2	-0.033924	0.5973	0.038809	0.74153

7Networks_RH_Vis_3	0.046263	0.47867	-0.11764	0.30064
7Networks_RH_Vis_4	-0.16016	0.018567	0.13707	0.10772
7Networks_RH_Vis_5	0.058668	0.3427	-0.1222	0.32994
7Networks_RH_Vis_6	0.014021	0.83055	-0.068484	0.49273
7Networks_RH_Vis_7	-0.022471	0.73405	0.025383	0.78663
7Networks_RH_Vis_8	-0.037437	0.57282	-0.022487	0.83179
7Networks_RH_Vis_9	-0.047876	0.48225	0.092151	0.29541
7Networks_RH_Vis_10	0.016975	0.80232	-0.042458	0.67763
7Networks_RH_Vis_11	0.054493	0.35708	-0.067285	0.61478
7Networks_RH_Vis_12	0.014776	0.82598	0.010443	0.91209
7Networks_RH_Vis_13	-0.031754	0.62904	-0.031339	0.74954
7Networks_RH_Vis_14	0.012977	0.8418	-0.14005	0.17876
7Networks_RH_Vis_15	0.026938	0.66212	-0.068086	0.59664
7Networks_RH_SomMot_1	0.037501	0.56873	-0.086867	0.40558
7Networks_RH_SomMot_2	0.030815	0.63649	-0.044098	0.71403
7Networks_RH_SomMot_3	0.11773	0.066815	-0.28746	0.014132
7Networks_RH_SomMot_4	0.017257	0.78505	-0.020402	0.86196
7Networks_RH_SomMot_5	-0.04032	0.5074	-0.0014048	0.99269
7Networks_RH_SomMot_6	0.045523	0.46724	-0.11774	0.35075
7Networks_RH_SomMot_7	-0.06929	0.27877	-0.08431	0.40853
7Networks_RH_SomMot_8	0.031813	0.5918	0.034054	0.82033
7Networks_RH_SomMot_9	0.027008	0.68193	-0.038093	0.75679
7Networks_RH_SomMot_10	0.040142	0.51509	-0.007268	0.96512
7Networks_RH_SomMot_11	0.04506	0.45817	0.11781	0.32939
7Networks_RH_SomMot_12	0.0006033	0.99252	-0.11943	0.23107
7Networks_RH_SomMot_13	0.01692	0.78108	-0.022586	0.84963
7Networks_RH_SomMot_14	0.12475	0.048685	-0.14817	0.17146
7Networks_RH_SomMot_15	0.015389	0.81403	0.025695	0.83007
7Networks_RH_SomMot_16	0.017261	0.78542	0.060817	0.64336
7Networks_RH_SomMot_17	0.063942	0.3294	-0.26003	0.0081624
7Networks_RH_SomMot_18	0.06379	0.30556	-0.078342	0.46215
7Networks_RH_SomMot_19	-0.012906	0.84477	-0.049674	0.63496
7Networks_RH_DorsAttn_Post_1	-0.028847	0.63632	-0.014462	0.91569
7Networks_RH_DorsAttn_Post_2	0.065433	0.28324	-0.29619	0.02782
7Networks_RH_DorsAttn_Post_3	0.069326	0.25789	-0.14135	0.23337
7Networks_RH_DorsAttn_Post_4	0.10875	0.074748	-0.21554	0.13004
7Networks_RH_DorsAttn_Post_5	0.021496	0.72454	-0.025668	0.86743
7Networks_RH_DorsAttn_Post_6	-0.013621	0.83005	0.0036559	0.97039

7Networks_RH_DorsAttn_Post_7	0.012981	0.82677	-0.037657	0.82965
7Networks_RH_DorsAttn_Post_8	-0.0084823	0.8934	0.038211	0.73724
7Networks_RH_DorsAttn_Post_9	-0.038642	0.53678	0.03108	0.78929
7Networks_RH_DorsAttn_Post_10	0.06167	0.33431	-0.043208	0.67943
7Networks_RH_DorsAttn_FEF_1	0.05782	0.36785	-0.049904	0.69078
7Networks_RH_DorsAttn_FEF_2	0.064173	0.28964	-0.13362	0.33989
7Networks_RH_DorsAttn_PrCv_1	-0.012223	0.84537	0.065481	0.58746
7Networks_RH_SalVentAttn_TempOccPar_1	0.034713	0.56938	-0.22452	0.11504
7Networks_RH_SalVentAttn_TempOccPar_2	0.0035157	0.95216	0.044896	0.77571
7Networks_RH_SalVentAttn_TempOccPar_3	0.0049294	0.93459	-0.11048	0.40572
7Networks_RH_SalVentAttn_PrC_1	-0.027791	0.64229	0.11681	0.49596
7Networks_RH_SalVentAttn_FrOper_1	-0.001387	0.98184	0.011737	0.92829
7Networks_RH_SalVentAttn_FrOper_2	0.063812	0.35037	-0.020277	0.83769
7Networks_RH_SalVentAttn_FrOper_3	-0.0069686	0.90936	-0.026862	0.81893
7Networks_RH_SalVentAttn_FrOper_4	-0.015541	0.80051	-0.16973	0.20346
7Networks_RH_SalVentAttn_Med_1	-0.05008	0.41361	0.1985	0.12697
7Networks_RH_SalVentAttn_Med_2	-0.0030423	0.96217	0.055779	0.59487
7Networks_RH_SalVentAttn_Med_3	0.029224	0.65494	0.0013009	0.99141
7Networks_RH_Limbic_OFC_1	-0.046644	0.48393	0.14545	0.18315
7Networks_RH_Limbic_OFC_2	0.041184	0.49742	-0.012827	0.90721
7Networks_RH_Limbic_OFC_3	0.058736	0.35898	-0.0058573	0.95804
7Networks_RH_Limbic_TempPole_1	0.020697	0.72865	-0.16974	0.27194
7Networks_RH_Limbic_TempPole_2	-0.039484	0.53512	0.021472	0.85333
7Networks_RH_Limbic_TempPole_3	-0.064371	0.33849	0.05844	0.54706
7Networks_RH_Cont_Par_1	0.0052287	0.93065	0.018464	0.91404
7Networks_RH_Cont_Par_2	0.11953	0.044264	-0.107	0.47125
7Networks_RH_Cont_Par_3	-0.0095611	0.87139	0.027634	0.87846
7Networks_RH_Cont_Temp_1	-0.0224	0.71882	0.26487	0.072585
7Networks_RH_Cont_PFCv_1	0.025652	0.67507	-0.034168	0.81645
7Networks_RH_Cont_PFCl_1	0.10067	0.095965	-0.048468	0.70801
7Networks_RH_Cont_PFCl_2	0.045089	0.46641	-0.053835	0.65743
7Networks_RH_Cont_PFCl_3	0.0065973	0.91339	0.033812	0.76753
7Networks_RH_Cont_PFCl_4	0.05794	0.36176	0.13494	0.19301
7Networks_RH_Cont_PFCl_5	-0.018524	0.76053	0.072774	0.52668
7Networks_RH_Cont_PFCl_6	0.037125	0.5393	-0.12707	0.2743
7Networks_RH_Cont_PFCl_7	0.037633	0.5587	0.11287	0.33879
7Networks_RH_Cont_pCun_1	-0.060723	0.31192	0.21667	0.095314

7Networks_RH_Cont_PFCmp_1	-0.034261	0.59357	0.098281	0.31428
7Networks_RH_Cont_PFCmp_2	0.0073659	0.91043	-0.072901	0.49474
7Networks_RH_Cont_PFCmp_3	0.032848	0.59758	-0.109	0.40345
7Networks_RH_Cont_PFCmp_4	-0.0082365	0.9027	0.049384	0.63757
7Networks_RH_Default_Par_1	0.04386	0.47892	-0.1613	0.26073
7Networks_RH_Default_Par_2	0.10623	0.077322	-0.16732	0.2688
7Networks_RH_Default_Par_3	0.017001	0.77731	-0.043425	0.7711
7Networks_RH_Default_Temp_1	-0.057436	0.35624	-0.030608	0.79545
7Networks_RH_Default_Temp_2	-0.019443	0.75644	0.013218	0.91278
7Networks_RH_Default_Temp_3	0.086733	0.19513	-0.084617	0.43547
7Networks_RH_Default_Temp_4	-0.041545	0.49468	-0.10176	0.40342
7Networks_RH_Default_Temp_5	0.04861	0.44075	-0.27408	0.048471
7Networks_RH_Default_PFCv_1	-0.083913	0.19125	0.12837	0.255
7Networks_RH_Default_PFCm_1	-0.054706	0.36494	0.27425	0.02385
7Networks_RH_Default_PFCm_2	0.058903	0.32953	0.11629	0.38274
7Networks_RH_Default_PFCm_3	0.02927	0.65944	-0.077827	0.51683
7Networks_RH_Default_PFCm_4	-0.017048	0.80289	0.058069	0.52556
7Networks_RH_Default_PFCm_5	0.064147	0.3257	-0.019145	0.84249
7Networks_RH_Default_PFCm_6	0.18828	0.0021595	-0.046963	0.69211
7Networks_RH_Default_PFCm_7	0.030791	0.59863	0.02853	0.85299
7Networks_RH_Default_PCC_1	0.0070305	0.91539	-0.092366	0.4163
7Networks_RH_Default_PCC_2	-0.084853	0.19643	0.15324	0.15821
7Networks_RH_Default_PCC_3	0.053687	0.36939	0.045433	0.74041

Supplementary Table 8. Genetic and environmental correlation between Conscientiousness and cortical thickness in HCP. Genetic correlation between Conscientiousness and local cortical thickness calculated using solar 8.4.0. Regions are named according to the Schaefer 200 atlas, based on 7-networks. Here we report environmental correlation (ρ_e) and genetic correlation (ρ_g) and the associated p-values.

