OBSTETRIC AND SOCIAL ORIGINS OF MENTALLY
HANICAPPED CHILDREN

BY
D. V. I. FAIRWEATHER
Maternity Hospital, Aberdeen*

AND
R. ILLSLEY
Sociologist, Obstetric Medicine Research Unit, Medical Research Council, University of Aberdeen

New and conflicting evidence about the effect of pre-natal life and the process of birth has revived the old argument about the relative importance of nature and nurture in producing cerebral defects. A few processes have received general recognition; for example, that birth trauma may cause cerebral palsy and that rubella in early pregnancy may cause certain malformations associated with impaired cerebral function. The effect of foetal anoxia, not accompanied by birth trauma, is still disputed (Darke, 1944; Illingworth, 1955; Lilienfeld and Pasamanick, 1955; Graham, Caldwell, Ernhart, Pennoyer, and Hartmann, 1957; Fraser and Wilks, 1959). Prematurity has been alternately blamed and exonerated in successive studies of the past 40 years (see Alm, 1953), a recent example being two conflicting papers from Edinburgh (Drillien, 1959; Douglas, 1960).

The Baltimore workers (Lilienfeld and Pasamanick, 1954; Pasamanick and Lilienfeld, 1955) have postulated “a continuum of reproductive casualty” which signifies that in their view a wide range of obstetric abnormalities, such as pre-eclampsia, prematurity, and placenta praevia, are responsible for an equally wide range of defects in children, such as mental deficiency, epilepsy, and behaviour disorder. Recently Knobloch and Pasamanick (1959) have gone so far as to suggest that, insofar as “intellectual potential” is concerned, “all men are conceived equal”. On this view all observable differences in intellectual ability are the result of pre-natal damage, the birth process, or post-natal conditions.

Studies in this field are difficult to assess and to reconcile with each other. Much confusion may be attributed to imperfect definition of terms and criteria and the study of incomplete or highly-selected populations. Adequate social, genetic, obstetric, paediatric, and psychological data probably do not exist anywhere for a complete population or sample.

The present study deals with the social and medical background of 66 mentally-handicapped children, born in Aberdeen in 1948 and studied in 1958. Advantage has been taken of unusually comprehensive local arrangements for the ascertainment and care of handicapped children, and also of the fact that, since 1948, records of all births in the city have been compiled specifically for the purposes of socio-medical research. It has thus been possible to compare the handicapped group with the population from which they are drawn.

METHOD

As a starting point, we obtained from the local education authority a list of all children born in Aberdeen in 1948 who were attending or had attended the special school for handicapped children. The local health authority provided information about blind, deaf, and ineducable children. All Scottish residential schools for maladjusted or physically or mentally handicapped children were written to.

The Aberdeen special school for physically and mentally handicapped children was opened in 1953 and shortage of places is not a problem. Children usually reach the school either by referral from ordinary schools because of poor educational progress or as a result of intelligence tests given to all children in the city at ages 7, 9, and 11. Children who score 75 I.Q. or less on group tests are tested individually (using the Terman-Merrill revision of the Stanford-Binet Intelligence Scale Form L), and those

*Present Address: Department of Midwifery and Gynaecology, University of Durham.
who score 70 or less (corrected for age) are considered for special educational treatment. The diagnosis of mental handicap is a matter of great difficulty (Clarke and Clarke, 1958; O'Connor and Tizard, 1956). It seemed most practical in the circumstances to adopt the working definition of 70 I.Q. or less used by the local education authority, and for research purposes this procedure is probably as satisfactory as any.

By these means, a total of 66 mentally-handicapped children (with or without an accompanying physical handicap) was ascertained. This includes seven children with I.Q.s. of 70 or less attending ordinary schools and five with I.Q.s. slightly over 70 attending the special school because of their poor educational progress. Fifteen children had I.Q.s. of 50 or less.

Of the 66 children, three had died before 1958 (one of leukaemia, two of epilepsy) and four had left the city. Of the remaining 59 children, the mothers of 58 were interviewed.

