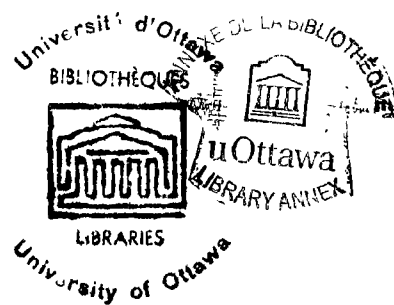


000971
CSF 2

**BODY BUILD AND INTELLIGENCE IN CONGENITAL
ACROMICRIA SYNDROME**

by **Fay Ching-Fai Tang**

**Thesis presented to the School of
Psychology and Education of the
University of Ottawa as partial
fulfillment of the requirements
for the Master of Arts degree in
Psychology**



Ottawa, Canada, 1963

UMI Number: EC55411

INFORMATION TO USERS

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleed-through, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

UMI[®]

UMI Microform EC55411
Copyright 2011 by ProQuest LLC
All rights reserved. This microform edition is protected against
unauthorized copying under Title 17, United States Code.

ProQuest LLC
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106-1346

ACKNOWLEDGMENTS

This thesis was prepared under the supervision of Professor Maurice Chagnon, Ph.D., of the School of Psychology and Education of the University of Ottawa.

The writer wishes to express her indebtedness to Dr. H.F. Frank, Superintendent of the Ontario Hospital, Smiths' Falls, Ontario, for his permission to use the mongoloid patients of this institution as subjects in the study. She wishes also to extend her thanks to Dr. D. Gibson, former Chief Psychologist of the hospital, and to many staff members for their assistance to make this study possible.

Gratitude is also expressed to Professor Polly Johnson of the School of Psychology and Education of the University of Ottawa for her invaluable assistance and encouragement.

CURRICULUM STUDIORUM

The writer was born November 12, 1935, in Canton City, China. She received the Bachelor of Science degree in Psychology from the National Taiwan University, Taiwan, China, in 1958.

TABLE OF CONTENTS

Chapter	page
INTRODUCTION	vi
I.- REVIEW OF THE LITERATURE	1
1. Nature of Mongolism	1
2. Previous Research	8
3. Summary and Hypothesis of Research	14
II.- EXPERIMENTAL DESIGN	16
1. The Sample	16
a. Selection	16
b. Description	20
2. Experimental Procedures	22
3. Analysis: Statistical Techniques	22
III.- PRESENTATION, DISCUSSION, SUMMARY AND CONCLUSIONS. .	26
1. Presentation	26
2. Discussion, Summary and Conclusions	31
BIBLIOGRAPHY	34
Appendix	
1. ABSTRACT OF <u>Body Build and Intelligence in</u> <u>Congenital Acromicria Syndrome</u>	37
2. DESCRIPTION OF THE TOTAL MONGOLOID POPULATION OF THE ONTARIO HOSPITAL, SMITHS' FALLS, ONTARIO, CANADA	39

LIST OF TABLES

Table	page
I.- Means and Standard Deviations of the Weight/Height Ratios of 258 Mongoloids Distributed by Sex and by Age	18
II.- Significance of the Differences Between the Means and the Standard Deviations of Male and Female Mongoloids Distributed by Age . . .	19
III.- Means and Standard Deviations of the Weight/Height Ratios of Each Age Group of the Population and the Number of Mongoloids Selected to Constitute the Sample Groups.	21
IV.- Means and Standard Deviations of the Weight/Height Ratios, I.Q.'s, and Ages of the Heavier and Lighter Mongoloids	23
V.- Significance of the Difference of the Means of the I.Q. of the Heavier and Lighter Groups of Mongoloids	27
VI.- A Chi Square Solution on the Relationship Between I.Q. and Weight/Height Ratio.	28
VII.- Percentages of the Heavier and Lighter Mongoloids Who Have High or Low I.Q.'s.	29
VIII.- Significance of the Differences Between Percentages of Mongoloids Who Have High and Low Weight/Height Ratios and High I.Q.'s and Mongoloids Who Have High and Low Weight/Height Ratios and Low I.Q.'s.	30
IX.- Range, Mean and Standard Deviation of Age of the Total Mongoloid Population	40
X.- Range, Mean and Standard Deviation of I.Q. of the Total Mongoloid Population	41
XI.- Range, Mean and Standard Deviation of Weight/Height Ratio of the Total Mongoloid Population.	42

INTRODUCTION

The problem of mongolism is an old one. Its syndrome was roughly described as a form of cretinism by Séguin as early as 1843. The condition was clearly recognized and described as a clinical type of mental deficiency by J. Langdon Down¹ in England in 1866. He gave it its famous name - mongolism. Since then, the problem of mongolism has been the subject of many investigations. The emphasis on research in this area in the past has been mostly from the medical point of view. A large majority of the investigators tended to study its physical characteristics, physiological conditions; such as metabolism, biochemistry, central nervous system, et cetera, and birth order, maternal age, heredity, and other factors in order to discover its etiology and the methods of treatment. There were relatively few studies of a psychological nature. Studies of the relationship of psychological behavior and body build in mongolism have been absent. On the basis of empirical observations, many authors have pointed out that the majority of mongoloid patients are short and obese, but that a few are slender and wiry in build. It was suggested that there probably

¹ J. Langdon Down, "Observations on Ethnic Classification of Idiots", Clinical Lectures and Reports of the London Hospital, 1866, p. 259-262.

existed a relationship between the physical appearance and intelligence in mongoloids. The present study was set up to: 1) check the preceding hypothesis; and, 2) to add to the few psychological studies of mongolism.

