

provide a fruitful approach towards understanding the mechanisms controlling REM sleep.

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Influence of Family Size on Schizophrenic Birth Order

A SIMPLE formula has been proposed¹ to replace the more complex relationships previously demonstrated² among culture, family size and birth order in schizophrenia. Using data from five previously reported samples of schizophrenic patients²⁻⁶, Hinshelwood reported a statistically significant over-representation of the last but one birth position regardless of family size. He did not offer any explanation for the supposed special vulnerability of the last but one child.

We have shown² an over-representation of later birth positions for schizophrenics from families of five or more children and especially from families of eight or more children. Accordingly, we suggested that schizophrenia is related to the rejection, neglect or other deprivation more likely to be suffered by later children in large families. The same five samples used by Hinshelwood provide a sufficient number of cases to test our further expectation that the over-representation of cases should increase progressively with later birth orders in large families, where each additional child generally aggravates family stress in the conditions of low socio-economic status prevalent among schizophrenics⁷. The last rather than last but one child should therefore be most susceptible to schizophrenia.

Table 1 summarizes our analysis of the data for the families of eight or more children. Each of the last four ordinal positions is more susceptible to schizophrenia than any of the first four. In accordance with our expectation, the number of cases increases progressively in the last four positions. Contrary to Hinshelwood's theory, the last but one is not specifically over-represented. Families

Table 1. DISTRIBUTION OF ORDINAL POSITIONS OF SCHIZOPHRENICS FROM VERY LARGE FAMILIES OF EIGHT OR MORE CHILDREN

Position	Observed distribution	Expected distribution	Percentage over-representation
First	45.0	58.875	-23.6
Second	51.0	58.875	-13.4
Third	48.0	58.875	-18.5
Fourth	48.0	58.875	-18.5
Last but 3	53.5	58.875	-9.1
Last but 2	61.5	58.875	+4.5
Last but 1	74.0	58.875	+25.7
Last	90.0	58.875	+52.9
N	471.0	471.0	

$$\chi^2 = 29.29; df = 7; P < 0.001.$$

Table 2. DISTRIBUTION OF ORDINAL POSITIONS OF SCHIZOPHRENICS FROM MODERATELY LARGE FAMILIES OF FIVE TO SEVEN CHILDREN

Position	Observed distribution	Expected distribution	Percentage over-representation
First	139.5	153.2	-8.9
Second	134.5	153.2	-12.2
Last but 2	142.5	153.2	-7.0
Last but 1	164.5	153.2	+7.4
Last	185.0	153.2	+20.8
N	766.0	766.0	

$$\chi^2 = 11.69; df = 4; P < 0.02.$$

of five to seven children show a similar trend (Table 2) but, as we expect, to a less marked degree. In small families of two to four children the trend is actually reversed with a slight preponderance of earlier born members.

In small families, the greatest over-representation is found for the second born of three-child families, and this position contributes the bulk of cases responsible for Hinshelwood's conclusion. He classified this position as last but one, although middle child or next to oldest seems more descriptive. The older child in families of two is also over-represented though not to a statistically reliable degree. This also contributes to Hinshelwood's conclusion and was likewise classified by him as last but one, although such a term is even harder to justify for a first born. There is therefore little basis to support Hinshelwood's claim that the last but one child is especially vulnerable to schizophrenia. There is even less evidence that family size can be disregarded in considering effects of birth order.

We have pointed out² a strong influence of culture on birth order effects, indicated by a report that birth positions in the first half of large families are over-represented among schizophrenics in India⁸ in contrast with greater vulnerability of the later born in North America and Britain. Such evidence for a socio-cultural effect deserves further study, but this should not take the form of a search for a formula involving some mathematical mystique. It calls rather for a deeper analysis of the interplay among genetic factors, biochemical imbalances, and stressful life situations.

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