Migration from the city is the only probable important cause of losses. In Aberdeen in 1948, 3,533 children were born and survived at least one week. According to the normal distribution of intelligence test scores (Fraser Roberts and Mellone, 1952), about 87 of these would be expected to have an I.Q. of 70 or less. On this basis, about 21 children out of 87 (24 per cent.) may have been missed. A deficiency of this size could be accounted for by migration; a follow-up of all premature babies born in Aberdeen in 1948 showed that 24 per cent. had left the city by 1958 (unpublished records). It is known that geographical movement of families is more frequent in the upper than in the lower social classes. The chances are, therefore, that the upper classes are slightly under-represented in this series.

58 mothers were interviewed by one of the authors (D.V.I.F.). The interview ranged over the social, educational, and occupational background of the parents and siblings of the child, the mother's obstetric history (which was later checked against hospital records), and the child's own education and health, particular attention being paid to illnesses and accidents which might have affected the child's mental development. Details were also obtained about the education of the child's uncles, aunts, and cousins.

**Obstetric Factors**

**Age and Parity.**—The higher parities are heavily over-represented in this series. Only 34 were first or second pregnancies compared with an expected 45 (based on all 1948 Aberdeen births). Eighteen were fifth or later pregnancies (expected six) and they included one ninth and two eighth pregnancies. This proportion of high multiparae is unusual even among the wives of the least skilled section of the community. After standardizing for the number of pregnancy, the age distribution of the 66 mothers is similar to that of all 1948 mothers. There is no significant association between birth order and the child's I.Q.

**Abnormal Pregnancy or Labour.**—The pregnancy and labour records (40 hospital; 25 domiciliary) have been reviewed to detect any abnormality which might have damaged the child. In 58 of the 66 cases both pregnancy and labour were uncomplicated. In the remaining eight cases (Table I, opposite), complications of varying severity arose. Since obstetric abnormalities are most common in primiparae, it is not surprising that only two of these cases were multiparae. In one case (65), a difficult forceps delivery was undoubtedly the cause of cerebral damage. In three cases (57, 70, 28), the child was in hazard from placental insufficiency or anoxia; this may have caused brain damage, but it is noteworthy that in all three cases the social background was poor and unstable, and all the siblings of these three children had I.Q.s. under 80. In the remaining four cases, an undoubted obstetric abnormality existed but it did not produce any obvious or immediate risk to the baby at birth so that a causal relationship to the mental handicap is conjectural. In three of the four cases other close relatives have attended the special school; in the fourth case, the mother is "backward", the child illegitimate, and both mother and child were treated for syphilis.

One twin pregnancy has not been included in Table 1 because the obstetric records cannot be traced. The family circumstances were highly unstable; the family disintegrated and the children have been dispersed among various foster homes. The twin of the child included in the present series has an I.Q. of 72.

**Prematurity.**—The 66 cases include twelve in which the baby weighed 5½ lb. or less at birth. Omitting the twin birth, because birth weights are markedly different in twin pregnancies, this gives a prematurity rate of 16-9 per cent. in single births.

This is an exceptionally high rate. In 1948 the rate for all single births in Aberdeen was 5·6 per cent. Even for a population consisting entirely of births in Social Classes IV and V* and illegitimate births, adjusted to the same parity distribution as the

---

*Social class is based on the husband's occupation according to the method used by the Registrar General (General Register Office, 1951).
mentally handicapped series, we would not expect a prematurity rate of more than 7·3 per 100 live births surviving to the end of the first week of life.

The birth weights of other children born to the same mother may form a better basis of comparison than birth weights in Social Classes IV and V as a whole. Six of the mentally handicapped children had no siblings, the remaining sixty (ten premature; fifty full-term) had 214 siblings, the birth weight being known in 198 cases. Of these, nineteen were premature—a rate of 9·6 per cent. If the sixty mentally handicapped children are included we get a total prematurity rate of 11·2 per cent.

There was a strong tendency for those women who produced one premature child also to bear small babies in other pregnancies. The premature mentally handicapped children had 31 siblings, of whom ten (32 per cent.) were also premature; the full-weight children had 183 siblings of whom only nine (5 per cent.) were premature.

In general, therefore, it seems that the mentally handicapped series contains an excess of children
who were premature by weight at birth and of mothers who gave birth to more than one premature child.

Inspection of the individual cases (three are listed in Table I and the remainder in Table II) suggests that low birth weight alone may be of little significance. There was only one case of extreme prematurity (Case 41, at 2½ lb.), the remainder weighing 4½ lb. or more. Six of the pregnancies were full-time by date, one terminated at 37 weeks, two more prematurely. In two the duration of pregnancy was uncertain, but both babies weighed 5 lb. or more.