Two groups of mongoloids of different body builds, the heavier and the lighter, are compared as to the level of mental abilities.

The first chapter discusses the nature of mongolism and reviews the literature which leads to the formulation of the research hypothesis.

Chapter two is concerned with an explanation of the procedures used in the selection of the sample population, and a description of this sample. The statistical methods used in the analysis of the data are described.

Chapter three is a presentation and discussion of the obtained results. Suggestions for further research are included in the conclusions.

CHAPTER I

REVIEW OF THE LITERATURE

1. Nature of Mongolism.

Mongolism is a state of mental deficiency, a form of infantilism, and a growth disorder with specific patterns which are manifested at the time of birth and become more definite as life goes. Among every thousand newborn babies two or three are mongoloids. They account for six to ten per cent of all mental deficiency.

The condition was first described as a form of cretinism by Séguin in 1843. Langdon Down gave it its famous name-- mongolism in 1866 in England, because of the superficial resemblance of the facial features of the mongoloid to the features of members of the Mongolian race.¹ The choice of this name proved to be unfortunate: it led many investigators astray in studying the pathology and etiology of the condition. Many doctors thought that mongolism was "a regression to the Mongolian race, a pathological racial mutation"² or "a throwback to a previous ancestral type, and

1 J. Langdon Down, "Observations on Ethnic Classification of Idiots", Clinical Lectures and Reports of the London Hospital, London, 1866, p. 259-262.

2 Clemens E. Benda, Mongolism and Cretinism, Grune & Stratton, N.Y., 1946, xv-310 p.

that it occurs in stocks in which there is an infusion of Mongolian blood."³ They doubted the possibility of treatment and usually delayed treating these patients until nothing could be done.

Mongolism is always associated with mental deficiency. It is clearly a pathological and not a racial condition: it is found in all races and even in the Mongolian race itself. It occurs in the children of the rich and the poor, the old and the young, the intelligent and those of limited mental capacities, and it is found practically in all parts of the world. Benda said, "It seems to happen without any rule, out of the blue sky".⁴

As mongolism is present at birth, it is assumed that it develops in the prenatal period. The patients' underdeveloped extremities are caused by the poor growth of the bony structures. This malformity leads to the use of the term acromicria, which was first introduced by Schüller in 1907, and used later by Clife in 1922, by Benda in 1949, by Goldstein in 1954.⁵ Acro means end-point, micros means

³ F.G. Crookshank, The Mongol in Our Midst, E.P. Dutton & Co., N.Y., 1924, 123 p.

⁴ Clemens E. Benda, The Child with Mongolism, Congenital Acromicria, Grune & Stratton, N.Y., 1960, xvi-276 p.

⁵ Hyman Goldstein, "Congenital Acromicria Syndrome", Archives of Pediatrics, Vol. 73, No. 4, 1956, p. 115-124.

small. The term describes the appearance of the long bones of mongoloids under X-ray. The character of growth deficiency indicates that the name of congenital acromicria syndrome is well chosen.

The chief abnormalities of this syndrome affect the head, eyes, nose, tongue, hands, feet and stature. Its typical physical characteristics are:

1. Small skull (equal to about a four year old at maturity).
2. Broad and flat face.
3. Almond-shaped eyes.
4. Flat nose.
5. Thick lips with fissures.
6. Long and thick tongue with fissures. The oral cavity appears to be too small for it.
7. Dry, rough skin, and appears to be too large for the body.
8. Short extremities.
9. Flat and flabby hand, short and slightly cone shaped fingers, little fingers curve inward.
10. Big gap between the big toe and the second toe.
11. Transverse palmar line on either hand.
12. Round and lacks the formation of an arch foot. The foot soles show transverse wrinkles. 6,7,8

6 J.E. Wallace Wallin, Children with Mental and Physical Handicaps, Prentice-Hall, N.Y., 1949, vii-527 p.

7 L.S. Penrose, The Biology of Mental Defect, Sidgwick & Jackson, Ltd., London, 1949, xiv-285 p.

8 J. Øster, Mongolism, Ejnar Munksgaard, Copenhagen, 1953, 205 p.

Penrose concluded that "any defective with four or more of these characteristics is almost certainly a mongol".⁹

The majority of mongoloids are short and obese, but a few are slender and wiry in build, although undersized. Every organ system of a newborn patient of this kind is immature. At birth the height of most of the mongoloid children is within the normal range. The weight is lower than normal but falls within the normal limits during the following three years. The increase in weight becomes more noticeable at the age of five, and most of the mongoloid children are overweight after that time. As age increases, the mongoloid features become more conspicuous, the defects become more prominent. This is due not to an increasing development of the pathological features but to a lack of normal development. Every part of the body is underdeveloped or maldeveloped. The result is an ill-finished child who is eternally deprived of maturation in mind and body.¹⁰

The mental condition of mongoloids is almost similar to their physical condition. The mental ages of an average group of mongoloid patients, including all ages, range between two and five years in Benda's record. Most authors

⁹ Penrose, Op. Cit.

¹⁰ Benda, Op. Cit.

agree that the mental level of mongoloids varies throughout the idiot and imbecile range. Their I.Q. is generally under forty. A mental age of seven years is their upper limit of intellectual development.^{11,12}

The motor, speech, and sensory development are generally very slow. Each step in the development takes a long period.