ROI name	ρ_e	**p**	ρ_g	**p**
7Networks_LH_Vis_1	-0.064948	0.28488	0.1025	0.31847
7Networks_LH_Vis_2	-0.02984	0.62517	0.019301	0.86777
7Networks_LH_Vis_3	-0.04565	0.44006	0.11881	0.479
7Networks_LH_Vis_4	-0.054817	0.36709	0.062505	0.48675
7Networks_LH_Vis_5	-0.066132	0.28586	0.049089	0.63462
7Networks_LH_Vis_6	0.030085	0.63056	-0.10719	0.27071
7Networks_LH_Vis_7	0.10483	0.095888	-0.17563	0.054484
7Networks_LH_Vis_8	-0.037894	0.50597	0.11199	0.37415
7Networks_LH_Vis_9	0.02718	0.66247	0.048604	0.60027

7Networks_LH_Vis_10	0.006716	0.91632	-0.039026	0.66474
7Networks_LH_Vis_11	0.011557	0.84615	0.11806	0.28916
7Networks_LH_Vis_12	0.038152	0.55275	0.056155	0.56363
7Networks_LH_Vis_13	0.03894	0.55583	0.083177	0.35067
7Networks_LH_Vis_14	-0.0097543	0.87756	0.040093	0.68631
7Networks_LH_SomMot_1	-0.057818	0.36342	-0.012428	0.89643
7Networks_LH_SomMot_2	0.022158	0.71025	0.0030509	0.9803
7Networks_LH_SomMot_3	0.013214	0.83743	-0.075175	0.41197
7Networks_LH_SomMot_4	-0.038026	0.54074	-0.052692	0.61323
7Networks_LH_SomMot_5	-0.042224	0.47148	-0.011526	0.92927
7Networks_LH_SomMot_6	-0.023461	0.71585	0.054897	0.53905
7Networks_LH_SomMot_7	0.022402	0.7139	-0.11424	0.35455
7Networks_LH_SomMot_8	-0.015646	0.79978	0.16104	0.20094
7Networks_LH_SomMot_9	0.021912	0.71896	0.044365	0.69357
7Networks_LH_SomMot_10	0.040408	0.5338	0.0018957	0.98346
7Networks_LH_SomMot_11	-0.031879	0.5857	0.17057	0.21643
7Networks_LH_SomMot_12	0.02527	0.68136	-0.046722	0.67003
7Networks_LH_SomMot_13	-0.046903	0.4495	0.14179	0.23077
7Networks_LH_SomMot_14	0.024183	0.68735	-0.055121	0.60424
7Networks_LH_SomMot_15	-0.034015	0.58054	0.051024	0.60102
7Networks_LH_SomMot_16	0.059599	0.35429	0.0059328	0.95628
7Networks_LH_DorsAttn_Post_1	0.012847	0.83681	0.0024396	0.98349
7Networks_LH_DorsAttn_Post_2	-0.082169	0.15444	0.21064	0.12309
7Networks_LH_DorsAttn_Post_3	-0.13785	0.026164	0.18714	0.089026
7Networks_LH_DorsAttn_Post_4	0.089721	0.14692	-0.079131	0.48982
7Networks_LH_DorsAttn_Post_5	-0.020779	0.72154	0.14512	0.29471
7Networks_LH_DorsAttn_Post_6	0.048387	0.42126	-0.067583	0.62783
7Networks_LH_DorsAttn_Post_7	-0.062047	0.33429	0.061672	0.53802
7Networks_LH_DorsAttn_Post_8	-0.016782	0.78155	0.18563	0.115
7Networks_LH_DorsAttn_Post_9	-0.018915	0.76367	-0.012598	0.89756
7Networks_LH_DorsAttn_Post_10	0.031742	0.62404	-0.0054248	0.95587
7Networks_LH_DorsAttn_FEF_1	0.0012074	0.98385	-0.03539	0.77955
7Networks_LH_DorsAttn_FEF_2	0.051657	0.40508	-0.23482	0.035912
7Networks_LH_DorsAttn_PrCv_1	0.071308	0.22766	0.057345	0.70572
7Networks_LH_SalVentAttn_ParOper_1	-0.048551	0.40677	0.44971	0.011622
7Networks_LH_SalVentAttn_ParOper_2	0.011054	0.85074	0.07777	0.51737
7Networks_LH_SalVentAttn_ParOper_3	0.035949	0.5466	-0.22066	0.1244
7Networks_LH_SalVentAttn_FrOper_1	0.027079	0.65782	-0.13815	0.20704

7Networks_LH_SalVentAttn_FrOper_2	0.0060741	0.92349	-0.068191	0.51249
7Networks_LH_SalVentAttn_FrOper_3	0.082737	0.18921	-0.15307	0.13103
7Networks_LH_SalVentAttn_FrOper_4	-0.05578	0.36937	0.22878	0.087082
7Networks_LH_SalVentAttn_PFCl_1	0.036465	0.55057	-0.080429	0.40039
7Networks_LH_SalVentAttn_Med_1	0.06556	0.29499	0.039304	0.73709
7Networks_LH_SalVentAttn_Med_2	-0.029269	0.63817	0.20471	0.076651
7Networks_LH_SalVentAttn_Med_3	0.18241	0.0023486	-0.18904	0.15321
7Networks_LH_Limbic_OFC_1	0.016641	0.7784	-0.057306	0.62549
7Networks_LH_Limbic_OFC_2	0.020569	0.73956	-0.066454	0.54852
7Networks_LH_Limbic_TempPole_1	-0.020167	0.7478	-0.049579	0.67028
7Networks_LH_Limbic_TempPole_2	-0.068709	0.2488	0.12783	0.21985
7Networks_LH_Limbic_TempPole_3	0.035139	0.54352	-0.24495	0.051972
7Networks_LH_Limbic_TempPole_4	-0.08702	0.17095	0.001956	0.98381
7Networks_LH_Cont_Par_1	-0.049678	0.40022	0.20071	0.15089
7Networks_LH_Cont_Par_2	0.007694	0.8956	0.22045	0.071016
7Networks_LH_Cont_Par_3	0.07245	0.203	-0.19127	0.51629
7Networks_LH_Cont_Temp_1	-0.049154	0.40271	0.27491	0.063131
7Networks_LH_Cont_PFCl_1	-0.046553	0.41537	0.09774	0.42352
7Networks_LH_Cont_PFCl_2	-0.010549	0.86113	-0.016505	0.89088
7Networks_LH_Cont_PFCl_3	0.042447	0.49671	-0.17574	0.092612
7Networks_LH_Cont_PFCl_4	-0.028096	0.63689	-0.043983	0.72709
7Networks_LH_Cont_PFCl_5	0.0063653	0.9169	-0.095556	0.34152
7Networks_LH_Cont_PFCl_6	0.014141	0.81043	-0.19224	0.1834
7Networks_LH_Cont_pCun_1	-0.066858	0.26904	0.092518	0.38309
7Networks_LH_Cont_Cing_1	-0.11147	0.091664	0.077725	0.39249
7Networks_LH_Cont_Cing_2	0.086283	0.16925	-0.13526	0.22553
7Networks_LH_Default_Temp_1	-0.04993	0.41833	0.086754	0.49008
7Networks_LH_Default_Temp_2	-0.015926	0.78895	0.023261	0.84843
7Networks_LH_Default_Temp_3	-0.04147	0.49615	0.023729	0.83154
7Networks_LH_Default_Temp_4	0.012872	0.82815	0.013016	0.93042
7Networks_LH_Default_Temp_5	-0.12892	0.030379	0.19183	0.18859
7Networks_LH_Default_Temp_6	0.058995	0.3182	0.028938	0.81058
7Networks_LH_Default_Temp_7	-0.034855	0.57043	0.038947	0.74722
7Networks_LH_Default_Temp_8	-0.055349	0.34985	0.1208	0.35757
7Networks_LH_Default_Temp_9	-0.11427	0.047385	0.4982	5.21e-05
7Networks_LH_Default_PFC_1	0.015253	0.80163	0.023044	0.83034
7Networks_LH_Default_PFC_2	0.14183	0.019705	-0.07732	0.54361
7Networks_LH_Default_PFC_3	-0.029937	0.60228	-0.077713	0.63792
7Networks_LH_Default_PFC_4	0.018597	0.76949	-0.063143	0.48475

7Networks_LH_Default_PFC_5	0.0052145	0.93273	-0.072579	0.54359
7Networks_LH_Default_PFC_6	-0.038198	0.52674	0.035423	0.75324
7Networks_LH_Default_PFC_7	0.008005	0.9011	-0.081125	0.38503
7Networks_LH_Default_PFC_8	-0.04726	0.45704	0.01941	0.85888
7Networks_LH_Default_PFC_9	0.0006621	0.99141	-0.084682	0.36825
7Networks_LH_Default_PFC_10	0.034605	0.56842	-0.033061	0.7549
7Networks_LH_Default_PFC_11	-0.0053709	0.92953	-0.080094	0.41108
7Networks_LH_Default_PFC_12	0.023434	0.70878	-0.1089	0.25206
7Networks_LH_Default_PFC_13	0.030111	0.63253	-0.068264	0.47474
7Networks_LH_Default_PCC_1	-0.067327	0.29068	0.14357	0.17746
7Networks_LH_Default_PCC_2	0.020287	0.73103	0.083937	0.48916
7Networks_LH_Default_PCC_3	-0.057912	0.3506	0.055444	0.60229
7Networks_LH_Default_PCC_4	-0.067292	0.28639	0.084173	0.43057
7Networks_LH_Default_PHC_1	0.023201	0.7205	-0.022727	0.81902
7Networks_RH_Vis_1	0.025792	0.67275	0.11076	0.30486
7Networks_RH_Vis_2	-0.037932	0.54234	0.017212	0.87986
7Networks_RH_Vis_3	-0.069689	0.26834	0.02386	0.82949
7Networks_RH_Vis_4	-0.078664	0.22617	0.065232	0.43832
7Networks_RH_Vis_5	-0.032746	0.58188	0.14489	0.23971
7Networks_RH_Vis_6	0.060811	0.33681	-0.089479	0.35169
7Networks_RH_Vis_7	0.040591	0.52061	-0.10804	0.23124
7Networks_RH_Vis_8	-0.077806	0.22347	0.081951	0.41943
7Networks_RH_Vis_9	-0.12498	0.058197	0.046815	0.58067
7Networks_RH_Vis_10	0.012055	0.85353	0.027264	0.7814
7Networks_RH_Vis_11	-0.030673	0.59609	0.029942	0.8172
7Networks_RH_Vis_12	-0.063738	0.32387	0.10698	0.24239
7Networks_RH_Vis_13	0.0042855	0.94602	0.050114	0.59646
7Networks_RH_Vis_14	-0.10908	0.083476	0.075251	0.45205
7Networks_RH_Vis_15	0.01894	0.75207	-0.003272	0.97901
7Networks_RH_SomMot_1	0.0060077	0.92545	-0.037959	0.7088
7Networks_RH_SomMot_2	0.0003322	0.99578	-0.017854	0.87804
7Networks_RH_SomMot_3	0.073656	0.23798	-0.12889	0.25554
7Networks_RH_SomMot_4	-0.10396	0.091408	0.16114	0.15342
7Networks_RH_SomMot_5	-0.099081	0.094896	0.30489	0.039043
7Networks_RH_SomMot_6	0.03068	0.61525	-0.1115	0.36072
7Networks_RH_SomMot_7	-0.02715	0.6621	0.11586	0.23764
7Networks_RH_SomMot_8	0.03211	0.57914	0.014912	0.91834
7Networks_RH_SomMot_9	0.14682	0.019982	-0.15484	0.19432
7Networks_RH_SomMot_10	0.12265	0.040929	-0.22477	0.15868