The social history of the families of these premature children demonstrates a close association between obstetric and social factors. Two were illegitimate and four the children of unskilled workers. Only one father had a non-manual occupation. In five cases close relatives had attended the special school. For most of these children a poor intra-uterine environment was followed by poor post-natal conditions.

**Physical Defects and Childhood Illness**

Mental handicap is frequently associated with physical defects, some congenital, some arising through childhood illness, and some of indeterminate origin. Severe or prolonged childhood illness may also retard mental development indirectly by depriving the child of the social, emotional, or physical life enjoyed by the healthy child. This study was not designed to test the contribution of such influences; the data given below derives from second-hand sources, the statements of the mother, school medical examination, and (in nineteen cases only) the records of the Royal Aberdeen Hospital for Sick Children.

In 21 of the 66 children, a specific physical defect, or an illness that might have contributed to mental defect, was identified. In three of these, the physical defect almost certainly explains the mental defect (two mongols and one case of cerebral palsy due to birth injury). In four cases of epilepsy and one of microcephaly, the association is almost as definite, though the origin and nature of the lesion remains in doubt. In two children with severe impediments of speech and in one who had spent 2 years in hospital owing to osteochondritis, it might be considered that their experience had helped to depress intelligence to

**Table II**

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Birth Weight (lb. oz.)</th>
<th>Duration of Gestation (wks)</th>
<th>Mother's Age at Delivery (yrs)</th>
<th>No. of Pregnancies</th>
<th>Pregnancy and Labour</th>
<th>Child</th>
<th>Social History of Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>4 8</td>
<td>39</td>
<td>22</td>
<td>1</td>
<td>Short labour Meconium staining Spontaneous delivery</td>
<td>A</td>
<td>Imbecile; ? hydrocephalus; epilepsy —</td>
</tr>
<tr>
<td>32</td>
<td>4 11</td>
<td>Premature</td>
<td>27</td>
<td>3</td>
<td>Short labour Spontaneous delivery</td>
<td>A</td>
<td>—</td>
</tr>
<tr>
<td>67</td>
<td>4 12</td>
<td>41</td>
<td>21</td>
<td>3</td>
<td>Short labour Spontaneous delivery</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>75</td>
<td>4 12½</td>
<td>37</td>
<td>23</td>
<td>1</td>
<td>Short labour Spontaneous delivery</td>
<td>D</td>
<td>—</td>
</tr>
<tr>
<td>72</td>
<td>4 14</td>
<td>40</td>
<td>23</td>
<td>3</td>
<td>Short labour Slight meconium staining Spontaneous delivery</td>
<td>B</td>
<td>—</td>
</tr>
<tr>
<td>39</td>
<td>5 0</td>
<td>Not known</td>
<td>27</td>
<td>3</td>
<td>Spontaneous delivery No pregnancy or labour record</td>
<td>—</td>
<td>Voluntary admission to special school</td>
</tr>
<tr>
<td>16</td>
<td>5 8</td>
<td>40</td>
<td>23</td>
<td>1</td>
<td>21 hrs labour Spontaneous delivery</td>
<td>A</td>
<td>Slight degree of microcephaly</td>
</tr>
<tr>
<td>53</td>
<td>5 8</td>
<td>Not known</td>
<td>28</td>
<td>1</td>
<td>Spontaneous delivery at home</td>
<td>Good</td>
<td>—</td>
</tr>
</tbody>
</table>

*Table II continues on the next page*
the level of mental handicap. In the remaining ten cases, the link between the illness or defect and mental handicap is conjectural. Four were admitted to hospital in infancy with febrile convulsions, but there was no evidence of encephalitis and no subsequent epileptiform episodes; in two growth was severely retarded, but repeated examinations in hospital failed to reveal any cause.

The ten children with the lowest I.Q. scores in this series (44 I.Q. or less) all appeared among the 21 children with physical handicaps or a possibly predisposing illness. Though this may point to a causal association, it should be remembered that children with the most severe degrees of mental handicap are the most likely to receive intensive medical examination, so that their illnesses may have been recorded in greater detail.