Socially, mongoloid children are always described as lovable, cheerful, and easily managed. But this is not the whole truth because the contrary has also been found.¹³

They have a marked tendency to imitate. They appear to be very fond of music. Most of them appear to be more intelligent than they actually are. In Prototzky's study it was found that the mean social age of twenty-one cases was three years and four months above the mean mental age. The mean social age of the mongoloid children was one year and three months above the mean social age of non-mongoloid defective patients.¹⁴

11 C. Prototzky, A.E. Grigg, "A Review of the Prognosis in Mongolism", American Journal of Orthopsychiatry, Vol. 12, 1942, p. 503-511.

12 K. Brousseau and H.G. Brainerd, Mongolism, A Study of the Physical and Mental Characteristics of Mongolian Imbeciles, Baltimore, Williams and Wilkins, 1928, viii-210 p.

13 William L. Wunsch, "Some Characteristics of Mongoloids Evaluated in a Clinic for Children with Retarded Mental Development", American Journal of Mental Deficiency, Vol. 62, 1957, p. 122-130.

14 Prototzky, Op. Cit.

On the basis of his empirical observations, Goldstein divided the mongoloids into two groups:

1. The first group would be predominantly thyroid deficient. The subjects were described as short, atonic of muscle, having wide facial features, pudgy hands and feet and a higher I.Q.
2. The second would be predominantly pituitary gland deficient. Subjects had taller, thinner bodies, and a lower I.Q. They were more restless and had a greater degree of emotional disturbance.¹⁵

Later, Hallenbeck, in reviewing Goldstein's statement, says:

It would be interesting to see some research which examined the variables of intelligence level, body build, physical stigmata and degree of emotional disturbance in the same group. If these hypotheses are credible, better counselling of the parents raising a mongoloid child would be at least one result.¹⁶

The statements of these two preceding authors lead to the development of the hypothesis which this study attempts to check.

In the literature, a great deal of work has been done on the etiology and the cause of the mongoloid condition.

¹⁵ Goldstein, Op. Cit.

¹⁶ Phyllis N. Hallenbeck, "A Survey of Recent Research in Mongolism", American Journal of Mental Deficiency, Vol. 64, No. 5, 1960, p. 827-834.

There are three main theories. Mongolism would be due to:

1. The defect or damage of the germ plasm, either paternal or maternal;
2. Hereditary factors;
3. A noxious factor which originates in the mother during gestation.¹⁷

The authors of these theories are convinced that mongolism is hereditary. However, this is debatable because mongolism fails to logically affect both identical twins.¹⁸

The finding of an extra chromosome in mongoloids was announced by Jacobs in 1959.¹⁹ It was rapidly confirmed by Ford and many others.²⁰ The presence of this extra chromosome has become the most consistent diagnostic sign in mongolism. Carr believes that "the disease probably results from this".²¹

17 Albert Franklyn Newman, An Investigation of the Relation Between Physical Stigmata Frequency and Intellectual Status in Mongolism, unpublished M.A. thesis, University of Toronto, Toronto, Canada, April 1960, 30 p.

18 Abraham Friedman, "Mongolism in Twins", American Journal of Disease Child, Vol. 90, 1955, p. 43-50.

R. Warner, "Mongolism in One of Twins and in Another Sibling", American Journal of Disease Child, Vol. 78, 1949, p. 575-588.

19 P.A. Jacobs, "The Somatic Chromosomes in Mongolism", Lancet, Vol. 1, No. 7075, April 1959, p. 710.

20 C.E. Ford, "The Chromosomes in a Patient Showing Both Mongolism and the Klinefelter Syndrome", Ibid., p. 709-710.

21 D.H. Carr, "A 13-15/21 Translocation Chromosome in Carrier Father and Mongol Son", Canadian Medical Association Journal, Vol. 87, No. 16, Oct. 1962, p. 852-858.

2. Previous Research.

A review of the literature reveals that the emphasis in research on mongolism has been mostly on the medical aspects of the problem. There have been relatively few studies of a psychological nature. The previous researches which have some relationship with the present study will now be mentioned.

Gibson's²² study to detect any systematic relationship between the number of physical stigmata (degree of mongolism) and intelligence used thirty-two cases: 16 females and 16 males. The age ranged from four to twenty-one years. Fourteen diagnostic signs of mongolism were used:

1. cephalic index (.83 or greater)
2. four-finger furrow
3. short fifth finger
4. one flexion furrow on the fifth digit
5. epicanthus
6. furrowed tongue
7. flattened occiput
8. lobule absent
9. prominent ears
10. malformed ears
11. large space between first and second toe

²² D. Gibson, Robert J. Gibbins, "The Relation of Mongolian Stigmata to Intellectual Status", American Journal of Mental Deficiency, Vol. 63, No. 2, 1958, p. 345-348.

12. short broad head
13. crooked fifth digit
14. nostrils facing forward

The subjects were placed into three groups according to age:

1. from age 4 to 9 (N = 11) the mean number of stigmata was 6.7
2. from age 10 to 15 (N = 15) the mean number of stigmata was also 6.7
3. from age 16 to 21 (N = 6) the mean number of stigmata was 7.3.

The 1937 revision of the Stanford-Binet Scale and the Kuhlmann Scale were used in the measurement of intelligence.

A significant coefficient of correlation of .42 was found between number of physical stigmata (degree of mongolism) and intellectual level: the greater the number of mongoloid features the subject possessed the more intelligence he manifested on an intelligence test. There was no significant correlation between chronological age and I.Q. and chronological age and physical stigmata.