7Networks_RH_SomMot_11	0.11928	0.044933	-0.13389	0.2486
7Networks_RH_SomMot_12	0.033194	0.60135	-0.042358	0.66231
7Networks_RH_SomMot_13	-0.033354	0.57265	0.151	0.19275
7Networks_RH_SomMot_14	-0.013894	0.82124	-0.10084	0.33701
7Networks_RH_SomMot_15	-0.033134	0.59847	0.13934	0.22787
7Networks_RH_SomMot_16	0.049156	0.42372	-0.16076	0.20616
7Networks_RH_SomMot_17	-0.013447	0.83426	-0.043259	0.6478
7Networks_RH_SomMot_18	-0.011777	0.84464	0.029374	0.7772
7Networks_RH_SomMot_19	-0.073228	0.24941	0.078787	0.43681
7Networks_RH_DorsAttn_Post_1	-0.040541	0.4945	0.07579	0.56922
7Networks_RH_DorsAttn_Post_2	0.010981	0.85371	0.031156	0.81417
7Networks_RH_DorsAttn_Post_3	0.018623	0.75483	-0.0139	0.90487
7Networks_RH_DorsAttn_Post_4	0.10217	0.085061	-0.10224	0.46516
7Networks_RH_DorsAttn_Post_5	0.07109	0.23011	0.17888	0.23056
7Networks_RH_DorsAttn_Post_6	-0.037489	0.54228	0.0077089	0.94115
7Networks_RH_DorsAttn_Post_7	0.094227	0.1044	-0.06988	0.67998
7Networks_RH_DorsAttn_Post_8	-0.055313	0.36767	0.10858	0.32297
7Networks_RH_DorsAttn_Post_9	-0.11172	0.06457	0.097959	0.3821
7Networks_RH_DorsAttn_Post_10	0.0065193	0.91602	0.066388	0.51352
7Networks_RH_DorsAttn_FEF_1	0.057465	0.35332	-0.016993	0.88894
7Networks_RH_DorsAttn_FEF_2	0.079956	0.17606	-0.16492	0.2391
7Networks_RH_DorsAttn_PrCv_1	0.034624	0.57171	0.033622	0.7768
7Networks_RH_SalVentAttn_TempOccPar_1	-0.055551	0.3496	0.13085	0.33651
7Networks_RH_SalVentAttn_TempOccPar_2	-0.034108	0.55298	0.21391	0.15619
7Networks_RH_SalVentAttn_TempOccPar_3	-0.014745	0.80389	0.066698	0.60599
7Networks_RH_SalVentAttn_PrC_1	0.034203	0.5573	-0.14436	0.38077
7Networks_RH_SalVentAttn_FrOper_1	-0.10899	0.070204	0.024027	0.85036
7Networks_RH_SalVentAttn_FrOper_2	0.11162	0.090163	-0.039414	0.67997
7Networks_RH_SalVentAttn_FrOper_3	-0.10961	0.063444	0.22582	0.048594
7Networks_RH_SalVentAttn_FrOper_4	-0.038408	0.52142	0.016602	0.89945
7Networks_RH_SalVentAttn_Med_1	0.008653	0.88464	-0.012837	0.91935
7Networks_RH_SalVentAttn_Med_2	0.030873	0.61957	0.028197	0.78219
7Networks_RH_SalVentAttn_Med_3	0.1234	0.048592	-0.1865	0.1132
7Networks_RH_Limbic_OFC_1	0.055683	0.38469	-0.059048	0.5804
7Networks_RH_Limbic_OFC_2	0.097447	0.097481	-0.052069	0.6227
7Networks_RH_Limbic_OFC_3	0.025041	0.68725	-0.11927	0.27572
7Networks_RH_Limbic_TempPole_1	-0.014221	0.80784	-0.13906	0.35545
7Networks_RH_Limbic_TempPole_2	-0.065724	0.28728	0.16808	0.13421
7Networks_RH_Limbic_TempPole_3	0.020005	0.75813	0.064125	0.49351

7Networks_RH_Cont_Par_1	-0.0085431	0.88421	0.040877	0.80632
7Networks_RH_Cont_Par_2	0.056387	0.33171	-0.064617	0.65577
7Networks_RH_Cont_Par_3	0.050984	0.37838	-0.025144	0.88575
7Networks_RH_Cont_Temp_1	-0.019349	0.74772	0.30613	0.033051
7Networks_RH_Cont_PFCv_1	0.10628	0.072742	-0.12425	0.3811
7Networks_RH_Cont_PFCl_1	0.031837	0.5907	0.038827	0.75487
7Networks_RH_Cont_PFCl_2	0.051712	0.39068	-0.14617	0.21597
7Networks_RH_Cont_PFCl_3	-0.015155	0.79744	0.01252	0.91023
7Networks_RH_Cont_PFCl_4	0.10506	0.087014	-0.11848	0.24684
7Networks_RH_Cont_PFCl_5	0.001159	0.98441	-0.10959	0.32553
7Networks_RH_Cont_PFCl_6	-0.042857	0.46401	-0.052324	0.64359
7Networks_RH_Cont_PFCl_7	0.061375	0.32877	-0.000357	0.99748
7Networks_RH_Cont_pCun_1	-0.026653	0.65047	0.11823	0.35632
7Networks_RH_Cont_PFCmp_1	-0.022101	0.72204	-0.052293	0.57996
7Networks_RH_Cont_PFCmp_2	0.054398	0.38748	-0.079633	0.44224
7Networks_RH_Cont_PFCmp_3	0.13632	0.022917	-0.35277	0.0055624
7Networks_RH_Cont_PFCmp_4	0.015009	0.81673	-0.08206	0.41685
7Networks_RH_Default_Par_1	0.096409	0.11484	-0.1736	0.20686
7Networks_RH_Default_Par_2	0.051848	0.37915	0.035998	0.80278
7Networks_RH_Default_Par_3	0.07584	0.19682	-0.10138	0.48369
7Networks_RH_Default_Temp_1	-0.072035	0.23246	-0.13063	0.2536
7Networks_RH_Default_Temp_2	-0.06481	0.28543	0.25578	0.027171
7Networks_RH_Default_Temp_3	-0.010969	0.86504	0.15502	0.13457
7Networks_RH_Default_Temp_4	-0.090786	0.12372	0.14349	0.23308
7Networks_RH_Default_Temp_5	-0.029523	0.62965	0.093208	0.48505
7Networks_RH_Default_PFCv_1	0.028163	0.64781	0.0085197	0.93844
7Networks_RH_Default_PFCm_1	-0.028774	0.62448	0.093378	0.43438
7Networks_RH_Default_PFCm_2	0.11179	0.056766	-0.088394	0.49661
7Networks_RH_Default_PFCm_3	-0.079264	0.21623	0.084014	0.46581
7Networks_RH_Default_PFCm_4	-0.061389	0.35221	-0.040624	0.64718
7Networks_RH_Default_PFCm_5	0.10794	0.083631	-0.2236	0.016305
7Networks_RH_Default_PFCm_6	0.12873	0.030521	-0.31017	0.0075385
7Networks_RH_Default_PFCm_7	0.062026	0.27803	-0.081251	0.58736
7Networks_RH_Default_PCC_1	-0.10668	0.093358	0.108	0.33288
7Networks_RH_Default_PCC_2	-0.074807	0.24147	0.066631	0.52251
7Networks_RH_Default_PCC_3	0.065721	0.25947	0.035262	0.79011

Supplementary Table 9. Genetic and environmental correlation between Extraversion and cortical thickness in HCP. Genetic correlation between Extraversion and local cortical thickness calculated using solar 8.4.0. Regions are named according to the Schaefer 200 atlas, based on 7-networks. Here we report environmental correlation (ρ_e) and genetic correlation (ρ_g) and the associated p-values.