**SOCIAL FACTORS**

The sociological analysis is based mainly on the 58 cases in which it was possible to interview the mothers. The remaining eight cases include the two children from the only two professional-class families in the whole series; such information as is available about the other six suggests that they resembled the main sample in social and family background.

**PARENTAL BACKGROUND.**—Mentally handicapped children are drawn from the poorest and least stable section of the population (Table III). With one exception the mothers were brought up in the manual working class, for the most part in the homes of semi-skilled and unskilled manual workers; in nine cases, their class of origin could not be defined because death, family breakdown, or illegitimate birth made

<table>
<thead>
<tr>
<th>Table III</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOCIAL BACKGROUND AND CHILDBEARING HISTORY OF THE PARENTS OF 58 MENTALLY HANDICAPPED CHILDREN; OBSERVED AND EXPECTED NUMBERS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(1) Social Class of Maternal Grandfather ..</th>
<th>I and II</th>
<th>III</th>
<th>IV and V</th>
<th>N.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (7·3)</td>
<td>18 (25·7)</td>
<td>30 (21·7)</td>
<td>9 (3·3)</td>
<td></td>
</tr>
<tr>
<td>1–3</td>
<td>4–6</td>
<td>7–9</td>
<td>10 or more</td>
<td></td>
</tr>
<tr>
<td>15 (25·7)</td>
<td>19 (21·7)</td>
<td>16 (8·5)</td>
<td>8 (2·1)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(2) Size of Mother's Family of Upbringing ..</th>
<th>Professional, Technical and Clerical</th>
<th>Shop Assistant</th>
<th>Skilled Manual</th>
<th>Semi- and Unskilled Manual</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>(19·6)</td>
<td>(10·9)</td>
<td>14 (12·2)</td>
<td>39 (13·7)</td>
<td>2 (1·7)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(3) Mother's Pre-Marital Occupation ..</th>
<th>I and II</th>
<th>III</th>
<th>IV and V</th>
<th>Illegitimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (8·6)</td>
<td>19 (29·5)</td>
<td>33 (16·7)</td>
<td>5 (3·3)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(4) Father's Social Class .. .. ..</th>
<th>Child Illegitimate</th>
<th>Child Conceived</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before Marriage</td>
<td>After Marriage</td>
<td></td>
</tr>
<tr>
<td>12 (5·0)</td>
<td>14 (13·9)</td>
<td>32 (39·1)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>13 (7·9)</td>
<td>24 (28·1)</td>
<td>16 (14·5)</td>
<td>5 (7·5)</td>
<td></td>
</tr>
</tbody>
</table>

Expected numbers, in parenthesis, are based on appropriate Aberdeen populations:

1. Aberdeen married women (all parties), 1950–52 (5,431 cases).
4. Aberdeen mothers (all parties), 1949 (3,308 cases).
6. Aberdeen primiparae, 1949 (1,181 cases).
orthodox occupational classification meaningless. The mothers also came from exceptionally large families, 41 per cent. having been reared in families of seven or more children. None had held professional, technical, or clerical jobs; 39 out of the 58 had been semi-skilled or unskilled workers (Classes IV and V). Of the fathers, only one held a Class I or II occupation compared with 33 in Classes IV and V.

Five children were illegitimate at birth and in nine other families the mother had borne at least one illegitimate child. In all, twelve mothers had begun their childbearing history with an illegitimate pregnancy. Nearly a quarter of the mothers had their first child before the age of 20. At the time of survey in 1958, the 55 married women in the series had already given birth to 257 live-born children, making a mean family size of 4.7; fifteen of these women were still under age 35 and sixteen more were under age 40. At the 1951 Census of Scotland fertile married women of the same age and length of marriage, had a mean family size of 3.3 live born children (General Registry Office, Edinburgh, 1956).