Gibson's study was reviewed and criticized by Johnson²³ three years later in 1961. The smallness of the

²³ Carl D. Johnson, D. Charles Barnett, "Relationship of Physical Stigmata to Intellectual Status in Mongoloids", American Journal of Mental Deficiency, Vol. 66, No. 3, 1961, p. 435-437.

sample was criticized. It was also pointed out that many of the physical diagnostic signs in mongolism vary with the subject's age. The presence or absence of a relationship between intelligence and mongoloid signs would be partly a function of the chronological age range of the sample population. The lack of an objective criteria for assessing the various physical stigmata in mongolism was mentioned, though it was admitted that this was the common difficulty with research in this area.

Johnson carried out a similar research which was directed towards shedding further light on Gibson's findings by using a larger sample group. He used eighty-eight mongoloids: 37 males and 51 females. Their ages ranged from six years and six months to 45 years and 9 months with a mean of 21 years and 1 month. Their mental age on the Stanford-Binet ranged from twenty-four months to 72 months with a mean of 43 months. Their I.Q. ranged from fourteen to 40 with a mean of 26 points. There was no sex difference in intelligence.

Twenty-three physical signs were used in Johnson's study, 14 of them were similar to those used by Gibson and 9 others were added:

1. hypertrophy of tongue papillae
2. flat inside dental ridge
3. slanting palpebral fissures of eyes
4. plantar gap

5. short, broad neck
6. dry, fissured lips
7. high-arched palate
8. plantar furrow
9. transverse palmar line (one or both hands).

Johnson found a correlation of .05 and of .02 between number of stigmata and I.Q. and chronological age respectively.

Neither of the above findings was significant at the .05 level of confidence. There would be no significant relationship between the number of physical diagnostic signs and the intelligence of mongoloid patients.

Johnson's findings were supported by Cant's²⁴ findings in the study of a fourteen year old girl who appeared to be a typical mongol but whose I.Q. on the Terman was 116. The author suggested that mongoloid stigmata were not always associated with mental retardation.

Dunsdon²⁵ arrived at the same conclusion as Johnson and Cant. He estimated that the upper limit of the range of mongoloid intelligence was higher than what was generally

24 W.H.P. Cant, J.W. Gerrard, B.W. Richards, "A Girl of Mongoloid Appearance and Normal Intelligence", Journal of Mental Science, Vol. 99, 1953, p. 560-563.

25 M.I. Dunsdon, C.O. Carter, "Upper End of Range Intelligence in Mongolism", Lancet, Vol. 1, 1960, p. 565-568.

accepted. Fifty-two mongoloid children were selected and a group of 390 mongoloid patients who had attended schools for the mentally retarded, private schools, and primary schools. The age of the majority of the children was between eight years six months and 14 years 5 months. A few ranged in age from sixteen years to 17 years 7 months. The obtained I.Q.'s ranged from nineteen to 68. There was no sex differences in intelligence.

Kääriäinen and Dingman²⁶ had the same finding as Johnson, Cant and Dunsdon.

Gibson's findings were supported by Newman²⁷ who tested forty mongoloid patients: 21 males and 19 females. Their ages ranged from seven to 28 years with a mean of 15. Their results on the Stanford-Binet, 1937 revision, intelligence test ranged from seven to 28 I.Q. points with a mean of approximately 15. Fifteen mongoloid diagnostic signs which were similar to Gibson's were used.

Newman found a positive significant relationship between the number of physical stigmata in mongolism and intellectual level, but there was no significant relationship between chronological age and stigmata frequency and chronological age and intellectual level. Though female mongols

²⁶ Risto Kääriäinen, Harvey F. Dingman, "The Relation of the Degree of Mongolism to the Degree of Subnormality", American Journal of Mental Deficiency, Vol. 66, No. 3, 1961, p. 438-443.

²⁷ Newman, Op. Cit.

were significantly brighter than the males, there was no sex difference in the stigmata occurrence.

Nakamura²⁸ did a study on the nature of institutionalized adult mongoloid intelligence. He used sixty-four patients: 35 males and 29 females. Their age ranged from sixteen to 63, with a mean of 27.9 years and a standard deviation of 8.9. Their mental age ranged from 1.7 to 5.8 years, with a mean of 3.5 years and a standard deviation of 1.1. The range of I.Q.'s which were obtained on the Stanford-Binet Form L was from twelve to 39 with a mean of 23.2 and a standard deviation of 6.9. There was no significant sex difference in intelligence. The relationship between chronological age and I.Q. was zero. It was also found that at the age of thirty-one and above, there were relatively few mongoloids with an I.Q. above 21.

Nakamura's study was criticized by Sternlicht because of the mental ages that were reported. The lowest mental age on the Stanford-Binet is two years but Nakamura obtained mental ages of 1.7 years in his study.

Sternlicht²⁹ did a study similar to Nakamura's for the purpose of cross-validation and he used sixty-four

²⁸ Hiromu Nakamura, "Nature of Institutionalized Adult Mongoloid Intelligence", American Journal of Mental Deficiency, Vol. 66, No. 3, 1961, p. 456-458.

²⁹ Manny Sternlicht, Zev W. Wanderer, "Nature of Institutionalized Adult Mongoloid Intelligence", American Journal of Mental Deficiency, Vol. 67, No. 2, 1962, p. 301-302.

institutionalized mongoloid adults: 35 males and 29 females. They were all over sixteen years of age and randomly selected.

Sternlicht presented as his findings the following:

1. The mean age of his sample patients was 27 years, with a standard deviation of 8.5 years.
2. The mean mental age was 3.5 years with a standard deviation of approximately one year.
3. The mean I.Q. was about 24, with a standard deviation of 7.5.
4. Ranges of chronological age, I.Q., and mental age were almost identical in the two different sex groups.