ROI	ρ_e	p	ρ_g	p
7Networks_LH_Vis_1	0.053537	0.39554	-0.080022	0.49455
7Networks_LH_Vis_2	-0.085001	0.17545	0.1109	0.40806
7Networks_LH_Vis_3	0.039429	0.52086	-0.29094	0.12616
7Networks_LH_Vis_4	0.069618	0.26821	-0.090178	0.38445
7Networks_LH_Vis_5	0.040657	0.52541	-0.15432	0.19358
7Networks_LH_Vis_6	0.060361	0.35379	0.024472	0.8298
7Networks_LH_Vis_7	-0.0089871	0.89153	-0.034108	0.74849
7Networks_LH_Vis_8	-0.050117	0.38866	-0.055774	0.70196
7Networks_LH_Vis_9	-0.02416	0.70959	-0.16524	0.12112
7Networks_LH_Vis_10	0.016238	0.80753	-0.095617	0.35591
7Networks_LH_Vis_11	-0.038029	0.5355	-0.14332	0.26521
7Networks_LH_Vis_12	0.029155	0.66211	-0.18079	0.11137
7Networks_LH_Vis_13	-0.092174	0.18095	-0.11126	0.28247
7Networks_LH_Vis_14	-0.079717	0.22427	-0.18043	0.11719
7Networks_LH_SomMot_1	0.091518	0.16996	-0.162	0.13853
7Networks_LH_SomMot_2	-0.0033659	0.95625	-0.077091	0.59107
7Networks_LH_SomMot_3	0.0008662	0.98972	-0.10388	0.32722
7Networks_LH_SomMot_4	0.062144	0.3342	0.095516	0.42968
7Networks_LH_SomMot_5	0.080971	0.17764	-0.028336	0.85044
7Networks_LH_SomMot_6	0.018197	0.78616	0.0355	0.7311
7Networks_LH_SomMot_7	0.0044337	0.94375	-0.026163	0.85543
7Networks_LH_SomMot_8	0.050155	0.4305	-0.16214	0.26882
7Networks_LH_SomMot_9	0.039121	0.5333	-0.037334	0.77424
7Networks_LH_SomMot_10	-0.014293	0.8321	-0.071083	0.50275
7Networks_LH_SomMot_11	-0.0019291	0.9743	0.10793	0.49893
7Networks_LH_SomMot_12	0.024481	0.69978	0.050893	0.68949
7Networks_LH_SomMot_13	0.037204	0.56296	-0.11595	0.39473
7Networks_LH_SomMot_14	0.013938	0.82307	0.0006109	0.99609
7Networks_LH_SomMot_15	-0.0079652	0.90076	0.14473	0.20061
7Networks_LH_SomMot_16	-0.076053	0.25921	0.032401	0.79724
7Networks_LH_DorsAttn_Post_1	-0.16395	0.010125	0.18221	0.19733
7Networks_LH_DorsAttn_Post_2	-0.025592	0.66519	0.085932	0.5839
7Networks_LH_DorsAttn_Post_3	0.021458	0.73394	-0.11798	0.36056
7Networks_LH_DorsAttn_Post_4	-0.072268	0.25862	0.068141	0.6048
7Networks_LH_DorsAttn_Post_5	0.033327	0.5771	-0.16289	0.30803

7Networks_LH_DorsAttn_Post_6	0.043485	0.48169	-0.26291	0.10776
7Networks_LH_DorsAttn_Post_7	0.081021	0.22564	-0.061497	0.59763
7Networks_LH_DorsAttn_Post_8	0.068724	0.2678	-0.079172	0.56127
7Networks_LH_DorsAttn_Post_9	-0.041357	0.52659	0.04599	0.68303
7Networks_LH_DorsAttn_Post_10	0.012499	0.85286	0.094899	0.40641
7Networks_LH_DorsAttn_FEF_1	0.041959	0.49151	-0.045694	0.7518
7Networks_LH_DorsAttn_FEF_2	-0.026133	0.68853	0.27256	0.032747
7Networks_LH_DorsAttn_PrCv_1	0.025218	0.67801	-0.12603	0.48072
7Networks_LH_SalVentAttn_ParOper_1	0.079801	0.18621	-0.39486	0.050257
7Networks_LH_SalVentAttn_ParOper_2	0.09847	0.10104	0.062847	0.65047
7Networks_LH_SalVentAttn_ParOper_3	-0.027282	0.65669	0.25781	0.11783
7Networks_LH_SalVentAttn_FrOper_1	0.021535	0.7316	0.081292	0.52399
7Networks_LH_SalVentAttn_FrOper_2	0.0040228	0.95092	-0.02999	0.80516
7Networks_LH_SalVentAttn_FrOper_3	-0.065504	0.31622	0.18495	0.11493
7Networks_LH_SalVentAttn_FrOper_4	0.078521	0.21202	-0.23768	0.14091
7Networks_LH_SalVentAttn_PFCl_1	0.031273	0.62011	0.028991	0.79279
7Networks_LH_SalVentAttn_Med_1	-0.031516	0.62802	-0.0049621	0.97093
7Networks_LH_SalVentAttn_Med_2	-0.0509	0.42794	-0.051951	0.70107
7Networks_LH_SalVentAttn_Med_3	-0.16597	0.0075355	0.31922	0.037709
7Networks_LH_Limbic_OFC_1	-0.047383	0.43451	0.11043	0.41854
7Networks_LH_Limbic_OFC_2	-0.026395	0.67966	0.14835	0.24876
7Networks_LH_Limbic_TempPole_1	0.0058285	0.92838	-0.0025622	0.98482
7Networks_LH_Limbic_TempPole_2	-0.0051759	0.93266	0.03622	0.76234
7Networks_LH_Limbic_TempPole_3	-0.023271	0.69305	0.11885	0.42108
7Networks_LH_Limbic_TempPole_4	0.11511	0.079438	-0.23433	0.040042
7Networks_LH_Cont_Par_1	-0.042268	0.48702	0.095689	0.55504
7Networks_LH_Cont_Par_2	0.00833	0.88991	-0.098702	0.48822
7Networks_LH_Cont_Par_3	0.0064707	0.91106	-0.17782	0.6151
7Networks_LH_Cont_Temp_1	-0.11517	0.056294	0.15167	0.3721
7Networks_LH_Cont_PFCl_1	-0.10445	0.07608	0.14082	0.31262
7Networks_LH_Cont_PFCl_2	0.0024864	0.96805	0.12924	0.35719
7Networks_LH_Cont_PFCl_3	0.022492	0.72658	-0.035246	0.77393
7Networks_LH_Cont_PFCl_4	0.11022	0.068968	0.0081348	0.95538
7Networks_LH_Cont_PFCl_5	0.078468	0.2138	0.044752	0.69926
7Networks_LH_Cont_PFCl_6	-0.028699	0.63527	0.046735	0.77889
7Networks_LH_Cont_pCun_1	0.017133	0.78424	-0.028656	0.81372
7Networks_LH_Cont_Cing_1	0.062287	0.36574	0.049674	0.64097
7Networks_LH_Cont_Cing_2	-0.018677	0.77418	0.029035	0.82281
7Networks_LH_Default_Temp_1	-0.019248	0.76154	0.08072	0.5824

7Networks_LH_Default_Temp_2	-0.18277	0.0025379	0.30708	0.028699
7Networks_LH_Default_Temp_3	-0.037831	0.54635	0.059492	0.64693
7Networks_LH_Default_Temp_4	-0.02172	0.7212	0.11325	0.51445
7Networks_LH_Default_Temp_5	0.12704	0.044484	-0.2608	0.10646
7Networks_LH_Default_Temp_6	-0.094622	0.11834	-0.096021	0.49354
7Networks_LH_Default_Temp_7	-0.021291	0.73531	-0.15165	0.27841
7Networks_LH_Default_Temp_8	0.02711	0.6559	-0.25684	0.089084
7Networks_LH_Default_Temp_9	-0.01211	0.83802	-0.11566	0.41095
7Networks_LH_Default_PFC_1	0.008559	0.89191	0.063287	0.61523
7Networks_LH_Default_PFC_2	0.0097872	0.87605	-0.091627	0.53662
7Networks_LH_Default_PFC_3	-0.054574	0.34975	0.54331	0.0062386
7Networks_LH_Default_PFC_4	0.0734	0.26474	0.029364	0.7767
7Networks_LH_Default_PFC_5	0.036195	0.57149	0.10258	0.4587
7Networks_LH_Default_PFC_6	0.046967	0.45348	-0.081911	0.52946
7Networks_LH_Default_PFC_7	0.018851	0.77837	0.088869	0.40692
7Networks_LH_Default_PFC_8	0.041454	0.52853	-0.23808	0.060608
7Networks_LH_Default_PFC_9	0.077158	0.23269	0.16521	0.12984
7Networks_LH_Default_PFC_10	-0.0014469	0.98126	0.2267	0.064771
7Networks_LH_Default_PFC_11	0.013029	0.83558	0.19112	0.087605
7Networks_LH_Default_PFC_12	0.073851	0.25637	0.039332	0.71993
7Networks_LH_Default_PFC_13	0.011871	0.85637	0.2071	0.060798
7Networks_LH_Default_PCC_1	0.041692	0.52181	-0.027633	0.82436
7Networks_LH_Default_PCC_2	0.011513	0.84931	-0.034073	0.80824
7Networks_LH_Default_PCC_3	-0.015493	0.81005	0.0045453	0.97047
7Networks_LH_Default_PCC_4	0.022176	0.73478	-0.07873	0.5274
7Networks_LH_Default_PHC_1	-0.012888	0.84913	0.072734	0.53178
7Networks_RH_Vis_1	-0.10692	0.088373	0.069403	0.58062
7Networks_RH_Vis_2	0.079509	0.21906	-0.19484	0.13632
7Networks_RH_Vis_3	0.046323	0.47771	-0.022524	0.86002
7Networks_RH_Vis_4	0.20965	0.0018512	-0.22295	0.021199
7Networks_RH_Vis_5	-0.10183	0.097222	0.11306	0.42317
7Networks_RH_Vis_6	0.14308	0.028281	-0.18751	0.089969
7Networks_RH_Vis_7	0.035772	0.58779	0.019244	0.85419
7Networks_RH_Vis_8	0.01956	0.76714	-0.14968	0.20488
7Networks_RH_Vis_9	0.11032	0.10562	-0.13142	0.18503
7Networks_RH_Vis_10	0.10643	0.11375	-0.27396	0.016507
7Networks_RH_Vis_11	-0.054489	0.35761	-0.15089	0.31436
7Networks_RH_Vis_12	-0.018922	0.77813	-0.16057	0.13046
7Networks_RH_Vis_13	0.10284	0.1147	-0.19221	0.084952

