

25 - Specific heritability factors

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© SPMM Course heritability. Non-additive genetic influences include phenomena such as epistasis – gene-gene interaction, and dominance effects where presence of one gene mitigates the expression of other gene. Heritability can be calculated from concordance rates using the mathematical formulae. Interpretation of heritability: (from Visscher et al., 2008) STATEMENT ACCURACY A high heritability means that most of the variation that is observed in the present population is caused by variation in genotypes. CORRECT. So, in the current population, the phenotype of an individual is a good predictor of the genotype A heritability of 80% means that 80% of the variability in whether an individual becomes affected is inherited, while 20% is not. CORRECT. It does not mean that genes account for 80% of the causative factors – as inheritance is not same as genetic causation. High heritability implies genetic determination FALSE. It does not mean that the phenotype is determined once we know the genotype, because the environment can change or can be manipulated to alter the phenotype Heritability is the proportion of a phenotype that is passed on to the next generation FALSE: Phenotype is not passed on – only the genotype. There are many modifiers in the environment and cellular machinery between a genotype and phenotype. Heritability is informative about the nature of between-group differences FALSE. Heritability is measured within a specified population – differences among groups may not be due to genetic differences but due to nature of studied population A large heritability implies genes of large effect FALSE. Not true for polygenic disorders. There is no strong relationship between heritability and the number or size of genes affecting the trait. An exception is Mendelian single gene disorders – they all have heritability of 100%.

Specific heritability factors Some common and highly regarded as environmental disorders such as obesity have been demonstrated to have high familial loading. 80% of offspring with both parents obese, 40% of offspring with one parent obese are obese themselves compared to 10% obesity in children with both lean parents. Reported estimates of heritability for IQ from twin studies are remarkably consistent in the range of 0.5–0.8, with differing estimates for the various components of cognitive abilities.

Disorder Heritability estimate* Schizophrenia