Sternlicht felt that his findings were limited to his samples.

3. Summary and Hypothesis of Research.

Mongolism is a state of congenital mental deficiency and has been found in all races, at all social, economic and intellectual levels, and in practically every part of the world. In the literature, mongolism is studied mainly from a medical point of view. Only a few studies were of a psychological nature. There was no research similar to the present study with regard to the body build and the intellectual status in mongolism. The statements of Goldstein

and of Hallenbeck and the empirical observations of many others are at the origin of the problem considered in our study: the relationship between body build and intelligence in congenital acromicria syndrome.

We plan to investigate the following hypothesis: congenital acromicria patients of a heavier body build do not differ significantly in intelligence from congenital acromicria patients of a lighter body build.

The purposes of the present study are:

1. to provide a basis for prediction of later intellectual ability from early anthropometric measures;
2. to clarify a hypothesis on "types" of mongolism;
3. to confirm Goldstein's clinical observation, as a basis for differential handling;
4. to offer an alternate approach to the earlier studies of Gibson and Gibbins and others on the relation of intellectual status to the physical anomalies of mongolism.

CHAPTER II

EXPERIMENTAL DESIGN

In order to test the hypothesis presented at the end of the first chapter, it was necessary to find two groups of mongoloids of different body build. The principles of selection and the description of the sample is to be found in the first section of this chapter. This is followed by a description of the experimental procedures and of the statistical techniques used in the analysis of the data.

1. The Sample.

a. Selection.- The sample population was selected from a total hospital population of 258 defectives, 146 males and 112 females of the mongoloid type from the Ontario Hospital, Smiths' Falls, Ontario, Canada.¹ All had been diagnosed as mongoloids by members of the hospital medical staff on the basis of mongolism's commonly accepted physical and intellectual characteristics.^{2,3}

1 This population is described in Appendix 2, p.39-42

2 J. Øster, Mongolism, Ejnar Munksgaard, Copenhagen, 1953, 205 p.

3 L.S. Penrose, The Biology of Mental Defect, Sidgwick & Jackson, Ltd., London, 1949, xiv-285 p.

On admission to the hospital, each patient had a routine admitting medical examination. From the records, the age, sex, weight and height of each mongoloid patient was obtained. About six weeks after their arrival at the hospital, the patients were seen by the Psychology Department for psychological assessment. The intellectual level (I.Q.) of each mongoloid patient was obtained from the psychological report on file which used either the 1937 revision of the Stanford-Binet Scale or the Gesell Scale.

Two groups of mongoloids of different body build were to be selected. As an index of body build, it was decided to use a weight/height ratio. With this formula the mongoloids of heavier body build get the higher ratios.

The total 258 mongoloid patients were distributed in age groups by sex with a class interval of twenty-four months. Table I gives means and standard deviations of the weight/height ratios of each of these groups.

In order to know if male and female mongoloids could be combined in the same sample, t tests of differences between the means and standard deviations of the weight/height ratios of the two groups were calculated. The formula for the comparison of uncorrelated groups was used. Table II shows the majority of differences were not significant at an .05 level. Thus the sex factor could be ignored and male and female mongoloids could be combined in the same sample.

Table I.-

Means and Standard Deviations of the Weight/Height Ratios of
258 Mongoloids Distributed by Sex and by Age.

C.A. Months	No. of Patients		Mean		s	
	Male N:146	Female N:112	Male	Female	Male	Female
5 - 29	15	18	.62	.66	.129	.17
30 - 54	19	18	.88	.79	.264	.09
55 - 79	31	17	.93	.91	.127	.183
80 - 104	32	13	1.09	1.09	.131	.145
105 - 129	19	11	1.21	1.11	.274	.265
130 - 154	14	11	1.38	1.40	.019	.287
155 - 179	9	10	1.80	1.83	.434	.426
180 - 204	4	5	1.84	1.68	.274	.841
205 - 229	1	4	1.97	1.96		.456
230 - 254	1	1				
255 - 279		2				
330 - 354	1					
405 - 429		2				

Table II.-

Significance of the Differences Between the Means and the Standard Deviations of Male and Female Mongoloids Distributed by Age.

C.A. Months	t	
	Mean	δ
5 - 29	-.8	1.72
30 - 54	1.2	8.677 ^a
55 - 79	.44	2.12
80 - 104	0	1.24
105 - 129	.96	1.02
130 - 154	-.289	4.3 ^b
155 - 179	-.14	1.01

a Significant at .01 level.

b Significant at .05 level.

The means and standard deviations of the weight/height ratios of each age group were computed. Each patient's weight/height ratio was compared to the mean in order to find out how far each of them deviated from the mean. All the patients (both sexes) in each age group were arranged on a scale according to their deviation from the mean, from the biggest plus deviation to the biggest minus deviation. The mongoloids with positive deviations were of a heavier body build than the mean while those with negative deviations were of a lighter body build than the mean.

The two sample groups were made up of the upper and lower quarters of each distribution of each age group. Table III shows how many mongoloids were selected in each of the age groups of the total population.

Heavy and light mongoloids of each age group were combined to form the two samples required for the testing of the hypothesis.

b. Description.- Each of the sample groups was composed of sixty-one mongoloid patients. In the heavier group, there were twenty-six females and 35 males. Ages ranged from eighteen months to 208 months, I.Q.'s from twelve to 67 points and weight/height ratios from .74 to 3.13.