The statistical description of these families does not bring out the extent of their social problems and the precariousness of their family life. The 58 families are better portrayed by the following classification based on their marital and occupational stability:

<table>
<thead>
<tr>
<th>Stability of Family</th>
<th>No. of Families</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unstable</td>
<td></td>
</tr>
<tr>
<td>Mother unmarried</td>
<td>3</td>
</tr>
<tr>
<td>Parents separated; child illegitimate</td>
<td>1</td>
</tr>
<tr>
<td>Husband deserted family</td>
<td>2</td>
</tr>
<tr>
<td>Mother deserted family on two occasions; parents separated</td>
<td>1</td>
</tr>
<tr>
<td>History of heavy drinking, marital fights, and petty larceny</td>
<td>2</td>
</tr>
<tr>
<td>Prolonged and/or frequent unemployment and change of job</td>
<td>16</td>
</tr>
<tr>
<td>Father died between 1948 and 1958</td>
<td>5</td>
</tr>
<tr>
<td>Stable occupational and family history</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td>58</td>
</tr>
</tbody>
</table>

No comparable data exist for the general population, but studies of unselected samples of "normal" families in Aberdeen suggest that the background of the mentally handicapped children is strikingly atypical. Out of the sixteen fathers with a history of prolonged or frequent unemployment, two had been unemployed for 10 years, one for eight years, and three for 1 to 2 years, while most of the remainder had been out of work many times during the last 10 years. The degree of personal and family disorganization encountered in this series is abnormally high. For the children in such families life must be uncertain and levels of living poor. If, as much recent work on intelligence testing suggests (Clarke and Clarke, 1958), nutritional and social conditions and emotional disturbance affect I.Q. appreciably, many of these children might, under better circumstances, have obtained scores well over 70.

Mother's Upbringing.—From the data given above (Table III) on the mother's class of origin we know that an unusually large proportion were the daughters of semi-skilled or unskilled workers. There is no direct evidence about their actual social conditions during upbringing but the height of the mothers may give a measure of their childhood environment (Boyne and Leitch, 1954; Illsley, 1955; Thomson, 1959). Of Aberdeen married primigravidae in the years 1948–54, 29 per cent. were 5 ft. 4 in. or more (tall) and 22 per cent. were under 5 ft. 1 in. (small). The proportion of tall women decreased from 45 per cent. in Social Classes I and II to 21 per cent. in Classes IV and V, and the proportion of small women increased over this class range from 10 to 28 per cent. Of the 58 survey mothers, eleven (19 per cent.) were tall and 25 (43 per cent.) were small. In view of what else is known about the social background of these mothers (see Table III), it seems reasonable to suggest that their conditions of upbringing were so poor that many had been stunted in growth.

Family Fertility.—The maternal family in general appears to be highly fertile.* The 58 mothers have 241 living siblings, of whom 183 have so far married and borne children; the liveborn children of these daughters now total 582, an average of 3.2 per sibling, although in many cases their childbearing history has only just begun. The position may perhaps best summarized by saying that 58 maternal grandparents have so far given rise to 843 grandchildren.

Residence and Kinship.—The series includes two pairs of cousins; 21 children are known to have had close relatives who attended special schools. Other survey families are interrelated. One group of intermarrying families, the tinkers or general dealers, is disproportionately represented. Six of the children come from families closely associated with this group and several others are more distantly connected.

A study of addresses reveals clusters of survey families in certain areas of the town—particularly in the interwar tenement estates (the slum clearance schemes of the 1930s) and in the old sub-standard

---

* Information about the father's family, obtained through the mother, may be inaccurate. What information we possess, viz., the size of family in which fathers were reared, the number of their relatives attending special schools, references to illegitimate birth and abnormal upbringings, suggests that in general the paternal families resemble the maternal families.
housing in the city centre, which provided most of the original tenants of the interwar tenement estates. Many of the survey families have lived in, and have relatives in, both areas. Some of the interwar tenement estates now have a reputation which discourages more “respectable” families from accepting a house in them and this leads to a selective inward drift of unstable families to reinforce those already there. The intermarriage between families, noted above, stems largely from the fact that they have lived and mixed together for many years in a few small well-defined areas of the city. The intermarriage of people with low intelligence may therefore be a function of where they live and of past housing policy; we do not need to postulate a process of natural selection whereby they mysteriously locate and attract each other.

**Intelligence of Other Members of the Family.** —If a child suffers mental damage through obstetric or childhood injury there is no special reason to expect his siblings or other relatives to be similarly affected. If, on the other hand, his low I.Q. has social or genetic origins, a similar defect is likely to appear in other members of the family. We have two measures of the intelligence level in these families:

(1) The number of close relatives (parents, siblings, uncles, aunts, and cousins) educated at special schools.

(2) Intelligence quotients for the siblings of the mentally handicapped children.

