A Study of School Adjustment as Related to Certain Physical and Psychological Characteristics Possessed by Male Students at the Louisiana State School for the Deaf.

Benjamin Louis Ruhl

Louisiana State University and Agricultural & Mechanical College

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A STUDY OF SCHOOL ADJUSTMENT AS RELATED TO CERTAIN PHYSICAL AND PSYCHOLOGICAL CHARACTERISTICS POSSESSED BY MALE STUDENTS AT THE LOUISIANA STATE SCHOOL FOR THE DEAF

A Dissertation

Submitted to the Graduate Faculty of the Louisiana State University and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Doctor of Education

in

The Department of Health and Physical Education

by

Benjamin Louis Ruhl
B.S., Louisiana State University, 1940
M.S., Louisiana State University, 1950
January, 1962
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This study is dedicated to the memory of the late Superintendent John S. Patton whose interest in and appreciation of the contributions of physical education, athletics, and recreation led to the development of a full scale program at the Louisiana State School for the Deaf.

Indebtedness is acknowledged to the faculty and staff and, particularly, to Mrs. Lillian R. Jones, principal, of the Louisiana State School for the Deaf without whose cooperation this study would not have been possible.

Acknowledgement is made to the dissertation committee for guidance and to Dr. Francis Drury, chairman, who was always available for consultation and whose knowledge of and interest in the deaf contributed a great deal to the organization of this study.

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ABSTRACT

The purpose of this study was to determine the relationships, by multiple regression techniques, between school adjustment and certain psychological and physical characteristics of 108 male residential students at the Louisiana State School for the Deaf between the ages of ten and nineteen.

The factors used as criteria were: adjustment ratings by teachers, dormitory supervisors, the principal, and the total of these ratings. Factors used as predictors were: age, motor quotient index, physical fitness index, incidence of hospital visits, athletic success ratings, and grade achievement index.

Age was obtained from school records. Motor quotient index was measured by McCloy's Motor Capacity Test; the physical fitness index was based on the American Association for Health, Physical Education, and Recreation Physical Fitness Test; incidence of hospital visits was taken from school hospital records. The athletic success rating was determined in conference by coaches, physical education instructors, and the investigator. Grade achievement index was based on Stanford Achievement test scores obtained from school records. Computations were made on an IBM 1620 computer at the Louisiana State University Computer Center.

Multiple correlation between total adjustment and the predictors was .65; for teachers' adjustment ratings, .57; for supervisors'
adjustment ratings, .44; and for the principal's adjustment ratings, .59. All of these were significant at the one per cent level of confidence.

Grade achievement contributed most to the variance in total adjustment ratings, teachers' adjustment ratings, and principal's adjustment ratings and also made considerable contribution to the variance in supervisors' adjustment ratings. Athletic success made the greatest contribution to variance in supervisors' adjustment ratings. Incidence of hospital visits, although small, was the most consistent contributor to variance in all of the adjustment ratings. Physical fitness index and motor quotient index made no appreciable contribution to variance of the adjustment ratings but did have small significant positive correlation with total adjustment ratings, teachers' adjustment ratings, and principal's adjustment ratings and substantial positive correlation with athletic success ratings and grade achievement index. Age made no contribution to any of the criteria.

Intercorrelations between grade achievement index, athletic success, physical fitness index, and motor quotient index were all moderate to high. The highest intercorrelations with predictors and adjustment ratings were between grade achievement and athletic success, ranging from .27 to .55. Incidence of hospital visits had small negative intercorrelations with all variables, indicating a decreased ability with increased incidence of hospital visits.

Means of physical fitness index and motor quotient index were on a level with comparable hearing groups, but grade achievement index
indicated an achievement level about forty-two per cent of comparable public school groups.

Prediction would have been almost as effective using grade achievement index, athletic success ratings, and incidence of hospital visits as it was with six variables.

Summary

Grade achievement, athletic success, incidence of hospital visits, physical fitness index, and motor quotient index were all significantly related to adjustment of students.

Different factors were more important to adjustment in the classroom and out of class, although success or achievement was important in both areas.

Scholastic achievement, athletic success, physical fitness, and motor quotient were all moderately to highly correlated, and all of these had significant correlations with total adjustment ratings.

Regression coefficients indicated grade achievement was most important in prediction of total adjustment ratings, principal's adjustment ratings, and teachers' adjustment ratings, but athletic success was most important in prediction of supervisors' adjustment ratings.
CHAPTER I

INTRODUCTION

The Louisiana State School for the Deaf is a state supported institution. Students are provided room and board, books, laundry, and minor medical care. The school population consists of children from all over the state, most of whom begin school at the age of six or seven and remain at the school until the age of eighteen or nineteen. The curriculum consists of the academic subjects generally found in the public schools of the state with at least one hour of physical education daily and the added vocation subjects: printing, woodworking, shoe repairing, upholstering, laundering, typing, IBM machine operation, beauty culture, and art. Upon completion of school at the Louisiana State School for the Deaf, a small percentage (less than five per cent a year) attend Gallaudet College in Washington which is the only college for the deaf in the world. The majority of the school population comes from middle or lower income brackets, and most of the parents are engaged in skilled or semi-skilled trades.

