http://researchspace.auckland.ac.nz

ResearchSpace@Auckland

Copyright Statement

The digital copy of this thesis is protected by the Copyright Act 1994 (New Zealand).

This thesis may be consulted by you, provided you comply with the provisions of the Act and the following conditions of use:

- Any use you make of these documents or images must be for research or private study purposes only, and you may not make them available to any other person.
- Authors control the copyright of their thesis. You will recognise the author’s right to be identified as the author of this thesis, and due acknowledgement will be made to the author where appropriate.
- You will obtain the author's permission before publishing any material from their thesis.

To request permissions please use the Feedback form on our webpage. http://researchspace.auckland.ac.nz/feedback

General copyright and disclaimer

In addition to the above conditions, authors give their consent for the digital copy of their work to be used subject to the conditions specified on the Library Thesis Consent Form.
Growth and Development of Intellectually Handicapped Children

by

Margaret R Sims

October 1982

A thesis presented to the Department of Anthropology, Auckland University for the degree of Doctor of Philosophy
FORRESTERS LAW: In a complex social system, the obvious, commonsense solution to a problem will turn out to be wrong most of the time.
ACKNOWLEDGEMENTS

I owe many people thanks for their help with this research. First I would like to thank the New Zealand Society for the Intellectually Handicapped for their permission to work in several of their Preschool/Special Care Centres. The staff at these Centres were always obliging and prepared to spend time to assist me. I would like to thank them all. To the parents of all the children I also present my thanks. They all expressed keen interest in the study and were prepared to spend time with me every assessment when I needed them. To the children themselves I give a big vote of thanks. They welcomed me back each time with a smile.

I would like to thank my supervisors, Dr G Bridgman and Dr G Tunnell. They both worked very hard to help get this thesis into its final form. To Geoff especially I want to say thanks for all the over-time put in.

The statistical analyses in this thesis were only possible because of clear and patient advise from Mr Steve Black. I want to thank you Steve, for all the time you spent advising and teaching me the correct way to approach statistics. I also owe thanks to the staff of the Computer Centre. Without their help I would never have been able to cope with all the computing in this thesis. I would specially like to thank Mr Russell Fulton for his patient help with my computing problems.

I thank Mr Marc Rackley who wrote the programme to convert the raw nutrition data into nutrient intakes per day. Thank you Marc. You did a job for me that I could never have done myself and I appreciate that.

I would also like to thank Mr Reg Croawell who kindly donated the paper for this thesis. Your support was greatly appreciated Reg.
ABSTRACT

There have been no studies in New Zealand designed to investigate the effectiveness of the major "systems-based" intervention programme available for intellectually handicapped children; the service offered by the New Zealand Society for the Intellectually Handicapped. The Society does not have a standardised programme running in all its Preschool/Special Care Centres throughout the country. However, the Auckland branch developed a formalised approach to programming and teaching in 1979. This study attempted to determine the effectiveness of this new approach in terms of the children it was designed to benefit. It was found that children attending Auckland Preschool/Special Care Centres did show greater rates of progress than children attending Preschool/Special Care Centres outside Auckland for a variety of different skills. For Downs Syndrome children these were self-help, cognitive and language skills. For motor-delayed multihandicapped children the skills were self-help and language. These differences persisted when differences between the social and environmental backgrounds of the children from Auckland and outside Auckland were controlled for.

It was also found that Downs Syndrome, motor-delayed multihandicapped and normal children showed different rates of progress for motor, socialisation, cognitive/academic and language skills. Rates of progress were not different for self-help skills although the absolute level of achievement was significantly different for the three populations.

The three groups of children showed different rates of growth in a variety of physical measurements, and different absolute sizes in several others. Downs Syndrome children have shorter limbs than either of the other two groups of children. They also have the narrowest jaws and a small thorax. Motor-delayed multihandicapped children have the smallest limb diameters but have the longest faces.
Downs Syndrome, motor-delayed multihandicapped and normal children differ in several ways in their social and environmental backgrounds. Parents of Downs Syndrome children are older than parents of the other two groups. Mothers of intellectually handicapped children are less likely to have a job than mothers of normal children. Different health records are evident between the three populations. Normal children tend to be seen as more healthy by their parents. Intellectually handicapped children tend to have less ascorbic acid in their diet than normal children.

Downs Syndrome children are more susceptible to minor environmental fluctuations than motor-delayed multihandicapped or normal children. The cumulative effect of this hostile environment can be seen in their short stature and smaller overall body dimensions compared to normal children.

Motor-delayed multihandicapped children do not show the same reaction to the environment as Downs Syndrome children. In this more severely handicapped group, the effect of the motor and intellectual handicap over-rides any effect the environment might have. However, nutritional intake is closely related to physical growth in these children. This is because in most cases exercise does not mediate between nutritional intake and physical growth.

