

How science works

Using twin studies to research schizophrenia



One way of finding out whether a disorder has a genetic component is to see whether it runs in families. If relatives of sufferers have a higher than average risk of getting the disorder themselves, then it may be that the disorder has a genetic component.

However, family members typically share similar environments. Consequently, increased risk amongst close relative may simply indicate that that are exposed to the same set of environmental risks.

An alternative approach is to do a twin study. This looks at the **concordance rate** (degree of similarity) of twins with respect to the disorder being considered. Concordance rates means **the probability of one twin having the disorder if the other already has it expressed as a percentage.**

In a twin study, MZ (identical) and DZ (non-identical) twins are compared. Whilst MZ twins have a greater degree of genetic similarity, both types of twin pair grow up in identical environments. So if we discover that MZ twins have a higher concordance, this cannot be because their environments are more similar than those of DZ twins; it must therefore be because their genes are more similar. When interpreting twin study data, we look for the following features:

Feature	Interpretation
MZ concordance is significantly higher than DZ concordance	The disorder has a genetic component
MZ concordance is same or similar to DZ concordance	The disorder is environmentally caused.
MZ concordance is 100%	The disorder is genetically caused
MZ concordance is significantly less than 100%	The disorder has an environmental component

Strengths of twin studies

- Twins provide a perfect way of controlling for genetic inheritance as MZs always share 100% and DZ share 50%, a naturally occurring manipulation of an independent variable, yet both have the same environmental experience (control of confounding variables) meaning that the effect of nature over nurture can be studied effectively.
- With increasing numbers of multiple births, it is possible to



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'the nature -nurture debate'
Paper 4, section 5 e and f



replicate the findings of twin studies with large samples in many different world cultures, increasing the reliability and generalisability of the findings; records of multiple births means that researchers can easily find large sample with which to test their hypotheses

Weaknesses of twin studies

- One of the grounding assumptions of the twin study methodology concerns the degree of similarity between the environments of MZ and DZ twins. Because both types of twin pair are born at the same time into the same environment it is assumed that each member of a twin pair is exposed to exactly the same set of environmental influences, regardless of zygosity. However, this not strictly true as ...
 - MZ twins can experience differences in terms of environmental experiences, even in the womb
 - MZ twins are typically closer than DZ twins, their parents are more likely to dress them similarly and they are always the same sex; all these factors mean that people will treat them more similarly and therefore it may not be right to assume that both MZ and DZ twin pair share equally similar environments; MZ environments may be more similar than DZs
 - Even though genetically identical, MZ twins are not exactly the same;
 - their fingerprints are different.
 - One twin is typically larger and more robust than the other; first observable in his difference is first observable during pre-natal development.
- Genes turn on and off at different point in life and in interaction with differing environmental experiences (epigenetic modification); therefore MZ twins may both share a gene or cluster of genes which predispose them to schizophrenia however, only one twin may be exposed to the environmental circumstances which trigger that gene to start affecting the person's thinking and behaviour (cross reference to nature-nurture debate)
- The validity of the findings of twin studies still rely on the validity and reliability of the measures used to ascertain the degree of similarity on the certain characteristic in question, in this case schizophrenia; and it is possible that systems such as the DSM are only valid for certain sub-types of schizophrenia
- In studies of separated twins, whereby similarity in developmental outcomes must be due to genes and not to similar environments are problematic as often the environments that they are placed in are actually more similar than the researches have credited
- Genetic inheritance in schizophrenia may be a more complex issue than twin studies would at first have us believe; Boklage (1977) noted that if MZ twins were both right handed, the concordance rate for schizophrenia was 92% but if one was right handed and the other left-handed, the concordance rate was only 25%!