A survey of the hearing loss of students at the Louisiana State School for the Deaf,¹ made in 1959 by Mrs. Lillian R. Jones, principal,

¹Unpublished report to the Superintendent.
as shown in Tables I and II, showed the percentage of hearing loss of students as well as age at onset of deafness.

The first school years of a deaf child at the Louisiana State School for the Deaf are a series of frustrations; a laborious process of attempting to develop a means of communication with a hearing world. In addition to these frustrations, the deaf children are deprived of the love and attention of their parents—parents who quite often over-protected them from a very early age. There is no way of measuring the effects of this separation and these frustrations on the child.

Institutions of all types have certain limitations and restrictions. Regimentation, to some extent, is essential in such group living. Considerable restriction of freedom, a planned program of activity, restricted social relationship between the sexes, almost constant supervision, and a generally narrower opportunity for new experiences are inherent. These limitations have their effect upon the students at the Louisiana State School for the Deaf. The most obvious effects observed are immature reaction to frustration, failure to accept responsibility for their own behavior, uncooperativeness, and disregard for the rights of others.

It is only through education that the deaf may hope to achieve personal, social, and economic efficiency. Their educational needs require that those responsible for their education have a thorough understanding of the handicap and consider it a privilege to help them. The deaf must be encouraged to develop their potentials. To help them do this, a greater insight into their abilities must be sought as well as a better means to develop these abilities. Education of the deaf cannot be
### TABLE I

**PERCENTAGE OF HEARING LOSS OF STUDENTS AT THE LOUISIANA STATE SCHOOL FOR THE DEAF**

<table>
<thead>
<tr>
<th>Percent of Hearing Loss</th>
<th>Number of Pupils</th>
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<tbody>
<tr>
<td>100</td>
<td>85</td>
</tr>
<tr>
<td>90 - 100</td>
<td>51</td>
</tr>
<tr>
<td>80 - 90</td>
<td>33</td>
</tr>
<tr>
<td>70 - 80</td>
<td>23</td>
</tr>
<tr>
<td>60 - 70</td>
<td>17</td>
</tr>
<tr>
<td>50 - 60</td>
<td>11</td>
</tr>
<tr>
<td>40 - 50</td>
<td>4</td>
</tr>
<tr>
<td>30 - 40</td>
<td>2</td>
</tr>
<tr>
<td>Loss due to psychogenic causes</td>
<td>6</td>
</tr>
<tr>
<td>Not tested</td>
<td>58</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>290</strong></td>
</tr>
</tbody>
</table>

### TABLE II

**AGE AT WHICH STUDENTS AT THE LOUISIANA STATE SCHOOL FOR THE DEAF LOST HEARING**

<table>
<thead>
<tr>
<th>Age at Which Hearing Lost</th>
<th>Number of Pupils</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth or prior to one year</td>
<td>205</td>
</tr>
<tr>
<td>Between 3 1/2 and 5 1/2 years</td>
<td>5</td>
</tr>
<tr>
<td>After 5 1/2 years</td>
<td>6</td>
</tr>
<tr>
<td>After 13 years</td>
<td>32</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>248</strong></td>
</tr>
</tbody>
</table>

Note: 42 students were classified as hard of hearing.
approached with a closed mind following the easy beaten path of tradition but new ways and means of developing their abilities through better understanding must be sought. This study was undertaken for the purpose of obtaining understanding of some factors which might assist in improving school adjustment of the deaf.

The purpose of this study was to determine the relationships of the factors of age, motor quotient index, physical fitness index, incidence of hospital visits, athletic success, and grade achievement with the student's adjustment as determined by judgmental ratings of their home room teachers, dormitory supervisors, and the principal. Intercorrelations were determined between these factors--factors which were considered of importance in the students' life at the school and, therefore, should be instrumental in influencing their adjustment.
CHAPTER II

REVIEW OF RELATED LITERATURE

Review of the literature included four main groupings: (1) material concerned with the scope, nature, and unique problems due to deafness, (2) comparative studies of deaf and hearing groups; (3) similar studies made with hearing groups; (4) material from disciplines outside the field of physical education which makes some contribution to the total problem of deafness.