7Networks_RH_Vis_14	0.055131	0.39844	-0.065248	0.5747
7Networks_RH_Vis_15	0.0061621	0.9205	-0.2335	0.10633
7Networks_RH_SomMot_1	0.032782	0.61995	-0.0341	0.77207
7Networks_RH_SomMot_2	-0.03881	0.55165	0.065865	0.62779
7Networks_RH_SomMot_3	-0.028605	0.65841	-0.096233	0.46683
7Networks_RH_SomMot_4	0.13351	0.03729	-0.32774	0.010006
7Networks_RH_SomMot_5	0.02142	0.72438	-0.10228	0.5575
7Networks_RH_SomMot_6	-0.059529	0.34211	0.39681	0.0043669
7Networks_RH_SomMot_7	-0.027023	0.67459	0.089866	0.42844
7Networks_RH_SomMot_8	-0.012817	0.82893	-0.15698	0.3524
7Networks_RH_SomMot_9	-0.061856	0.34738	0.099585	0.46975
7Networks_RH_SomMot_10	-0.083616	0.17576	0.33604	0.07144
7Networks_RH_SomMot_11	-0.054939	0.36693	-0.060138	0.65642
7Networks_RH_SomMot_12	0.029496	0.65251	-0.095682	0.39314
7Networks_RH_SomMot_13	0.039699	0.51591	-0.10734	0.42019
7Networks_RH_SomMot_14	-0.060215	0.34624	0.20887	0.082407
7Networks_RH_SomMot_15	0.074078	0.25471	-0.21551	0.1102
7Networks_RH_SomMot_16	0.044258	0.48576	-0.017018	0.9083
7Networks_RH_SomMot_17	0.016732	0.80182	0.0034331	0.9743
7Networks_RH_SomMot_18	-0.0002032	0.99724	0.0729	0.54356
7Networks_RH_SomMot_19	0.037853	0.56816	-0.044358	0.7071
7Networks_RH_DorsAttn_Post_1	0.12956	0.033488	-0.39271	0.0090691
7Networks_RH_DorsAttn_Post_2	-0.042592	0.4863	0.047714	0.75593
7Networks_RH_DorsAttn_Post_3	-0.055149	0.36853	0.1499	0.26152
7Networks_RH_DorsAttn_Post_4	-0.066956	0.27209	0.035153	0.82871
7Networks_RH_DorsAttn_Post_5	-0.034534	0.57084	0.002895	0.9866
7Networks_RH_DorsAttn_Post_6	-0.048955	0.44155	0.016534	0.89107
7Networks_RH_DorsAttn_Post_7	-0.052304	0.37659	-0.13033	0.50992
7Networks_RH_DorsAttn_Post_8	-0.021661	0.73243	-0.04801	0.70717
7Networks_RH_DorsAttn_Post_9	-0.012034	0.84687	-0.0079447	0.95142
7Networks_RH_DorsAttn_Post_10	0.063493	0.32141	-0.054187	0.64792
7Networks_RH_DorsAttn_FEF_1	0.036238	0.57044	-0.082884	0.55697
7Networks_RH_DorsAttn_FEF_2	-0.10139	0.094386	0.23664	0.13632
7Networks_RH_DorsAttn_PrCv_1	0.043708	0.48577	0.015835	0.90703
7Networks_RH_SalVentAttn_TempOccPar_1	0.025134	0.68427	-0.27981	0.07122
7Networks_RH_SalVentAttn_TempOccPar_2	0.025227	0.66675	-0.046896	0.79158
7Networks_RH_SalVentAttn_TempOccPar_3	-0.0060195	0.92069	-0.046135	0.75756
7Networks_RH_SalVentAttn_PrC_1	-0.039251	0.51251	0.12158	0.5175
7Networks_RH_SalVentAttn_FrOper_1	0.066307	0.28731	-0.16304	0.26723

7Networks_RH_SalVentAttn_FrOper_2	-0.0089948	0.8961	-0.048914	0.66139
7Networks_RH_SalVentAttn_FrOper_3	-0.02695	0.66061	-0.093119	0.47909
7Networks_RH_SalVentAttn_FrOper_4	-0.023284	0.70533	0.073645	0.62407
7Networks_RH_SalVentAttn_Med_1	0.0077895	0.89902	-0.087767	0.5504
7Networks_RH_SalVentAttn_Med_2	-0.02831	0.65829	-0.1114	0.3448
7Networks_RH_SalVentAttn_Med_3	-0.055515	0.39558	0.18657	0.171
7Networks_RH_Limbic_OFC_1	-0.020512	0.75904	-0.0068245	0.9561
7Networks_RH_Limbic_OFC_2	-0.027698	0.65098	-0.0096158	0.93808
7Networks_RH_Limbic_OFC_3	-0.00191	0.97631	-0.0046917	0.96927
7Networks_RH_Limbic_TempPole_1	0.0028129	0.96242	0.0094998	0.95699
7Networks_RH_Limbic_TempPole_2	0.04069	0.52812	-0.21731	0.094393
7Networks_RH_Limbic_TempPole_3	-0.017347	0.79823	0.020666	0.84912
7Networks_RH_Cont_Par_1	0.042869	0.47291	-0.030203	0.87495
7Networks_RH_Cont_Par_2	-0.049235	0.40761	0.047455	0.77758
7Networks_RH_Cont_Par_3	-0.0673	0.25583	-0.082241	0.68871
7Networks_RH_Cont_Temp_1	-0.0271	0.66604	0.06713	0.68218
7Networks_RH_Cont_PFCv_1	-0.033149	0.58753	-0.11875	0.47414
7Networks_RH_Cont_PFCl_1	-0.049598	0.41437	-0.063746	0.65747
7Networks_RH_Cont_PFCl_2	0.0083144	0.89339	-0.081534	0.55489
7Networks_RH_Cont_PFCl_3	-0.011735	0.84692	0.060028	0.63876
7Networks_RH_Cont_PFCl_4	-0.041926	0.51093	0.089136	0.44296
7Networks_RH_Cont_PFCl_5	0.010977	0.85801	0.078803	0.54055
7Networks_RH_Cont_PFCl_6	0.029267	0.62772	0.26061	0.044661
7Networks_RH_Cont_PFCl_7	-0.054037	0.40326	0.1808	0.17861
7Networks_RH_Cont_pCun_1	0.026904	0.65622	-0.093957	0.51925
7Networks_RH_Cont_PFCmp_1	-0.082324	0.20068	0.18823	0.080778
7Networks_RH_Cont_PFCmp_2	-0.12242	0.059834	0.20125	0.093539
7Networks_RH_Cont_PFCmp_3	-0.0023353	0.97013	0.075503	0.60523
7Networks_RH_Cont_PFCmp_4	0.037722	0.57667	0.15783	0.17972
7Networks_RH_Default_Par_1	-0.092129	0.14154	0.20127	0.20897
7Networks_RH_Default_Par_2	-0.13136	0.029462	0.19083	0.25272
7Networks_RH_Default_Par_3	-0.096041	0.10903	0.17631	0.29545
7Networks_RH_Default_Temp_1	0.10527	0.090832	-0.0009406	0.99403
7Networks_RH_Default_Temp_2	-0.032442	0.60537	0.046196	0.73227
7Networks_RH_Default_Temp_3	-0.04314	0.52315	-0.0025058	0.98349
7Networks_RH_Default_Temp_4	0.046821	0.44162	0.027101	0.84237
7Networks_RH_Default_Temp_5	-0.01359	0.829	-0.094507	0.54411
7Networks_RH_Default_PFCv_1	-0.020133	0.75225	0.14711	0.25633
7Networks_RH_Default_PFCm_1	0.12364	0.040129	-0.2789	0.043711

7Networks_RH_Default_PFCm_2	0.0011902	0.98433	-0.047617	0.75028
7Networks_RH_Default_PFCm_3	-0.052223	0.43133	0.11435	0.40067
7Networks_RH_Default_PFCm_4	0.028907	0.6746	0.1454	0.15898
7Networks_RH_Default_PFCm_5	0.040152	0.53835	0.20964	0.050636
7Networks_RH_Default_PFCm_6	-0.060876	0.32567	0.23515	0.074308
7Networks_RH_Default_PFCm_7	-0.0021966	0.97005	0.062016	0.71978
7Networks_RH_Default_PCC_1	0.065014	0.32566	-0.12205	0.34071
7Networks_RH_Default_PCC_2	0.032446	0.62287	-0.14395	0.23764
7Networks_RH_Default_PCC_3	-0.046719	0.43497	-0.10252	0.50449

Supplementary Table 10. Genetic and environmental correlation between Neuroticism and cortical thickness in HCP. Genetic correlation between Neuroticism and local cortical thickness calculated using solar 8.4.0. Regions are named according to the Schaefer 200 atlas, based on 7-networks. Here we report environmental correlation (ρ_e) and genetic correlation (ρ_g) and the associated p-values.

ROI	ρ_e	**p**	ρ_g	**p**
7Networks_LH_Vis_1	-0.047877	0.45749	0.25034	0.0042261
7Networks_LH_Vis_2	-0.0027296	0.96605	0.010559	0.91487
7Networks_LH_Vis_3	0.0020641	0.97383	-0.13515	0.34983
7Networks_LH_Vis_4	0.065051	0.30471	0.026561	0.73032
7Networks_LH_Vis_5	0.031692	0.62767	-0.055558	0.5298
7Networks_LH_Vis_6	-0.016376	0.80384	0.068957	0.40936
7Networks_LH_Vis_7	-0.0011101	0.98665	0.074864	0.34494
7Networks_LH_Vis_8	-0.14611	0.014575	0.20597	0.057727
7Networks_LH_Vis_9	0.11043	0.089814	0.0078776	0.92191
7Networks_LH_Vis_10	-0.084906	0.20532	0.085363	0.26812
7Networks_LH_Vis_11	0.19401	0.0019177	-0.17036	0.07541
7Networks_LH_Vis_12	-0.027136	0.68839	0.035967	0.66643
7Networks_LH_Vis_13	-0.082967	0.23039	0.024316	0.75156
7Networks_LH_Vis_14	0.085281	0.20056	-0.098157	0.24969
7Networks_LH_SomMot_1	-0.040441	0.54663	0.14549	0.074439
7Networks_LH_SomMot_2	-0.031094	0.6214	0.1756	0.099401
7Networks_LH_SomMot_3	0.045761	0.49958	0.061823	0.43304
7Networks_LH_SomMot_4	0.094192	0.14969	0.040456	0.65443
7Networks_LH_SomMot_5	-0.036404	0.55775	-0.081721	0.46516
7Networks_LH_SomMot_6	0.1341	0.046001	-0.045297	0.55884
7Networks_LH_SomMot_7	-0.038099	0.56128	0.038746	0.71698
7Networks_LH_SomMot_8	0.099988	0.12581	-0.25277	0.01901
7Networks_LH_SomMot_9	-0.018037	0.78009	-0.10423	0.2824

