Psych 3102
Lecture 8

Complex Traits

Qualitative traits	Quantitative traits
single gene	multiple genes (polygenic)
Mendelian inheritance	no simple inheritance pattern but familial
phenotypes in distinct categories	phenotypes expressed on a continuum
phenotype typically not affected by environment	phenotype influenced by environment
ABO blood group system Huntington disease PKU Duchenne muscular dystrophy	skin color Alzheimer disease schizophrenia depression

Schizophrenia

discontinuous trait

Phenotype:

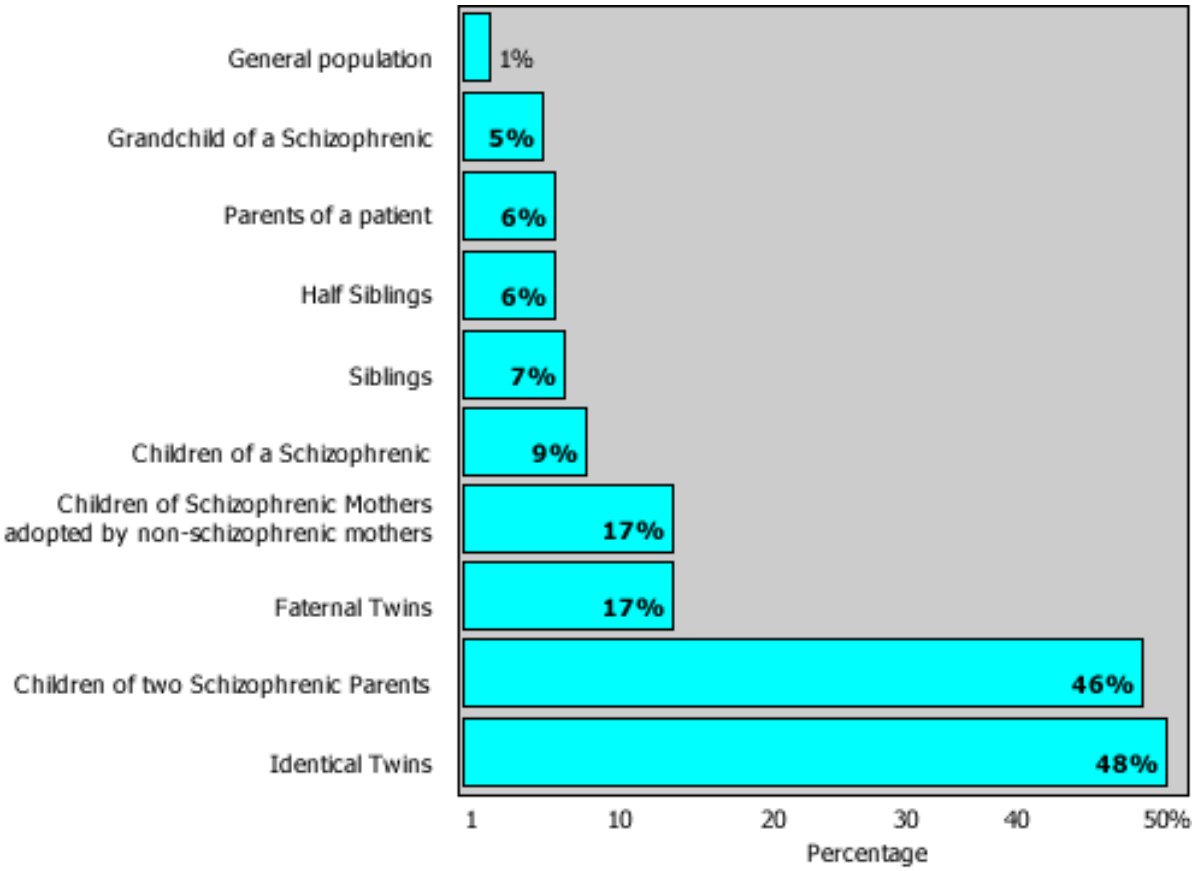
Prevalence:

1% worldwide

familial pedigrees show disorder runs in families

clearly not single gene inheritance pattern

Risk of schizophrenia



Spousal risk = 2% Why?

- multifactorial polygenic inheritance

multifactorial - many factors environment

several chromosomes

polygenic - many genes

- genetic heterogeneity

there are different genes associated with schizophrenia in different families

several different genotypes produce the same (or similar) phenotype

COMT gene - one allelic variant increases risk of schizophrenia by 50%

General cognitive ability

- continuous variation

Phenotype:

familial ability levels do run in families

relatives resemble each other for level of cognitive ability - but how much of the resemblance is due to genes relatives share and how much is due to the environment they also share?

Relationship	% genes shared	Correlation between ability scores
MZ twins	100	.85
DZ twins	50	.60
Parent/offspring	50	.45
Sibs	50	.45
½ sibs, aunts,uncles, grandparent, /child	25	.30
cousins	12.5	.15
unrelated	0	.00
spouses	0	.40

assortative mating

heritable

environmental

shared (common) environment increases correlations within families but increases variation across different families - environmental effect that increases similarity within family , due to shared experiences

non-shared (individual-specific) environment decreases correlations within families – environmental effect that makes individuals differ, due to their unique experiences

Quantitative inheritance

- many genes influence a trait
- trait shows continuous variation

- each gene still follows Mendelian inheritance laws
- for continuous variation the genes must show

  additive effects

dominant alleles produce non-additive effects

Problem
- what about discontinuous traits like schizophrenia
- polygenic
- continuous variation?

Two models used to explain this:

Model 1 Liability-threshold model

Model 2 Continuous variation model