**Scope, Nature, and Unique Problems Due to Deafness**

According to a 1940-1950 census under the auspices of the Public Health Service and Office of Vocational Rehabilitation, Department of Health, Education and Welfare¹ there were 188,100 deaf in the United States (95,300 male and 92,800 female) and 2,385,000 deaf and hard of hearing. Approximately fifty-three per cent of the hard of hearing are sixty-five years of age or older.

Public education facilities were first provided for the deaf in the United States in 1817. There are now seventy-one public residential schools, ten public day schools, two hundred six public day classes, and

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sixty-one private and denominational residential and day centers with an enrollment of 25,525. Since World War II, speech and hearing clinics have flourished. There are now 396 of these clinics in the United States.

Frisina stated: "Improved medical techniques, earlier detection and developmental deviations, and a steady increase in the general population apparently have been reflected in the number of multiple handicapped, hearing impaired children." There was a total of 2820 reported from public and private residential schools and special classes. Frisina further stated that the number of hearing handicapped individuals seemed to be increasing, possibly as a result of general population increase and improved prenatal and postnatal medical techniques; thus, many multiple handicapped children survive who otherwise would have died.

Frisina cited these statistics: incidence of hearing impairment in the age range of forty-five years and older includes eighty-five to ninety per cent of all those with hearing impairment; approximately ten per cent of the population over sixty-five have hearing impairments; and approximately .5 per cent of the population between the ages of five and seventeen years have hearing problems of communicative or educative significance.

There are three main classifications of the deaf in the United States: (1) hard of hearing—with less than average loss of sixty-five decibels; (2) the partially deaf with hearing losses between sixty-

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\(^2\) Frisina, ibid., p. 268. \(^3\) Ibid., pp. 266-269.

five and eighty decibels; (3) the profoundly deaf with hearing losses exceeding eighty decibels.

At the thirty-eighth meeting of the American Instructors of the Deaf in 1957, these definitions were made: the deaf—those in whom the sense of hearing is non-functional for the ordinary purposes of life; the hard of hearing—those in whom the sense of hearing, although defective, is functional with or without a hearing aid.

Hearing covers a range of about 120 decibels and is more acute at about 3000 cycles per second. The ear connects with the brain by means of neurons which are activated when their threshold of stimulation is reached. This stimulation is on an all-or-none basis. The Organ of Corti is the nerve center which connects with the central nervous system and provides interpretation and response to sound.

Hearing loss may be due to mechanical, nerve impairment, or certain psychological conditions which affect hearing. Aphasia—loss or impairment of the ability to speak or understand spoken language; Agnosia—inability to interpret properly sensory stimuli as symbols; and Apraxia—inability to willfully carry out muscular acts.

In reviewing the literature, no studies of the deaf were found involving all of the factors considered in this study and none for the purpose of determining relationships among these factors. In the period 1897 to 1955 there were only eight doctoral dissertations and twenty-one

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5John R. Pierce and Edward E. David, Jr., Man's World of Sound (Garden City: Doubleday and Co., 1958), Chap. VII.
masters' theses listed in the **Index of the American Annals of the Deaf** that were related to any phase of this study. The majority of the studies were concerned with speech therapy, teaching methods, comparative studies with hearing groups, and general educational problems. The *American Annals of the Deaf* is the official organ of the Conference of Executives of American Schools for the Deaf which makes periodic surveys of publications of the deaf.

There will be greater variation in personal and social adjustment between individuals within a particular group than there will be between comparable groups. However, the deaf do seem to have an unusually high incidence of adjustment problems. This may be due to lack of understanding or counselling. The following is a report made to the thirty-eighth meeting of the American Instructors of the Deaf:

> While our general population survey to date has yielded a preliminary rate of about .08% deaf in the state [N.Y.], the rate of deaf in mental hospitals is three times as high, and in state schools for mental defectives, twenty times as high.

In 1959, Dr. Milton Brutten reported:

> ...by the very nature of the handicap of deafness this child is more prone to emotional disturbances. We need first

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of all to classify these children into characteristic groupings which are identifiable by behavior patterns, test results, emotional and social problems, academic achievement, and the child's general relationship to his environment.

Rainer and Kallman\(^\text{10}\) stated that there is a critical lack of adequate statistical data and general scientific information regarding the emotional problems of the deaf, the range of their adjustment levels under varying socioeconomic and cultural levels, their specific developmental needs, and the way they deal with family problems. Specialized facilities for dealing with the deaf are lacking everywhere.