7Networks_LH_SomMot_10	0.064797	0.33952	0.040622	0.6086
7Networks_LH_SomMot_11	-0.0013146	0.98293	-0.19634	0.098135
7Networks_LH_SomMot_12	-0.0023356	0.96948	-0.013002	0.89045
7Networks_LH_SomMot_13	-0.13066	0.047272	0.061289	0.5401
7Networks_LH_SomMot_14	0.012453	0.84395	-0.050036	0.58395
7Networks_LH_SomMot_15	0.13834	0.037146	-0.087852	0.28975
7Networks_LH_SomMot_16	0.12312	0.071644	-0.043525	0.65425
7Networks_LH_DorsAttn_Post_1	0.054777	0.41234	-0.0047965	0.96245
7Networks_LH_DorsAttn_Post_2	-0.074136	0.22368	-0.026498	0.82176
7Networks_LH_DorsAttn_Post_3	0.0059476	0.92658	-0.12272	0.20424
7Networks_LH_DorsAttn_Post_4	0.040624	0.53783	-0.043703	0.65485
7Networks_LH_DorsAttn_Post_5	0.0055079	0.92948	-0.12125	0.30778
7Networks_LH_DorsAttn_Post_6	0.047818	0.45868	-0.31287	0.0081973
7Networks_LH_DorsAttn_Post_7	0.048414	0.48084	-0.15208	0.071998
7Networks_LH_DorsAttn_Post_8	-0.0083791	0.89699	-0.14415	0.15702
7Networks_LH_DorsAttn_Post_9	0.088791	0.18619	-0.10055	0.2293
7Networks_LH_DorsAttn_Post_10	0.077377	0.25989	-0.12791	0.12901
7Networks_LH_DorsAttn_FEF_1	0.02409	0.69992	-0.11174	0.29934
7Networks_LH_DorsAttn_FEF_2	-0.0054613	0.93412	-0.11127	0.24493
7Networks_LH_DorsAttn_PrCv_1	-0.14019	0.025654	0.27029	0.034949
7Networks_LH_SalVentAttn_ParOper_1	-0.011825	0.84995	-0.1362	0.37587
7Networks_LH_SalVentAttn_ParOper_2	0.1058	0.08768	-0.15232	0.1434
7Networks_LH_SalVentAttn_ParOper_3	0.046311	0.4699	-0.1865	0.13163
7Networks_LH_SalVentAttn_FrOper_1	0.031429	0.62575	-0.014733	0.87668
7Networks_LH_SalVentAttn_FrOper_2	-0.077199	0.24107	0.15156	0.092961
7Networks_LH_SalVentAttn_FrOper_3	-0.0031189	0.96208	-0.0062703	0.94248
7Networks_LH_SalVentAttn_FrOper_4	-0.12037	0.06786	0.15277	0.18585
7Networks_LH_SalVentAttn_PFCl_1	-0.013474	0.83232	-0.19769	0.016261
7Networks_LH_SalVentAttn_Med_1	0.058263	0.37685	-0.16551	0.099074
7Networks_LH_SalVentAttn_Med_2	0.023709	0.71767	-0.10352	0.30122
7Networks_LH_SalVentAttn_Med_3	-0.016261	0.7995	-0.019578	0.86445
7Networks_LH_Limbic_OFC_1	-0.064079	0.3039	-0.010361	0.91867
7Networks_LH_Limbic_OFC_2	-0.046152	0.48162	0.073162	0.44974
7Networks_LH_Limbic_TempPole_1	-0.12799	0.053521	0.1865	0.060594
7Networks_LH_Limbic_TempPole_2	-0.11102	0.073703	0.11613	0.19772
7Networks_LH_Limbic_TempPole_3	-0.093617	0.12441	0.22367	0.040437
7Networks_LH_Limbic_TempPole_4	0.048096	0.47474	0.10383	0.22468
7Networks_LH_Cont_Par_1	0.012376	0.84411	-0.24586	0.041558

7Networks_LH_Cont_Par_2	0.055685	0.37754	-0.16076	0.1255
7Networks_LH_Cont_Par_3	0.023072	0.7035	-0.61527	0.023377
7Networks_LH_Cont_Temp_1	-0.051739	0.40668	0.015634	0.90259
7Networks_LH_Cont_PFCl_1	-0.028233	0.63992	-0.12102	0.25479
7Networks_LH_Cont_PFCl_2	-0.056376	0.37569	0.0026803	0.97926
7Networks_LH_Cont_PFCl_3	-0.025933	0.6915	-0.17792	0.047717
7Networks_LH_Cont_PFCl_4	-0.12514	0.046221	-0.14873	0.17119
7Networks_LH_Cont_PFCl_5	-0.060778	0.34531	-0.020322	0.81417
7Networks_LH_Cont_PFCl_6	-0.10145	0.10372	0.02227	0.85701
7Networks_LH_Cont_pCun_1	-0.13945	0.028334	0.064878	0.47417
7Networks_LH_Cont_Cing_1	-0.16194	0.017895	0.13782	0.078656
7Networks_LH_Cont_Cing_2	-0.031663	0.63316	0.093499	0.32624
7Networks_LH_Default_Temp_1	-0.1366	0.037612	0.28867	0.0067798
7Networks_LH_Default_Temp_2	-0.18056	0.0037357	0.032467	0.75837
7Networks_LH_Default_Temp_3	-0.025449	0.69124	0.087542	0.36563
7Networks_LH_Default_Temp_4	-0.094748	0.12986	0.2418	0.068916
7Networks_LH_Default_Temp_5	-0.10286	0.10565	0.2069	0.10886
7Networks_LH_Default_Temp_6	-0.082272	0.18578	0.2374	0.024113
7Networks_LH_Default_Temp_7	0.036942	0.5685	-0.19257	0.063367
7Networks_LH_Default_Temp_8	-0.042844	0.49552	-0.0049762	0.96433
7Networks_LH_Default_Temp_9	-0.026336	0.66691	-0.093316	0.37622
7Networks_LH_Default_PFC_1	-0.0037976	0.95269	0.044949	0.62807
7Networks_LH_Default_PFC_2	0.066145	0.3062	-0.042077	0.70106
7Networks_LH_Default_PFC_3	-0.087375	0.15028	0.18103	0.19311
7Networks_LH_Default_PFC_4	-0.027099	0.68338	-0.088624	0.25236
7Networks_LH_Default_PFC_5	-0.1218	0.06425	0.046441	0.64919
7Networks_LH_Default_PFC_6	-0.065028	0.30734	-0.037655	0.69885
7Networks_LH_Default_PFC_7	-0.01271	0.85047	-0.12836	0.10752
7Networks_LH_Default_PFC_8	-0.065448	0.33233	0.037162	0.69332
7Networks_LH_Default_PFC_9	-0.050075	0.44229	-0.12706	0.11676
7Networks_LH_Default_PFC_10	0.043267	0.49506	-0.14947	0.096427
7Networks_LH_Default_PFC_11	0.01802	0.77713	-0.19591	0.019358
7Networks_LH_Default_PFC_12	-0.049657	0.45166	-0.078663	0.33485
7Networks_LH_Default_PFC_13	-0.014897	0.82266	-0.033393	0.68652
7Networks_LH_Default_PCC_1	-0.20284	0.0021478	0.31793	0.0004296
7Networks_LH_Default_PCC_2	0.031194	0.61785	0.054649	0.60259
7Networks_LH_Default_PCC_3	0.060689	0.35253	-0.13911	0.12258

7Networks_LH_Default_PCC_4	-0.024948	0.70905	-0.047753	0.6054
7Networks_LH_Default_PHC_1	-0.08906	0.19414	0.11631	0.17103
7Networks_RH_Vis_1	0.011955	0.85296	0.039556	0.67133
7Networks_RH_Vis_2	-0.044233	0.50293	0.053047	0.59047
7Networks_RH_Vis_3	-0.034403	0.60608	0.17045	0.075226
7Networks_RH_Vis_4	0.014586	0.83018	0.058569	0.4162
7Networks_RH_Vis_5	2.23e-05	1	0.16618	0.11398
7Networks_RH_Vis_6	-0.15573	0.018292	0.21051	0.014021
7Networks_RH_Vis_7	0.011149	0.8669	0.031504	0.68596
7Networks_RH_Vis_8	-0.014096	0.83416	0.088537	0.31086
7Networks_RH_Vis_9	-0.043623	0.52785	0.0017798	0.98085
7Networks_RH_Vis_10	0.015104	0.82725	0.017292	0.8381
7Networks_RH_Vis_11	0.013021	0.83155	0.046146	0.67972
7Networks_RH_Vis_12	0.059262	0.38287	0.003335	0.96442
7Networks_RH_Vis_13	0.041056	0.53805	0.090736	0.26667
7Networks_RH_Vis_14	0.034435	0.60881	-0.05475	0.52642
7Networks_RH_Vis_15	0.10597	0.098354	-0.092332	0.38799
7Networks_RH_SomMot_1	0.087682	0.1907	0.062613	0.4715
7Networks_RH_SomMot_2	-0.012096	0.85655	0.06734	0.50151
7Networks_RH_SomMot_3	0.0020774	0.97408	0.021084	0.8304
7Networks_RH_SomMot_4	-0.057146	0.37929	0.13923	0.15527
7Networks_RH_SomMot_5	0.008822	0.88914	0.004562	0.97189
7Networks_RH_SomMot_6	0.075046	0.2463	-0.11337	0.28198
7Networks_RH_SomMot_7	0.090575	0.16481	-0.041182	0.62654
7Networks_RH_SomMot_8	0.069932	0.25704	-0.052423	0.67574
7Networks_RH_SomMot_9	-0.037802	0.57812	-0.062285	0.54451
7Networks_RH_SomMot_10	0.01087	0.86578	0.031528	0.82012
7Networks_RH_SomMot_11	0.07053	0.26825	-0.093008	0.35519
7Networks_RH_SomMot_12	0.12959	0.049368	0.0179	0.82962
7Networks_RH_SomMot_13	0.11337	0.071887	-0.20319	0.038311
7Networks_RH_SomMot_14	-0.0188	0.77175	-0.022283	0.80584
7Networks_RH_SomMot_15	0.01978	0.77068	-0.012566	0.89989
7Networks_RH_SomMot_16	0.022899	0.72677	-0.05458	0.61832
7Networks_RH_SomMot_17	-0.0043214	0.94892	0.051149	0.52805
7Networks_RH_SomMot_18	0.069537	0.27114	0.039778	0.65626
7Networks_RH_SomMot_19	0.14314	0.032471	-0.0065742	0.94095
7Networks_RH_DorsAttn_Post_1	0.041513	0.51182	0.16284	0.15244
7Networks_RH_DorsAttn_Post_2	0.0081352	0.89745	0.17148	0.13439
7Networks_RH_DorsAttn_Post_3	0.03494	0.57841	-0.10873	0.27805