* * * * * * *
# TABLE OF CONTENTS

## CHAPTER 1

**INTRODUCTION** ............................................. 1

1.1 THE NEW ZEALAND SOCIETY FOR THE
    INTELLECTUALLY HANDICAPPED. .................. 1

1.1.1 Preschool/Special Care Centres .......... 4

1.2 GROWTH AND DEVELOPMENT OF THE
    INTELLECTUALLY HANDICAPPED. .................. 6

1.2.1 Downs Syndrome ............................... 8

1.2.2 Motor-delayed multihandicapped .......... 12

1.2.3 Normal children. ............................. 13

1.3 RELATIONSHIP BETWEEN PHYSICAL AND
    MENTAL GROWTH. ................................ 14

1.4 SOCIAL, ENVIRONMENTAL AND NUTRITIONAL
    INFLUENCES. ....................................... 16

1.5 ORGANISATION OF THESIS .......................... 17

## CHAPTER 2

**DATA COLLECTION.** ........................................ 19

2.1 THE SAMPLE ........................................... 19

2.2 THE ANTHROPOMETRIC MEASUREMENTS .......... 23

2.2.1 Growth and normal children .............. 25

2.3 THE PSYCHOLOGICAL ASSESSMENTS. .............. 31

2.3.1 IQ tests and normal children ............. 37

2.4 THE QUESTIONNAIRE DATA. ...................... 39

2.4.1 The growth questionnaire .................. 39

2.4.2 The Interview Questionnaire ............... 40

2.4.3 The Preschool/Special Care Centre
    Questionnaire. ............................... 42
CHAPTER 3
SOCIAL/ENVIRONMENTAL INFLUENCES ON GROWTH AND DEVELOPMENT. ........ 44

3.1 INTRODUCTION ............................................. 44

3.2 BIOLOGICAL AND SOCIAL VARIABLES. .................... 44
3.2.1 Birth order and family size. ......................... 44
3.2.2 Birth weight and gestation ......................... 46
3.2.3 Parents' heights and weights ...................... 48
3.2.4 Parental ages. ..................................... 50
3.2.5 Socioeconomic Status ................................. 51
3.2.6 Demographic Patterns ............................... 55
3.2.7 The effect of biological/social variables on growth and development. ...... 63

3.3 HEALTH .................................................... 73
3.3.1 Introduction ............................................ 73
3.3.2 Demographic patterns ............................... 73
3.3.3 Relationship of health to growth and development. ................ 74

3.4 MOTHERS' AGE AT MENARCHE ......................... 80
3.4.1 Introduction ............................................ 80
3.4.2 Demographic patterns ............................... 81
3.4.3 Relationship between mothers' age at menarche and growth and development. .... 81

3.5 CONCLUSIONS. ............................................. 83

CHAPTER 4
NUTRITION. .................................................... 87

4.1 INTRODUCTION ............................................. 87

4.2 SOCIOECONOMIC PATTERNS IN FOOD CONSUMPTION .... 89
4.2.1 Analyses ............................................... 92
4.2.2 Results and Discussion ............................. 92

4.3 COMPARISON WITH OTHER NUTRITIONAL STUDIES. ...... 104
4.3.1 Results and Discussion ............................. 105
4.4 POPULATION DIFFERENCES IN NUTRITION .............................................. 108
4.4.1 Analysis ...................................................................... 109
4.4.2 Results and Discussion .................................................. 109

4.5 ANTHROPOMETRY AND NUTRITIONAL STATUS ......................... 117
4.5.1 Analysis .................................................................. 118
4.5.2 Results and Discussion .................................................. 119

4.6 CONCLUSIONS .................................................................. 127

CHAPTER 5

PRESCHOOL/SPECIAL CARE SERVICE ................................................. 133
5.1 INTRODUCTION .................................................................. 133

5.2 ANALYSES ..................................................................... 140

5.3 RESULTS AND DISCUSSION .................................................. 141

5.4 CONCLUSIONS .................................................................. 150

CHAPTER 6

DATA REDUCTION .................................................................. 152

6.1 THE SUBSAMPLES ................................................................. 154
6.1.1 Method .................................................................... 154
6.1.2 Conclusions ................................................................. 162

6.2 PRINCIPAL COMPONENTS ANALYSIS ........................................ 163
6.2.1 Birth. ........................................................................ 163
6.2.2 Schooling. ................................................................. 164
6.2.3 Socioeconomic Status .................................................... 166
6.2.4 Nutrition. ................................................................. 167
6.2.5 Health .................................................................... 167

6.3 REGRESSION .................................................................. 169
6.3.1 Regression 1 ............................................................... 170
6.3.2 Regression 2 ............................................................... 172