Both measures indicate that these families contained many persons of low intelligence. In 21 out of the 58 cases (36 per cent.), mothers reported the attendance of another close relative at a special school. These 21 families have now contributed 45 members to the special school population in addition to the survey child (five parents, eleven siblings, eleven uncles, two aunts, and sixteen cousins).

In 32 out of the 58 cases, both parents had been born and brought up in Aberdeen, so that full information could be obtained about the educational experience of their wider families. In fifteen of these 32 families (47 per cent.), members other than the survey child had attended the special school in Aberdeen.

Intelligence quotients are available for 132 siblings. This information results from tests carried out annually in city schools on children aged 7 (Moray House Picture Intelligence Test). The siblings whose quotients are not known had either not yet reached or were over age 7 before annual tests began. 9-year-old scores (Essential Test—Form A, Schonell) analysed separately, but not reported here, fully support the results of the 7+ test.

The mean intelligence quotient obtained at the 7+ test by all city children varied slightly from 105·7 to 107·3 between the years 1953-4 and 1957-8. The mean quotient of the siblings of mentally handicapped children was 84·0. Whilst the mean is low and the distribution heavily bunched towards the lower end of the I.Q. scale there is considerable variation. 28 siblings had quotients in the mental handicap range, and 41 had quotients over 90. In fourteen families, the family average (excluding the survey child) was 75 or less; in 15 it was over 90. These variations are discussed below.

**Variations between Survey Families**

Most systems of classifying mental defectives involve the notion that a small proportion, usually in the lower grades, are pathologically abnormal, the result of genetic or environmental “accidents” (including intra-uterine influence and birth injury) which cause organic impairment. In the much larger residual or “sub-cultural” group of milder mental handicap, the main causes are traditionally considered to be heredity and a poor social environment; relatives are frequently feeble-minded and the family’s social status is low (Penrose, 1949; Clarke and Clarke, 1958). Two groups roughly equivalent to these categories have been distinguished in the present series:

(1) 21 children who either had physical defects or had suffered from childhood illnesses which might affect their mental development.

(2) 27 children who had a relative at the special school or whose siblings had a mean I.Q. of 75 or less.

The characteristics of these groups and of children who resulted from abnormal labour and pregnancy or who were premature by birth weight are given in Table IV (overleaf).

Few of the physically defective group came from unstable homes or poor housing areas; one half had an I.Q. of 50 or less, but the mean I.Q. of their siblings was relatively high and few of their relatives had any connexion with the special school. Relatively few children in this group resulted from abnormal pregnancy and labour or were of low birth weight. Their mothers, though short in stature compared with the general population, did not differ from the mothers of other mentally handicapped children. In all respects other than maternal height, therefore, this group of children differed considerably from children without physical defects or predisposing illness.
Children whose families had a tendency to low I.Q. (Group 2 in Table IV) differed strikingly from the physically defective group, their predominant features being instability, poverty, freedom from physical defect, and I.Q.s, which, though low, were mostly above the imbecile range. In these characteristics they correspond to the "sub-cultural" group described above.

By the criteria given in Table IV, both the obstetrically abnormal and the premature children (combined in a single group in Table IV) differ from the physiologically defective but closely resemble the "familial" or "sub-cultural" group—indeed ten of them belong to it. The most likely explanation of this association is that women from families of low I.Q. and unstable social background are unduly subject to obstetric abnormality or more prone to bear small babies. Low I.Q. and domestic and occupational instability are associated with low standards of living and poor nutrition which in turn lead to stunted growth, poor obstetric performance, and low birth weight. On this interpretation there is no need to postulate obstetric damage as the cause of mental handicap in this group of children. This does not rule out the possibility of some obstetric damage or that the impaired reproductive efficiency which impedes foetal growth at the same time affects cerebral development.

**DISCUSSION**

The major obstacle to the simple interpretation of data on mental handicap is the intricate interplay of many relevant influences. Social factors affect the physiological efficiency of reproduction, child health, and intellectual development, which are themselves affected by genetic influences and are associated with each other. In these circumstances it seems best to think in terms of processes and interaction rather than of the precise contribution of individual factors.