7Networks_RH_DorsAttn_Post_4	-0.0082814	0.89591	-0.12842	0.28487
7Networks_RH_DorsAttn_Post_5	0.012089	0.84967	-0.044443	0.73021
7Networks_RH_DorsAttn_Post_6	0.030115	0.64281	-0.11829	0.18505
7Networks_RH_DorsAttn_Post_7	0.0056954	0.92648	-0.13212	0.36486
7Networks_RH_DorsAttn_Post_8	-0.044658	0.49063	0.015317	0.87166
7Networks_RH_DorsAttn_Post_9	0.0091581	0.88671	-0.026618	0.78467
7Networks_RH_DorsAttn_Post_10	-0.055311	0.39592	0.016689	0.84876
7Networks_RH_DorsAttn_FEF_1	0.072076	0.27177	-0.15759	0.13453
7Networks_RH_DorsAttn_FEF_2	0.08876	0.15261	-0.26742	0.0261
7Networks_RH_DorsAttn_PrCv_1	-0.026636	0.67973	0.028124	0.78175
7Networks_RH_SalVentAttn_TempOccPar_1	0.025323	0.69037	0.17683	0.13029
7Networks_RH_SalVentAttn_TempOccPar_2	0.090708	0.13254	-0.10111	0.44799
7Networks_RH_SalVentAttn_TempOccPar_3	0.005516	0.92941	0.032502	0.77013
7Networks_RH_SalVentAttn_PrC_1	-0.015161	0.80795	0.070134	0.61581
7Networks_RH_SalVentAttn_FrOper_1	-0.03008	0.64129	0.25572	0.017876
7Networks_RH_SalVentAttn_FrOper_2	0.14804	0.032053	-0.0005382	0.99459
7Networks_RH_SalVentAttn_FrOper_3	-0.10011	0.10956	0.14946	0.13266
7Networks_RH_SalVentAttn_FrOper_4	-0.091993	0.14994	0.25337	0.021244
7Networks_RH_SalVentAttn_Med_1	0.083248	0.18554	-0.14304	0.19007
7Networks_RH_SalVentAttn_Med_2	-0.0069754	0.91502	0.01306	0.88142
7Networks_RH_SalVentAttn_Med_3	0.14057	0.034752	-0.10546	0.29909
7Networks_RH_Limbic_OFC_1	0.0028532	0.96657	0.026906	0.76803
7Networks_RH_Limbic_OFC_2	-0.079244	0.20085	0.13042	0.15977
7Networks_RH_Limbic_OFC_3	0.021672	0.74012	-0.1467	0.11436
7Networks_RH_Limbic_TempPole_1	-0.0043151	0.94411	0.36748	0.0045149
7Networks_RH_Limbic_TempPole_2	-0.048192	0.46232	0.15112	0.11722
7Networks_RH_Limbic_TempPole_3	-0.018937	0.78204	0.011975	0.88168
7Networks_RH_Cont_Par_1	0.034226	0.58469	-0.040601	0.77741
7Networks_RH_Cont_Par_2	0.046798	0.44736	-0.11663	0.34767
7Networks_RH_Cont_Par_3	-0.014755	0.80977	-0.065073	0.66701
7Networks_RH_Cont_Temp_1	0.029293	0.65215	-0.013151	0.91389
7Networks_RH_Cont_PFCv_1	-0.043185	0.49524	0.019203	0.87688
7Networks_RH_Cont_PFCl_1	-0.010404	0.86738	-0.015973	0.88071
7Networks_RH_Cont_PFCl_2	-0.025513	0.68598	-0.11958	0.23628
7Networks_RH_Cont_PFCl_3	0.0057649	0.92596	-0.14242	0.13926
7Networks_RH_Cont_PFCl_4	-0.099027	0.13556	0.080294	0.35062
7Networks_RH_Cont_PFCl_5	-0.052868	0.39574	-0.15745	0.10193

7Networks_RH_Cont_PFCl_6	-0.0054907	0.92893	-0.16166	0.098969
7Networks_RH_Cont_PFCl_7	0.010729	0.87195	0.0042544	0.96512
7Networks_RH_Cont_pCun_1	0.038379	0.53765	0.014394	0.89477
7Networks_RH_Cont_PFCmp_1	-0.10307	0.11252	0.048371	0.55242
7Networks_RH_Cont_PFCmp_2	-0.052259	0.43139	0.11205	0.2053
7Networks_RH_Cont_PFCmp_3	0.028641	0.65387	-0.1681	0.12154
7Networks_RH_Cont_PFCmp_4	0.085144	0.21313	-0.11733	0.17645
7Networks_RH_Default_Par_1	0.033991	0.59721	0.022103	0.85441
7Networks_RH_Default_Par_2	-0.023787	0.70465	0.12054	0.33341
7Networks_RH_Default_Par_3	0.06102	0.33099	-0.10825	0.38287
7Networks_RH_Default_Temp_1	-0.065993	0.30308	0.19809	0.043939
7Networks_RH_Default_Temp_2	-0.067774	0.29184	0.11654	0.24423
7Networks_RH_Default_Temp_3	-0.075433	0.27279	0.072447	0.4165
7Networks_RH_Default_Temp_4	-0.01913	0.76009	0.02613	0.79735
7Networks_RH_Default_Temp_5	0.0039176	0.9521	0.24243	0.034091
7Networks_RH_Default_PFCv_1	-0.043205	0.51109	0.13676	0.14697
7Networks_RH_Default_PFCm_1	-0.086902	0.16127	0.067947	0.50731
7Networks_RH_Default_PFCm_2	0.0024132	0.96919	-0.041556	0.70862
7Networks_RH_Default_PFCm_3	0.03672	0.59045	0.080296	0.42046
7Networks_RH_Default_PFCm_4	-0.0015703	0.98174	-0.14564	0.055887
7Networks_RH_Default_PFCm_5	0.13419	0.040708	-0.23767	0.0028657
7Networks_RH_Default_PFCm_6	0.086476	0.17274	-0.25749	0.0086362
7Networks_RH_Default_PFCm_7	0.03059	0.61364	-0.16213	0.211
7Networks_RH_Default_PCC_1	0.0012425	0.98533	0.18947	0.045664
7Networks_RH_Default_PCC_2	0.076534	0.25585	0.056522	0.53083
7Networks_RH_Default_PCC_3	0.0075094	0.90336	-0.068331	0.54846

Supplementary Table 11. Genetic correlation between Openness and cortical thickness. Genetic correlation between Openness and local cortical thickness calculated using solar 8.4.0. Regions are named according to the Schaefer 200 atlas, based on 7-networks. Here we report environmental correlation (ρ_e) and genetic correlation (ρ_g) and the associated p-values.

	ρ_e	p	ρ_g	p	ρ_{ph} genetic	ρ_{ph} environment
Agreeableness						
7Networks_LH_Cont_PFCl_4	**-0.12**	**0.04**	**-0.08**	**0.61**	**-0.02(0.20)**	**-0.09(0.80)**
7Networks_LH_Default_PFC_7	-0.01	0.84	-0.22	0.06	-0.09(0.92)	-0.01(0.09)
7Networks_LH_Default_PFC_9	-0.05	0.44	-0.21	0.08	-0.08(0.72)	-0.02(0.28)
7Networks_LH_Default_PFC_11	**0.01**	**0.90**	**-0.36**	**0.004**	**-0.13(1.04)**	**0.005(-0.04)**
7Networks_LH_Default_PFC_12	-0.04	0.53	-0.17	0.17	-0.06(0.72)	-0.02(0.28)
7Networks_LH_Default_PFC_13	**-0.02**	**0.72**	**-0.26**	**0.03**	**-0.10(0.87)**	**-0.01(0.13)**
7Networks_RH_Default_PFCm_5	**0.03**	**0.64**	**-0.33**	**0.005**	**-0.12(1.17)**	**0.02(-0.17)**
Neuroticism						
7Networks_LH_Vis_14	-0.08	0.22	-0.18	0.12	-0.07(0.60)	-0.05(0.39)
7Networks_LH_DorsAttn_FEF_2	**-0.03**	**0.69**	**0.27**	**0.03**	**0.10(1.20)**	**-0.02(-0.20)**
7Networks_LH_SalVentAttn_ParOper_2	0.10	0.10	0.06	0.65	0.02(0.23)	0.07(0.77)
7Networks_LH_Default_Temp_6	-0.09	0.12	-0.10	0.49	-0.03(0.33)	-0.06(0.67)
7Networks_LH_Default_PFC_9	0.08	0.23	0.17	0.13	0.07(0.61)	0.04(0.40)
7Networks_LH_Default_PFC_11	0.01	0.84	0.19	0.09	0.08(0.91)	0.01(0.09)
7Networks_RH_Cont_PFCl_6	**0.03**	**0.63**	**0.26**	**0.04**	**0.09(0.82)**	**0.02(0.18)**
7Networks_RH_Default_PFCm_5	**0.04**	**0.54**	**0.21**	**0.05**	**0.09(0.79)**	**0.02(0.21)**
Openness						
7Networks_LH_Vis_1	**-0.05**	**0.46**	**0.25**	**0.005**	**0.12(1.25)**	**-0.02(-0.25)**
7Networks_LH_SalVentAttn_PFCl_1	**-0.01**	**0.83**	**-0.20**	**0.02**	**-0.10(0.94)**	**-0.01(0.06)**
7Networks_LH_Cont_PFCl_3	**-0.03**	**0.69**	**-0.18**	**0.05**	**-0.08(0.87)**	**-0.01(0.13)**
7Networks_LH_Cont_PFCl_4	**-0.13**	**0.05**	**-0.15**	**0.17**	**-0.06(0.46)**	**-0.07(0.54)**
7Networks_RH_Limbic_TempPole_1	**-0.01**	**0.94**	**0.37**	**0.005**	**0.12(1.02)**	**-0.00(-0.02)**
7Networks_RH_Cont_PFCl_5	-0.05	0.40	-0.16	0.10	-0.07(0.71)	-0.03(0.29)
7Networks_RH_Default_PCC_1	**0.00**	**0.99**	**0.19**	**0.05**	**0.09(0.99)**	**0.00(0.01)**