6.4 COVARIATES .................................................................. 175
### TABLES

Table 2.1 Comparison of normal sample with Auckland standards .......... 26
Table 2.2 Comparison of New Zealand standards with school-aged children from this study ........ 30
Table 2.3 Correlations between the tests ............... 37
Table 2.4 Correlation coefficients between test/retest for nutrition variables ............ 42
Table 3.1 Family size in percentages .................. 56
Table 3.2 Birth order (sibrank) in percentages ............ 57
Table 3.3 Birth weight and gestation in percentages ............ 57
Table 3.4 Problems of pregnancy or birth in percentages .......... 57
Table 3.5 Parental factors .................. 60
Table 3.6 Socioeconomic Status in percentages .......... 60
Table 3.7 Education of parents by population in percentages .......... 61
Table 3.8 Income of parents in early 1979 in percentages .......... 62
Table 3.9 Standardised regression coefficients .......... 65
Table 3.10 Health ratings in percentages .......... 75
Table 3.11 Standardised discriminant coefficients for function 1: health rating and psychological test scores .......... 77
Table 3.12 Means of variables within each health category .......... 77
Table 3.13 Standardised discriminant function coefficients for function 1: health category and physical variables .......... 78
Table 3.14 Means of variables within each health category .......... 78
Table 3.15 Age of mother at menarche ............... 81
Table 3.16 Standardised discriminant coefficients for function 1: mothers age at menarche and the psychological test scores .......... 82
Table 6.6 Means for variables in significant discrimination... 162
Table 6.7 Principal components for birth... 164
Table 6.8 Principal components for schooling... 165
Table 6.9 Principal components for socioeconomic status... 166
Table 6.10 Principal components for nutrition... 167
Table 6.11 Principal components for health... 168
Table 6.12 Anthropometric categories... 169
Table 6.13 Regression 1 results... 171
Table 6.14 Regression 2 results... 173
Table 7.1 ANOVA Table for Bayley/Stanford-Binet... 180
Table 7.2 ANOVA Table for Motor... 181
Table 7.3 ANOVA Table for Self-help... 182
Table 7.4 ANOVA Table for Socialisation... 183
Table 7.5 ANOVA Table for Cognitive... 184
Table 7.6 ANOVA Table for Language... 191
Table 7.7 ROP's and DQ's for Downs Syndrome... 191
Table 7.8 Apetite ratings for the 12 Downs Syndrome children. In %... 194
Table 7.9 Eating problems for 12 Downs Syndrome. In %... 195
Table 7.10 ANOVA Table for MDMH Bayley... 196
Table 7.11 ANOVA Table for MDMH Motor... 197
Table 7.12 ANOVA Table for MDMH Self-help... 197
Table 7.13 ANOVA Table for MDMH Socialisation... 198
Table 7.14 ANOVA Table for MDMH Cognitive... 198
Table 7.15 ANOVA Table for MDMH Language... 199
Table 7.16 ROP's and DQ's for motor-delayed multihandicapped... 199
Table 8.1 age means for the 3 populations... 203
Table 8.2 ANOVA Table for Bayley/Stanford-Binet... 204
Table 8.3 ANOVA Table for motor skills... 204
Table 8.4 ANOVA Table for self-help skills... 205
Table 8.5 ANOVA Table for socialisation skills... 205
Table 8.6 ANOVA Table for cognitive skills... 206
Table 8.7 ANOVA Table for language skills... 206
Table 8.8 DQ's and ROP's... 207
Table 8.9 ANOVA Table of body bulk... 212
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fig 2.1</td>
<td>Age by IQ.</td>
<td>35</td>
</tr>
<tr>
<td>Fig 4.1</td>
<td>Calories</td>
<td>111</td>
</tr>
<tr>
<td>Fig 4.2</td>
<td>Proteins</td>
<td>111</td>
</tr>
<tr>
<td>Fig 4.3</td>
<td>Riboflavin</td>
<td>113</td>
</tr>
<tr>
<td>Fig 4.4</td>
<td>Ascorbic Acid.</td>
<td>113</td>
</tr>
<tr>
<td>Fig 4.5</td>
<td>Vitamin A.</td>
<td>115</td>
</tr>
<tr>
<td>Fig 4.6</td>
<td>Calcium</td>
<td>115</td>
</tr>
<tr>
<td>Fig 7.1</td>
<td>Downs Syndrome cognitive scores</td>
<td>185</td>
</tr>
<tr>
<td>Fig 7.2</td>
<td>Downs Syndrome language scores</td>
<td>185</td>
</tr>
<tr>
<td>Fig 7.3</td>
<td>Downs Syndrome self-help scores</td>
<td>187</td>
</tr>
<tr>
<td>Fig 7.4</td>
<td>Motor-delayed multihandicapped self-help scores</td>
<td>187</td>
</tr>
<tr>
<td>Fig 7.5</td>
<td>Motor-delayed multihandicapped cognitive scores</td>
<td>189</td>
</tr>
</tbody>
</table>