**INTERRELATION BETWEEN SOCIAL AND GENETIC INFLUENCES.**—This report presents the familiar picture of mentally handicapped children coming from poor unstable families of high fertility and of intermarriage between families containing mentally defective children. This obviously has considerable genetic implications. On the other hand, it can be maintained that the presence of several defectives in each family reflects their similar environmental experience and that the families meet and intermarry because they share a common social and cultural background.

The high degree of residential concentration in slum and slum-clearance areas certainly suggests similarity of background. Common residence in such areas implies other shared characteristics—low
level of living, minimal education, unskilled work, low motivation, restricted access to educational progress and social success, and poorly informed attitudes to nutrition, health, and child care. A network of social relationships is established such that friends and spouses are drawn from within the group and its social and residential fringes, a tendency accentuated by unsympathetic or hostile attitudes among the remainder of the community. A series of sub-cultures based on residence, family, and shared interests are thus established which are inimical to full social, educational, and physical development; they are maintained from within by social and family ties, and from without by the attitude of the community and often by housing policies, and they are reinforced by the entry of persons who for reasons of social background, mental or physical illness, or heredity have acquired a position of low status in the community.

There is also a good deal of outward movement. Some leave because of material pressures such as housing shortage or the demands of a job, and the link with other members of the family and with their social group is weakened by distance and new interests. Others leave because, through education or informal social contact, they are influenced by the values of a wider society and they come to be at variance with the established outlook and habits of their group. Genetic variation in intelligence must also play some part in this process (Penrose, 1950). It would be wrong to assume that the high fertility rates described earlier inevitably imply a commensurate increase in the number of mentally backward or socially unstable individuals.

The majority of the children studied in this inquiry are drawn from poor residential and family backgrounds of this kind (Table IV). Whether the underlying reasons are environmental, heredity, or both, they may reasonably be described as “familial”, for the origin of their defect lies in the history of their families and it does not seem necessary to postulate obstetric abnormalities, illness, or injury as causal factors.

**INTERRELATION BETWEEN FAMILIAL AND OBSTETRIC INFLUENCES.**—The precise demarcation of a group of children whose mental handicap has familial origins is impossible for two major reasons. First, the social and family groups described above are not themselves strictly demarcated but merge at many points with the rest of the community. Secondly, many obstetric abnormalities and childhood illnesses are most likely to occur in the lowest social groups, so that there is inevitably a good deal of overlapping between “familial” and possible obstetric or paediatric factors.

Women in the lower social classes tend, for example, to have high prematurity rates and to be short in stature with malformed pelves which predispose to difficult labour and hence to possible birth injury (Baird, 1952; Illsley, 1955; Thomson, 1959). Tables I and II illustrate clearly how frequently familial factors arise in cases of obstetric abnormality, so that in a given instance the handicap could be attributed to two, three, or more “causes”.

**BIRTH TRAUMA AND PREMATURE.**—The case for intra-uterine or obstetric factors as causes of mental handicap rests largely on the effect of two conditions —birth trauma and prematurity. The possibility of mechanical damage during a difficult delivery is already well recognized, but, on the evidence of the present study, its numerical contribution to the volume of mental handicap is likely to be small. The effect of foetal anoxia is more difficult to estimate, but again the number of cases in which mental handicap should be attributed to this cause appear to be few. Similar findings have recently been reported following a carefully controlled and intensive study of 7-year-old children who were severely asphyxiated at birth (Fraser and Wilks, 1959).

Numerically, prematurity seems a greater potential source of mental handicap. An exceptionally high proportion of the children were 5½ lb. or less at birth. This agrees with the recent findings of Drillien (1958, 1959) in Edinburgh. For various reasons, however, this result should be interpreted with great caution.

(1) If low birth weight causes mental damage, it might be assumed, on the simplest view, that the lower the birth weight, the greater the chance of mental handicap. The present data do not support such a view. Among the premature children born in 1948 and still living in the city in 1959, the highest incidence of mental handicap (seven out of 33 or 21 per cent.) occurred among the children weighing 4½—5 lb. at birth; the 43 children weighing less than 4½ lb. contained only one mentally handicapped child.

The very small baby is in any case a comparatively rare occurrence. In the years 1948–51, 72 live and stillborn babies of 3 lb. or less were found in 10,365 births, and of these only eleven survived the first week of life. Corresponding figures for the years 1956–58 were 83, 9,966, and 10.