The mean age was 92.23 months with a standard deviation of 49.99 months. The mean I.Q. was 33.62 with a standard deviation of 10.77. The mean weight/height ratio was 1.375 with a standard deviation of .5203.

Table III.-

Means and Standard Deviations of the Weight/Height Ratios of Each Age Group of the Population and Number of Mongoloids Selected to Constitute the Sample Groups.

C.A.	Total Population			Mongoloids	
	N	Mean	δ	Heavier N:61	Lighter N:61
5 - 29	33	.64	.154	8	8
30 - 54	37	.84	.203	9	9
55 - 79	40	.92	.150	12	12
80 - 104	45	1.09	.135	11	11
105 - 129	30	1.17	.274	7	7
130 - 154	25	1.39	.217	6	6
155 - 179	19	1.82	.430	5	5
180 - 204	9	1.75	.208	2	2
205 - 229	5	1.96	.408	1	1

In the lighter group there were thirty females and 31 males. Ages ranged from five months to 212 months, I.Q.'s from nine to 58 points, and weight/height ratios from .35 to 1.46.

The mean age was 87.16 months with a standard deviation of 53.27 months. The mean I.Q. was 27.95 with a standard deviation of 12.13. The mean weight/height ratio was .85 with a standard deviation of .27. Table IV contains the above-mentioned data.

2. Experimental Procedures.

The data for age, weight, height, sex, and I.Q. of all the mongoloid patients at the hospital were taken from the file. This information was used to select the mongoloids in the way that was described previously in order to form the two sample groups.

3. Analysis: Statistical Techniques.

A first check of the research hypothesis will be possible through the comparison of the means of I.Q.'s of the heavier and of the lighter mongoloids. The *t* test of the significance of the difference of the means will be used. As two uncorrelated samples of equal size are being compared, the following formula is chosen:

Table IV.-

Means and Standard Deviations of the Weight/Height Ratios,
I.Q.'s, and Ages of the Heavier and
Lighter Mongoloids.

Variables	Heavier Mongoloids N:61 (M:35, F:26)		Lighter Mongoloids N:61 (M:31, F:30)	
	Mean	?	Mean	?
W/H Ratio	1.38	.52	.85	.27
I.Q.	33.62	10.77	27.95	12.13
Age	92.23	49.99	87.16	53.27

$$t = \sqrt{\frac{M_1 - M_2}{\frac{\sum x_1^2}{N_1} + \frac{\sum x_2^2}{(N_1 - 1)}}$$

As direction of the difference is predicted, the one tail test will be used.

Because extreme groups were chosen, test of the relationship between the two variables could not be made using correlational techniques. The χ^2 technique will, however, be used to test the distribution of mongoloids in 2 x 2 table. The formula chosen is:

$$\chi^2 = \frac{N(ad - bc)^2}{(a+b)(a+c)(b+d)(c+d)}$$

Goldstein's hypothesis concerning the relationship of body build and intelligence can be expressed thus:

(1) among the high I.Q.'s there should be a greater number of high weight/height ratios than of low weight/height ratios; (2) among the low I.Q.'s there should be a greater number of low weight/height ratios than of high weight/height ratios.

The accuracy of these statements will be checked by finding the significance of the difference of the percentages of high and low weight/height ratios that have a high I.Q. and the significance of the difference of low and high weight/height ratios that have a low I.Q. The following

formula will be used:

$$\bar{Z} = \frac{P_1 - P_2}{\sqrt{\frac{P_1 q_1}{N_1} + \frac{P_2 q_2}{N_2}}}$$

The cutting score of the high and low I.Q. is the mean I.Q. of the two sample groups combined, 30.786.

CHAPTER III

PRESENTATION, DISCUSSION, SUMMARY AND CONCLUSIONS

The object of this study was to study the relationship between intelligence and body build in two groups of mongoloid patients. The result of this study presented in the first part of this chapter will be discussed and summarized in the second part. The conclusions will include suggestions for further research.

1. Presentation.

In comparing the means of the I.Q.'s of the two sample groups of mongoloid patients a t of 2.71 is obtained. This is significant at more than .01 level of confidence. The data is presented in Table V. A χ^2 of 3.279 is obtained, which is significantly different between .10 and .05 level. The data is presented in Table VI. The percentage of the heavier mongoloids who have high I.Q.'s is fifty-nine, of the lighter mongoloids who have high I.Q.'s is forty-three. The percentage of the heavier mongoloids who have low I.Q.'s is forty-one, of the lighter mongoloids who have low I.Q.'s is fifty-seven. The data is presented in Table VII. Table VIII shows that the significance of the differences between percentages of mongoloids who have high and low weight/height ratios and high I.Q.'s and mongoloids

Table V.-

Significance of the Difference of the Means of the I.Q. of
the Heavier and Lighter Groups of
Mongoloids.

Groups	N	M	δ	D_M	t_M	P
H	61	33.62	10.77			
L	61	27.95	12.13	5.67	2.71	>.01

Table VI.-

A Chi Square Solution on the Relationship Between I.Q.
and Weight/Height Ratio.

		I. Q.		Sum
		High	Low	
W/H Ratio	High	36	25	61
	Low	26	35	61
Sum		62	60	122 - N

Table VII.-

Percentages of the Heavier and Lighter Mongoloids Who
Have High or Low I.Q.'s.