Supplementary Table 12. Phenotypic correlations in the complete HCP sample are partly driven by genetic effects. Using the regions that showed significant phenotypic correlation in the HCP sample (Figure 1), we explored the genetic and environmental contributions to the phenotypic relationship observed between local cortical thickness and the respective personality trait. Nomenclature of the regions is based on the parcel names of the Schaefer 200 – 7 networks parcel solution. Regions in **red bold** showed genetic correlations at p<=0.05 and regions in blue bol show environmental correlations at p<=0.05.

	ρ_{ph}g	ρ_{ph}e	ρ_{ph} (Spearmann's ρ)
Agreeableness:			
7Networks_LH_Default_Temp_5	0.15 (4.85)	-0.11 (-3.75)	0.03 (0.03)
7Networks_RH_SalVentAttn_Med_3	-0.17 (4.09)	0.13 (-2.95)	-0.04 (-0.05)
7Networks_RH_Default_PFCm_6	-0.15 (6.49)	0.15 (-6.32)	-0.02 (-0.00)
Extraversion:			
7Networks_LH_Default_Temp_9	0.17 (1.74)	-0.07 (-0.75)	0.10 (0.10)

Supplementary Table 13. Proportional contribution of genetic and environmental factors to phenotypic correlation. rph-a, the proportion of phenotypic correlations explained by overlapping genetic factors; rph-e, the proportion of phenotypic correlations explained by overlapping non-shared environmental factors.

	HCP all	**GSP**	**eNKI**
Agreeableness:			
7Networks_LH_Default_Temp_5	0.03	-0.04	-0.03
7Networks_RH_SalVentAttn_Med_3	-0.04	-0.01	-0.01
7Networks_RH_Default_PFCm_6	-0.02	0.02	-0.03
Extraversion:			
7Networks_LH_Default_Temp_9	0.10 *	0.02	0.02

Supplementary Table 14. No robust phenotypic association between personality and cortical thickness in regions that showed significant genetic correlation between personality trait and cortical thickness. Using the regions that showed significant genetic correlation, we explored whether these regions also had a phenotypic relationship with the respective personality trait in all samples. ** indicates FDR corrected at p<0.05, whereas * indicates p<0.05.

Personality trait	$\rho_{ph}g/\rho_{ph}e$ **vs** ρ_{ph}	$\rho_{ph}g$ **vs** ρ_{ph}	$\rho_{ph}e$ **vs** ρ_{ph}
Agreeableness	0.20, p<0.004	0.60, p<0.001	0.21, p<0.005
Conscientiousness	0.18, p<0.01	0.53, p<0.001	0.20, p<0.005
Extraversion	0.06, p>0.1	0.48, p<0.001	0.22, p<0.005
Neuroticism	0.14, p<0.05	0.60, p<0.001	0.31, p<0.001
Openness	0.31, p<0.001	0.71, p<0.001	0.13, p=0.07

Supplementary Table 15. Whole-brain correlation between genetic / environmental components of phenotypic correlations and phenotypic correlations in HCP. Spearman's ρ of the whole brain correlation between phenotypic correlation ρ_{ph} and genetic ($\rho_{ph}g$) / environmental($\rho_{ph}e$) contributions to ρ_{ph} (phenotypic) for each personality trait-brain structure association in HCP.

	HCP all	**GSP**	**eNKI**
Agreeableness:			
7Networks_LH_Default_Temp_5	0.03	-0.04	-0.03
7Networks_RH_SalVentAttn_Med_3	-0.04	-0.01	-0.01
7Networks_RH_Default_PFCm_6	-0.02	0.02	-0.03
Extraversion:			
7Networks_LH_Default_Temp_9	0.10 *	0.02	0.02

Supplementary Table 16. No robust phenotypic association between personality and cortical thickness in regions that showed significant genetic correlation between personality trait and cortical thickness. Using the regions that showed significant genetic correlation, we explored whether these regions also had a phenotypic relationship with the respective personality trait in all samples. ** indicates FDRq<0.05, whereas * indicates p<0.05.

Personality trait	ρ_{ph} **HCP vs** ρ_{ph} **GSP**	$\rho_{ph}g$ **HCP vs** ρ_{ph} **GSP**	$\rho_{ph}e$ **HCP vs** ρ_{ph} **GSP**
Agreeableness	0.06, p>0.4	-0.04, p>0.6	0.13, p=0.07
Conscientiousness	0.09, p>0.2	0.04, p>0.5	-0.00, p>0.9
Extraversion	0.04, p>0.5	0.09, p>0.1	-0.11, p>0.1
Neuroticism	-0.08, p>0.2	-0.06, p>0.3	0.05, p>0.5

Openness	0.21, p<0.005**	0.19, p<0.01**	-0.08, p>0.2

Supplementary Table 17. Whole-brain correlation between genetic / environmental components of phenotypic correlations in HCP and phenotypic correlations in GSP. Spearmans ρ of phenotypic correlation ρ_{ph}, as well as genetic (ρ_{ph}g) / environmental(ρ_{ph}e) contributions to ρ_{ph} (phenotypic) for each personality trait-brain structure association in HCP relative to the phenotypic correlation between personality trait and cortical thickness in GSP.

Personality trait	ρ_{ph} HCP vs ρ_{ph} eNKI	ρ_{ph}g HCP vs ρ_{ph} eNKI	ρ_{ph}e HCP vs ρ_{ph} eNKI
Agreeableness	-0.28, p<0.001**	-0.04, p>0.6	-0.05, p>0.4
Conscientiousness	0.16, p<0.05*	0.04, p>0.5	0.13, p=0.07
Extraversion	0.22, p<0.005**	0.09, p>0.1	0.05, p>0.4
Neuroticism	-0.04, p>0.5	-0.06, p>0.3	0.03, p>0.6
Openness	0.43, p<0.001**	0.35, p<0.001**	0.08, p>0.2

Supplementary Table 18. Whole-brain correlation between genetic / environmental components of phenotypic correlations in HCP and phenotypic correlations in eNKI. Spearman's ρ of phenotypic correlation ρ_{ph}, as well as genetic (ρ_{ph}g) / environmental(ρ_{ph}e) contributions to ρ_{ph} (phenotypic) for each personality trait-brain structure association in HCP relative to the phenotypic correlation between personality trait and cortical thickness in eNKI.

Personality trait	A	C	E	N	O
Agreeableness	1				
Conscientiousness	0.04 (0.13)				
Extraversion	0.38 (0.12) **	0.33(0.09) **			
Neuroticism	-0.14 (0.14)	-0.27(0.10) *	-0.31(0.10) *		
Openness	0.17 (0.11)	-0.24 (0.09) *	0.05(0.09)	-0.01(0.10)	

Supplementary Table 19. Genetic correlation of personality traits. Genetic correlation across personality traits using solar 8.4.0. ** indicates FDRq<0.05 corrected at p<0.05, controlled for number of analysis (10), whereas * indicates p<0.05.

Personality trait	A	C	E	N	O
Agreeableness	1				
Conscientiousness	0.32 (0.06) **				
Extraversion	0.26 (0.06) **	0.24(0.06) **			
Neuroticism	-0.41(0.06) **	-0.51(0.05) **	-0.39(0.06) **		
Openness	0.06 (0.06)	0.01 (0.07)	0.14(0.07) *	0.02(0.07)	

Supplementary Table 20. Environmental correlation of personality traits. Environmental correlation across personality traits using solar 8.4.0. ** indicates FDRq<0.05 corrected at p<0.05, controlled for number of analysis (10), whereas * indicates p<0.05.

	HCP		**GSP**		**eNKI**	
Agreeableness	ρ	p	ρ	p	ρ	p
7Networks_LH_Cont_PFCl_4	-0.1	0.001	0.03	0.37	-0.02	0.60
7Networks_LH_Default_PFC_7	-0.1	0.001	0.02	0.49	0.02	0.65
7Networks_LH_Default_PFC_9	-0.11	0.0003	0.00	0.99	0.06	0.12
7Networks_LH_Default_PFC_11	-0.11	0.0003	-0.01	0.74	-0.02	0.49
7Networks_LH_Default_PFC_13	-0.10	0.001	-0.01	0.67	-0.01	0.77
Neuroticism						
7Networks_LH_Vis_14'	-0.11	0.0001	0.05	0.16	-0.01	0.84
7Networks_LH_SalVentAttn_ParOper_2	0.11	0.0001	-0.02	0.51	0.01	0.87
7Networks_LH_Default_Temp_6	-0.10	0.0001	0.06	0.07	-0.01	0.73
7Networks_LH_Default_PFC_9	0.10	0.0001	0.01	0.85	-0.01	0.70

Supplementary Table 21. Post-hoc analysis of phenotypic correlations controlling for IQ in GSP and eNKI. Post-hoc analysis of associations between personality traits and local brain structure correcting in regions that survived FDRq<0.05 in the HCP sample in the GSP and eNKI samples.