

FOREWORD

This book tells us of the later achievements of two groups of infants: those who left the uterus too early and those who grew too slowly inside it. They and their mothers have formed part of the Newcastle Survey of Child Development and the Newcastle Maternity Survey, and are drawn from a well-defined geographical region. This is therefore a true population study, and I believe the immensely detailed and sophisticated assessment techniques used make it unique. The authors' conclusions are that, when compared with controls, children in both index groups show some impairment of performance at school age, but that those born too small are at a greater disadvantage than those born too soon. These conclusions have significance for children far beyond Newcastle.

Gerald Neligan died of leukaemia not long after the work was finished. It in no way minimizes the very substantial contributions of his co-authors to say that but for his vision, energy and enthusiasm the work is unlikely ever to have been started or brought to completion. Always anxious to see that clinical research should have practical application, he made many impressive contributions to paediatrics, and particularly to neonatal medicine. We are fortunate indeed that he should have remained well enough and spirited enough to see this last and perhaps his most important survey concluded.

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Preface

As perinatal mortality has fallen during the past 20 years, the quality of the survivors of the neonatal period has become a matter of increasing concern to all those clinically responsible for the care of the fetus before and during delivery, and of the baby during the first minutes, days and weeks after birth. The obstetricians and other doctors concerned with antenatal and perinatal care, the midwives, and the paediatricians concerned with postnatal care, have long been aware that babies of low birthweight have a relatively high risk of being handicapped, more or less severely, if they survive into later childhood. But they have not known whether it is more dangerous for a baby to be born too soon (after too short a period of intra-uterine growth), or to be born too small (as a result of too slow a net rate of intra-uterine growth). Until they know the answer to this question they cannot convert their awareness of the risk into practical actions which are likely to reduce it significantly and so improve the over-all quality of those survivors.

Those members of the community's health and social services who are responsible for the surveillance and fostering of the development of preschool children have a similar problem. They are aware that social and environmental factors are liable to modify this development, either favourably or unfavourably, and suspect that children of low birthweight are particularly susceptible to the effects of such modifying factors. But they do not know whether this applies only to those who are born too soon, or to those who are born too small, or equally to both groups; and they do not know as much as they would like about the nature of the effective components of the environment. Better understanding of these relationships is necessary before valid decisions can be made concerning the types of improvement of the environment which are most likely to be effective, and the particular children who are most likely to benefit from such improvements.

Doctors, psychologists, physiotherapists, speech therapists and others whose work is concerned with assessing the performance of children known or suspected to be suffering from a variety of handicaps are becoming increasingly interested in the possible antecedent factors. Among the perinatal factors which are considered to be possibly relevant, low birthweight is prominent: but it is important to know whether the effects of being born too soon carry the same implications as those of being born too small, and what may be the effect of associated biological and social factors. This knowledge is important not only as a contribution to the diagnosis, but also as a help in deciding about prognosis and the likelihood of response to a particular form of treatment.

We have undertaken this present study, the results of which are reported in this book, as a contribution to the better understanding of the complex relationships involved and in the hope of answering the key question concerning the direct effects (if any) of being born either too soon or too small.

The book begins with an Introduction which places our work in its historical context and suggests why no comparable study has been carried out previously. The first chapter describes the principles according to which we selected our study

population, and the reasons why we believe it to be appropriate for our main purpose of answering the key question. An essential feature of our study population is that it was selected from a much larger, geographically defined, population concerning which basic medical and social information was available. Another feature is that our abnormal groups (in terms of their intra-uterine growth experience) were selected by criteria which were so far from being extreme that their mean birthweights are above the upper limits of most other studies of 'prematurity' or 'low birthweight' (p. 3). The second chapter describes the essential biological characteristics of the groups studied, and the associated biological, social and environmental factors which may be relevant. The next four chapters report the results of the unprecedentedly extensive, detailed and specific series of assessments of the children's performance, carried out when they were five, six and seven years old, under the headings of cognitive functions, behaviour and temperament, neurological findings and physical growth. In each of these chapters simple analyses are included to examine the modifying effects of one biological and one social factor. The conclusions which can be drawn from these relatively simple observations are summarised in Chapter 7, but it is suggested that the main deduction which it is tempting to draw — that it is more harmful to be born too small (some of the effects of intra-uterine malnutrition being irreversible) than to be born too soon (provided postnatal malnutrition is avoided) — requires to be further tested by more complex analyses. The results of such multivariate analyses are reported in the next two chapters. Analysis of covariance is used to compare the strength of the effects of being born too soon with those of being born too small, after allowing for the effects of all the relevant biological and social factors which we have recorded. Multiple regression analysis is then used to identify and grade the effects of the associated factors within the three main groups studied. In Chapters 10 and 11 the over-all results are summarised, first in isolation, then in the context of the relevant literature.

A wide variety of tests was employed in order to achieve comprehensive assessment of the children we studied. It became evident that for the sake of simplicity, clarity and economy, the total information available needed to be pruned radically. We therefore made the following decisions:—

- (1) Not to present negative findings. However, in order not to mislead readers we have specified in one way or another the total number of items examined. For instance, in Table 4.6 (p. 43) we have listed the items in which there were significant differences between groups and we specify that the total items examined numbered 48.
- (2) Not to provide standard deviations except in some total scores.
- (3) Not to provide details of certain examinations and scoring systems, such as those used in Chapter 5.

The above information, which normally belongs in an Appendix, is available on request to the Editors (I.K. and D.S.), who are based at the Nuffield Psychology and Psychiatry Unit, Fleming Memorial Hospital, Newcastle upon Tyne.

This collaborative research project extended beyond our immediate research team, and we would like to acknowledge the generous help of Dr. K. F. Bailey, Deputy Director of Education; Dr. L. F. Mills, Principal Educational Psychologist;

Mr. Brian Shaw, as representing the Medical Officer of Health; and the various Directors of Education and Medical Officers of Health in Newcastle during the course of the study. We are also grateful to the teachers who rated the children's behaviour. The success of such a study, which involved the repeated examination of nearly 400 children in our Unit at the ages of five, six and seven years, depended entirely upon the co-operation of the children and their mothers, and we are most grateful to them. Two of us (I.K. and G.N.) received continued encouragement from Professor Martin Roth and Professor Donald Court, Heads of our respective departments.

The research was originally planned by three of us (I.K., G.N., R.G.) and we were later joined by Mr. D. McI. Scott. The core team consisted of four editors who worked closely together over a period of about six years. Much of the credit for enlisting the co-operation of the families is due to Miss E. G. Tweddle, our full-time research Health Visitor. The major task of computer analysis fell into two parts: the first half was the responsibility of Mr. McNay of the Newcastle Regional Hospital Board, and the subsequent multivariate analyses were organised by Mr. I. Leitch at the University Computer Laboratory.

A number of other collaborators was involved in other aspects of the research which, while not included in this report, constitute important complementary themes. These co-workers are Mr. J. W. Osselton, Senior Lecturer in Electrophysiology, University of Newcastle upon Tyne; Dr. H. I. J. van der Spuy, Senior Lecturer in Psychology, University of Cape Town; and Mrs. E. Scanlon, Senior Speech Therapist, Newcastle Area Health Authority.

Grants for the work were given by the Newcastle Regional Hospital Board.

The burden of the administrative and secretarial work fell on the shoulders of Mrs. L. Mein. Mrs. M. Scott and Mrs. M. Blackburn helped with the typing of the manuscript. In addition, the research team was fortunate to have had the help and support of Mrs. D. Fisher (*nee* Muckle) who spent almost five years helping with a variety of organisational, administrative and clerical tasks in a purely honorary capacity.