W/H Ratio	I. Q.'s				Total	
	High		Low			
	N	%	N	%	N	%
High	36	59	25	41	61	100
Low	26	43	35	57	61	100

Table VIII.-

Significance of the Differences Between Percentages of Mongoloids Who Have High and Low Weight/Height Ratios and High I.Q.'s and Mongoloids Who Have High and Low Weight/Height Ratios and Low I.Q.'s

I.Q.'s	W/H Ratios		D	D/ δ d	P
	High	Low			
High	59	43	16	1.79	.04
Low	41	57	16	1.79	.04

who have high and low weight/height ratios and low I.Q.'s is significant at an .04 level of confidence.

2. Discussion, Summary and Conclusions.

The research hypothesis of this study: congenital acromicria patients of a heavier body build do not differ significantly in I.Q. from congenital acromicria patients of a lighter body build was only partially rejected by the above findings.

The findings partly confirm Goldstein's empirical observation: there is a tendency for shorter and fatter mongoloids to have a higher I.Q. than those of taller and thinner bodies. However, in predicting I.Q. from body build in two extreme groups, forty-two per cent of the total group would be incorrectly identified. Therefore it must be remembered that though a trend exists, individual diagnosis and prognosis would not reach a high level of accuracy.

The lack of total agreement between the various tests of significance suggests the following interpretation. Though the number of false positives and false negatives is relatively high, i.e., forty-two per cent, the mean I.Q.'s of the correctly classified high and low mongoloids are sufficiently distant one from the other to arrive at a significant t .

Goldstein associated other variables with the two considered in this study. Heavier and lighter subjects would suffer from thyroid deficiency and be emotionally more stable while lighter and less intelligent subjects would have pituitary disturbance and be more restless. Further research should consider these variables and establish the relationship between each of the three.

Past studies on the relationship of physical factors and intelligence in mongolism have considered the number of physical stigmata and I.Q. Contradictory results have been reported. Further research could consider simultaneously body build, number of stigmata and intelligence.

Body build was operationally defined as weight/height ratio. It may be that this index is too coarse to discriminate between the two types referred to by Goldstein. Further work could be done with other criteria. More complex measurements could be made using a Sheldonian type of approach.

The data reported in Table I¹ and Benda's² work suggest that weight/height ratios increase with age. Further studies could consider the problem of the possible changes in I.Q. in relation to changes in weight/height ratios.

1 See Table 1, page 18.

2 Clemens E. Benda, The Child With Mongolism. Congenital Acromicria, Grune & Stratton, N.Y., 1960, xvi-276 p.

The possible studies mentioned above would throw further light on the central problem considered in the present work: the relationship between physical characteristics and intelligence in cases of congenital acromicria.

ANNOTATED BIBLIOGRAPHY

Benda, Clemens E., Mongolism and Cretinism, Grune & Stratton, N.Y., 1946, xv-310 p.

The author describes different aspects of the condition of mongolism and cretinism.

-----, The Child With Mongolism, Congenital Acromicria, Grune & Stratton, N.Y., 1960, xvi-276 p.

This book contains some of the material in the author's 1946 edition and a review of almost twenty-five years of research. It is the first single presentation based on more than a thousand clinical observations of different aspects of the problem of mongolism.

Brousseau, K, and H.G. Brainerd, Mongolism, A Study of the Physical and Mental Characteristics of Mongolian Imbeciles, Baltimore, Williams and Wilkins, 1928, viii-210 p.

A description of the physical and mental characteristics of mongolism.

Cant, W.H.P., J.W. Gerrard, E.W. Richards, "A Girl of Mongoloid Appearance and Normal Intelligence", Journal of Mental Science, Vol. 99, 1953, p. 560-563.

A study of the relationship between I.Q. and mongoloid physical stigmata.

Carr, D.H., "A 13-15/21 Translocation Chromosome in Carrier Father and Mongol Son", Canadian Medical Association Journal, Vol. 87, No. 16, October 1962, p. 852-858.

A study of chromosomes in mongolism.

Down, J. Langdon, "Observations on Ethnic Classification of Idiots", Clinical Lectures and Reports of the London Hospital, London, 1866, p. 259-262.

The first work to describe and name the condition of mongolism.

Dunsdon, M.I., C.O. Carter, "Upper End of Range Intelligence in Mongolism", Lancet, Vol. 1, 1960, p. 565-568.

A study of the upper limit of the range of mongoloid intelligence.

Ford, C.E., "The Chromosomes in a Patient Showing Both Mongolism and the Klinefelter Syndrome", Lancet, Vol. 1, No. 7075, April 1959, p. 710.

A study of chromosomes in mongolism.

Friedman, Abraham, "Mongolism in Twins", American Journal of Disease Child, Vol. 90, 1955, p. 43-50.

A study of mongolism in identical twins.

Gibson, D., Robert J. Gibbins, "The Relation of Mongolism Stigmata to Intellectual Status", American Journal of Mental Deficiency, Vol. 63, No. 2, 1958, p. 345-348.

A study of the relationship between I.Q. and mongoloid physical stigmata.

Goldstein, Hyman, "Congenital Acromicria Syndrome", Archives of Pediatrics, Vol. 73, No. 4, 1946, p. 115-124.

The hypothesis of the present study was drawn from this paper.

Hallenbeck, Phyllis N., "A Survey of Recent Research in Mongolism", American Journal of Mental Deficiency, Vol. 64, No. 5, 1960, p. 827-834.

The author suggests ways of testing Goldstein's original hypothesis.

Jacobs, P.A., "The Somatic Chromosomes in Mongolism", Lancet, Vol. 1, No. 7075, 1959, p. 710.

A first report on the finding of an extra chromosome in mongoloids.

