



## Variation can have physil/\*n@



## Genes code for physical features in humans

This includes physical features

Identical twins appear very similar

This also includes the physical features of their brains (structure, neurotransmitters etc)

 We know these things are likely to influence behaviour



## Complex quantitative traits

E.g., Height, Cognitive ability, Hyperactivity, Antisocial behaviour

Lots of different sources of variation

- Environment influences
- Lots (100s?) of genes each of small effect



## Why worry about genetics?

Genetic effects appear important in explaining behavioral variance

genetic designs may be genetic effects in disguise



## The classical twin study

- Compares MZ (identical) and DZ (50% similar)
- Estimates



## ACE Structural equation model





## Conduct Problems rMZ = .66, rDZ = .38<u>Additive genetics = .56</u> Common environment = .10 specific Environment = .34

Virginia Twin Study, Eaves et al., 1997



# Social class in the Classical Twin design

Contribute to C estimate?

- C estimates tend to be low (although upper CI may be high)
- Effects may differ between children in same family (eg one twin may be more resilient)



### Gene-Environment interaction

Genes have different effect on behaviour depending on environment

Response to environmental stimulus moderated by genetic make-up



#### Genetic x SES interaction for IQ



## Gene-Environment correlation



## Conclusions

Genetics appear to account for a large proportion of variance in behaviour

Offer an important opportunity to learn about environmental effects

(Also see MZ-Difference designs)
SEMs being developed to estimate GxE correlation and interaction simultaneously