(2) Most of the mentally handicapped premature children were 4½ to 5½-lb. babies born at or around term rather than tiny infants expelled very prematurely from the uterus. This suggests defective intra-uterine growth rather than immaturity per se as a possible causal factor.
The results of intelligence tests carried out on primigravidae in the sixth month of pregnancy (see Scott and Thomson (1956) for a description of sampling and testing methods) suggest that, for weights under 7½ lb., birth weight varies directly with maternal intelligence. Prematurity rates were 11·5, 7·8, and 2·1 per cent. for women of under average, average, and over average intelligence respectively (Raven, 1938), the number of persons tested in each group being 95, 142, and 144.

Similar results were obtained using a verbal intelligence test (Wechsler-Bellevue). It seems unlikely that women of low intelligence have a genetic tendency to produce small babies; on the other hand, we know that women of low intelligence are drawn disproportionately from the lower social classes who, because of their poor health and physique, produce an excess of small babies. On these grounds alone we might expect children of low intelligence to have been more frequently small as babies.

Prematurity is associated with many factors which might affect the mental development of the child, e.g. poor maternal health, low maternal I.Q., retarded intra-uterine growth, poor post-natal environment, low standards of maternal care, increased liability to infant illness and hospitalization, restricted cultural environment, etc. The families of mentally handicapped or premature children are socially so highly selected that, without a wealth of information about the general child population, it is impossible to choose adequately matched control cases. Differences in intelligence arising between premature children and matched control cases may well reflect imperfect matching and have no relevance to the effect of birth weight itself. Similar conclusions were reached by Douglas (1960), who found that apparent differences between premature and matched control cases disappeared when due allowance was made for inadequate matching.

Apart from the recognized obstetric risks, such as birth trauma and low birth weight, there may be other, as yet unrecognized, sources of intra-uterine damage, e.g. infectious disease in the mothers. On the whole, however, the total contribution of recognized abnormalities of pregnancy and labour, compared with familial factors, appears to be small.

Surveys of this kind cannot tell us how much is environmental, how much genetic, or what can be done by radical environmental change. Further joint sociological and obstetric studies of pregnancy, and particularly of prematurity, would obviously be helpful, preferably on a larger scale. On the sociological side we need to study family groups and residential concentrations to understand how they become established and perpetuate themselves, how they are reinforced by new entrants, what factors influence the formation of friendships and the selection of spouses, and how members split off from the group. We need, in fact, to study the habitat in which mental handicap appears in its greatest concentrations and the social forces which lead to such concentrations.

**Summary**

All mentally handicapped children born in Aberdeen city in 1948 and still living there in 1958 were identified. The mothers were interviewed and details obtained of their personal history and familial background. Pregnancy and birth records were traced and inspected for obstetric abnormalities. In 58 of the 66 cases, no recognized complications had occurred; cerebral damage could be reasonably inferred in one case; in the remaining seven the link between obstetric abnormality and mental handicap was conjectural. There was a marked excess of children weighing 5½ lb. or less at birth, most of these having been born at or around term and weighing 4½–5½ lb. 21 children had either a physical defect or had suffered a childhood illness of possible relevance.

The families were characterized by very high frequency of marital and occupational instability, poor social conditions, high fertility, low average intelligence, and a previous connexion with the special school. Such characteristics occurred frequently among the premature and obstetrically abnormal, and least among the physically defective group.

The high incidence of obstetric abnormalities and low birth weight among the mentally handicapped is largely the indirect result of the association between obstetric abnormalities and poor maternal health and physique, which are in turn related to poor social conditions and low I.Q. The direct contribution of recognized obstetric complications to the total volume of mental handicap is small.

Many people have contributed to this study. We wish especially to thank Dr. D. Younie and Miss Sangster of the City's Health and Welfare Department, Mr. J. R. Clark, Director of Education, and the staff of Beechwood School, for their help in tracing and studying the children born in 1948; Dr. M. S. Fraser, Child Health Department, University of Aberdeen, and Drs. Z. Stein and M. Susser, University of Manchester, for help and advice; Miss Margaret Milne for the extensive clerical work; and the medical, nursing and records staff of the Aberdeen Maternity Hospital for their provision of reliable obstetric data. Above all, we thank Professor Sir Dugald Baird whose persistent curiosity prompted our inquiry.
REFERENCES