Johnson, Carl D., D. Charles Barnett, "Relationship of Physical Stigmata to Intellectual Status in Mongoloids", American Journal of Mental Deficiency, Vol. 66, No. 3, 1961, p. 435-437.

Kääriäinen, Risto, Harvey F. Dingman, "The Relation of the Degree of Mongolism to the Degree of Subnormality", American Journal of Mental Deficiency, Vol. 66, No. 3, 1961, p. 438-443.

The last mentioned two articles study the relationship between I.Q. and mongoloid physical stigmata.

Nakamura, Hiromu, "Nature of Institutionalized Adult Mongoloid Intelligence", American Journal of Mental Deficiency, Vol. 66, No. 3, 1961, p. 456-458.

A study on the nature of institutionalized adult mongoloid intelligence.

Newman, Albert Franklyn, An Investigation of the Relation Between Physical Stigmata Frequency and Intellectual Status in Mongolism, unpublished M.A. thesis, University of Toronto, Toronto, Canada, April 1960, 30 p.

A study of the relationship between I.Q. and mongoloid physical stigmata.

Øster, J., Mongolism, Ejnar Munksgaard, Copenhagen, 1953, 205 p.

Mongolism is discussed from the physical and biological points of view.

Penrose, L.S., The Biology of Mental Defect, Sidgwick & Jackson, Ltd., London, 1949, xiv-285 p.

Mental deficiency is discussed from the point of view of human biology. Mongolism is considered as hereditary and the physical diagnostic signs are described.

Prototzky, C., A.F. Grigg, "A Review of the Prognosis in Mongolism", American Journal of Orthopsychiatry, Vol. 12, 1942, p. 503-511.

A study of social behavior in mongoloids.

Sternlicht, Manny, Zev W. Wanderer, "Nature of Institutionalized Adult Mongoloid Intelligence", American Journal of Mental Deficiency, Vol. 67, No. 2, 1962, p. 301-302.

A study on the nature of institutionalized adult mongoloid intelligence.

Wallin, J.E. Wallace, Children With Mental and Physical Handicaps, Prentice-Hall, N.Y., 1949, vii-527 p.

A description of mental and physical characteristics of mongolism.

Warner, R., "Mongolism in One of Twins and in Another Sibling", American Journal of Disease Child, Vol. 78, 1949, p. 573-588.

A study of mongolism in identical twins and siblings.

Wunsch, William L., "Some Characteristics of Mongoloids Evaluated in a Clinic for Children with Retarded Mental Development", American Journal of Mental Deficiency, Vol. 62, 1957, p. 122-130.

A study of the mongoloid temperament.

APPENDIX 1

ABSTRACT OF

Body Build and Intelligence in Congenital
Acromicria Syndrome

APPENDIX 1

ABSTRACT OF

Body Build and Intelligence in Congenital Acromicria Syndrome¹

The present study attempts to test Goldstein's hypothesis that there is a relationship between body build and I.Q. in congenital acromicria.

Two extreme mongoloid groups differing in body build were used. Body build was operationally defined as the weight/height ratio. The 122 mongoloids, residents of the Ontario Hospital, Smiths' Falls, ranged in age from eighteen months to 208 months.

A t of 2.71, ($p > .01$) was obtained when comparing the mean I.Q.'s of the two groups. Using the dimensions of higher and lower I.Q., heavier and lighter body build, a $2 \times 2 \chi^2$ table was set up. The results ($\chi^2 = 3.279$, $p > .10$, $< .05$) were not significant at an acceptable level of confidence. The difference between the percentages of mongoloids with high and low weight/height ratios having higher I.Q. was significant at the .04 level of confidence ($D/\delta^d = 1.77$).

¹ Fay, C.F. Tang, Master thesis presented to the School of Psychology and Education of the University of Ottawa, Ontario, Canada, May 1963, vii-42 p.

The various tests of significance would justify a partial rejection of the research hypothesis: congenital acromicria patients of a heavier body build do not differ significantly in intelligence from congenital acromicria patients of a lighter body build.

In extreme groups there is a tendency for heavier mongoloids to have higher I.Q.'s. However, the percentage of false positives and false negatives is such (42) that individual diagnosis and prediction would be inefficient.

The author suggests further research: the use of more refined criteria of body build, the inclusion of other variables such as glandular disturbances, degrees of restlessness and social adequacy.

APPENDIX 2

DESCRIPTION OF THE TOTAL MONGOLOID POPULATION
OF THE ONTARIO HOSPITAL, SMITHS' FALLS,
ONTARIO, CANADA

APPENDIX 2

The sample for the present study was drawn from a population, the characteristics of which are given in the following tables.

Table IX.-
Range, Mean and Standard Deviation of Age of the Total
Mongoloid Population.

Mongoloid	N	Range	Mean	δ
Total	258	5 months-35.41 years	8.04	5.18
M	146	6 months-21.41 years	7.64	3.94
F	112	5 months-35.41 years	8.57	6.41

Table X.-
Range, Mean and Standard Deviation of I.Q. of the Total
Mongoloid Population.

I.Q.	N	Range	Mean	σ
Total	258	9 - 60	30.79	10.50
M	146	10 - 57	30.39	10.68
F	112	9 - 60	31.32	11.84

Table XI.-

Range, Mean and Standard Deviation of Weight/Height
Ratio of the Total Mongoloid Population.

W/E Ratio	N	Range	Mean	σ
Total	258	.35 - 3.13	1.12	.46
M	146	.48 - 2.29	1.10	.38
F	112	.35 - 3.13	1.15	.54