Title: Trait correlations in human couples

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People tend to form partnerships with others who are similar to themselves. A new study examined correlations between human mating partners, and finds correlations across nearly every trait studied. Education, social attitudes, and substance use showed the highest correlations. Effect sizes differed between studies, suggesting potential cultural contingency.

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Social and biological research has shown that partners match on a multitude of traits related to attitudes, education, and health. This pattern of non-random partnership, termed 'assortative mating', has received considerable research attention as it may shape population characteristics.[1] Moreover, assortative mating may bias genetic estimates derived from study designs that assume random mating, including twin-based heritability estimates and DNA-based genome-wide association studies (GWAS). Therefore, it is important to study the magnitude of partner correlation across a wide variety of traits.

In this study[1], Horwitz and colleagues provide the largest meta-analysis of partner correlations to date, including 199 independent studies across 22 traits with sample sizes ranging from n=2,527 (for generalized anxiety) to n=2,727,151 (for diabetes). Partner correlations on 18 out of 22 traits were positive and significantly different from zero, correcting for multiple comparisons (see Figure 1). Societal attitudes, educational attainment, and substance use showed the strongest partner correlations (political values r_{meta}=.58, religiosity r_{meta}=.56, education r_{meta}=.55, smoking cessation r_{meta}=.54), while personality traits showed the weakest correlations (agreeableness r_{meta}=.11, neuroticism r_{meta}=.11, extraversion r_{meta}= .08).

The meta-analysis further indicated a high degree of variation in the magnitude of partner correlations between studies, which is also referred to as high between-study heterogeneity. This can partly be ascribed to differences in the ways the traits were measured, for example by using different questionnaires or self-report versus observation. However, between-study heterogeneity was also high for traits derived from

objective measures, such as height. This suggests that partner correlations are environmentally contingent; they may vary across time, location, and culture.

To further investigate the meta-analyzed traits and to index the magnitude of additional traits not commonly reported in the literature, they calculated correlations across 133 traits between 79,074 couples in the UK Biobank (UKB). The UK Biobank is a widely used cohort in genomic studies. As in the meta-analysis, nearly all of the partner correlations were positive and significantly different from zero, including sexuality (age of first intercourse r_{UKB} =.43, ever had same-sex intercourse r_{UKB} =.31), social well-being (happiness r_{UKB} =.25, family satisfaction r_{UKB} =.28, friendship satisfaction r_{UKB} =.19), and behavioral traits (playing video games r_{UKB} = .20, morning/evening person r_{UKB} = -.18, TV hours/day r_{UKB} =.44). Figure 1 portrays the overlap in partner correlations of the meta-analyses and the UKB analyses.

We derive two major conclusions from this study. First, partner correlations generally exhibited positive values. Political and religious attitudes, educational attainment, IQ score, and some substance use traits exhibited the strongest correlations, and personality traits exhibited the weakest correlations. Assortative mating is likely to arise from both genetically-influenced matching (*e.g.,* partners actively preferring similarity on heritable behaviors) as well as environmental boundaries (*e.g.,* similar social networks). Thus, several types of genetic estimates of these traits, including SNP heritability from GWAS and inferred causality from Mendelian randomization design, may be biased by partner similarity. Notably, education, IQ, and substance use behaviors are amongst the most prominent predictors of socioeconomic attainments, morbidity, and mortality.[3,4,5] The fact that mating partners match on these traits may increase genetic and phenotypic variation of these traits in future generations.[1]

Second, there was considerable between-study heterogeneity in the magnitude of partner correlations. Next to potential methodological reasons, this highlights the cultural contingency of human mating: Cultures and contexts affect our mating preferences and behaviors. Yet, a major limitation of this study, which the authors acknowledge, is the limited population diversity of available studies. For example, the UKB participants are relatively homogenous in terms of socioeconomic status and race, as they are predominantly wealthy and white. While the studies available for meta-analysis were more diverse than the UKB, they still starkly overrepresent European and US populations. The authors highlight that the results of their study may therefore not generalize to different populations.

Moreover, their results mostly represent female-male partnerships, and in the UKB, female-male partners living in the same household. In reality, human mating is far more variable than the types of couplings the authors were able to examine. Same- and opposite-sex/gender partners have shown different patterns of similarity for some traits.[6,7] This systematic review can be viewed as a motivator for future research to include more population-representative samples that allow a closer examination of factors that may explain between-study heterogeneity.

Despite limitations in the available data, this study represents a valuable contribution to indexing partner similarity across a wide range of characteristics that are relevant to sociologists, economists, and geneticists.

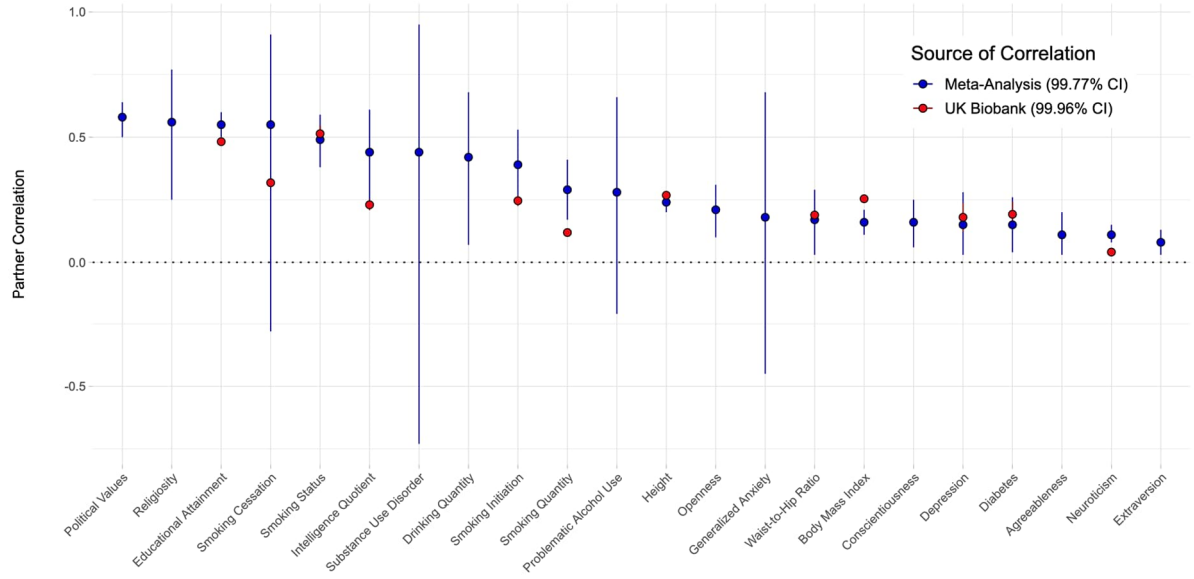

Figure 1. The point estimates of the mean meta-analyzed random effects partner correlations and UK Biobank partner correlations for comparable traits, along with their respective 95% confidence intervals.

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Competing interests

The authors declare no competing interest