A series of studies was conducted at the Louisiana State School for the Deaf from 1953 to 1957 and reported to the section on Physical Education and Recreation in Residential Schools for the Deaf at the thirty-eighth meeting of the American Instructors of the Deaf.\(^\text{11}\)

One of these studies was a comparison of YMCA Athletic Achievement scores made in 1953-54 and in 1956-57 to determine the effectiveness of the physical education program as reflected by test scores. Forty-five male students from physical education classes were used as subjects. The difference between the means of test scores made in 1953-54 and in 1956-57 was determined, and the significance of that difference was assessed by means of the t test. The 1953-54 mean of 116 was at the first quartile of the test standards, and the 1956-57 mean of 202 was at the median. The difference between the means was at the one per cent level of significance.

\(^{10}\)Rainer and Kallman, *loc. cit.*

Another study in this series compared static balance of a group in 1954 and in 1957 to determine whether or not practice on the balance test during this period and increased age would affect scores on the static balance test used. The S. Roy Heath test of static balance was used. Fifty-two male physical education students between the ages of ten and fifteen (at time of first test) were subjects. The t test was used to determine difference between the means in 1954 and in 1957. There was no significant difference between the mean of 102.75 in 1954 and that of 103.75 in 1957. Conclusions were that increased age and practice on the test used did not affect balance as measured by these tests and within the limits of the study.

**Summary.** The articles and studies considered in this section included a 1950 census of the deaf reporting 188,100 deaf, 348 schools, and 25,525 students in the United States and an increase of multiple handicapped children. One study gave physical and psychological disorders as causes of deafness. A report to the thirty-eighth meeting of the Instructors of the Deaf cited adjustment as a major problem. Two studies in Louisiana found normal physical achievement but poor balance.

**Studies Comparing Deaf and Hearing Groups**

Whereas the deaf will have unique problems, it is necessary that their achievements and adjustments approximate those of hearing groups. They must compete and live in a society in which they are a very small minority. The following studies are concerned with various aspects of the deaf and how they compare with hearing groups in relation to the factors studied.

A comprehensive survey of schools for the deaf and deaf students
was made in 1942 by Day, Fusfeld, and Pintner under the auspices of the National Research Council. This survey included more than fifty per cent of the deaf students attending school and schools from all of the geographical sections of the country.

The Pintner non-language and Pintner educational tests were administered to 4,432 of the students involved in the survey. They were from various geographical sections and from both day and residential schools. The results of these tests showed that twenty-five per cent of the subjects were dull or backward in intelligence, fifty per cent were normal, and twenty-five per cent were bright or very bright. Comparisons with a hearing group of 1000, equated according to socioeconomic status, indicated that the deaf were approximately two years below the hearing group on mental age and four to five years retarded on the educational level. The indications of this study were that the deaf were achieving educationally what they were capable of achieving, and that none of the three general methods of instruction—oral, combined oral and manual, or manual—seemed superior when intelligence was taken into account.

Brunschwig conducted a study for the purpose of determining the relationship between scores of deaf children on a self-descriptive questionnaire and such variables as age, intelligence test results,

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amount of hearing, age at hearing loss, and group differences between deaf and hearing groups. A personality questionnaire was included. Brunschwig also compared responses of the deaf and hearing groups on particular items of the questionnaire to determine unique patterns of the deaf. The deaf subjects used for the study were 141 boys and forty-two girls from a public residential school; hearing subjects were 190 boys and 156 girls from three public elementary schools. The groups were matched according to racial national background and socioeconomic status. In sections these groups were administered the Personality Inventory for Deaf Children (devised by the author from Roger's test of personality). The deaf subjects used were restricted to those who evidenced no difficulty in understanding the test items. They were, on the average, three years older than the hearing subjects used. In addition to the personality test, the Haggerty-Olsen-Wickman Behavior Rating Schedules, forms A and B, were filled out by the teachers and supervisors for the deaf group.

Relationships were determined between the groups by means of correlation techniques and critical ratios. The author concluded from the study that relationships between test results and variables of age, intelligence, amount of hearing, and age at becoming deaf were slight and not reliable in most cases. The deaf indicated more maladjustment than the hearing in general adjustment, social adjustment, school adjustment, and home adjustment with the most pronounced difference in social adjustment. There was much overlapping on comparative item analysis between self-expressed feelings and attitudes of the deaf and hearing.
Welles conducted a study with a hard of hearing group of 196 women and twenty-nine men and a hearing group of 131 women and seventeen men for the purpose of determining group differences in terms of personality measures such as emotionality, self-sufficiency, introversion, extroversion, and dominance and submission. He also checked agreement upon certain test items to determine if certain problems could be classified as peculiar to the deaf. Personality assessment was made by means of the Bernreuter Personality Inventory and supplemented by a small, specially constructed questionnaire. Critical ratios of differences between means of deaf and hearing groups and groups according to inventory item scores, number of years deafened, age at loss of hearing, amount of hearing in best ear, difference of hearing in ears, and amount of lip reading training.

Welles' conclusions were: (1) that the hard of hearing were significantly more emotional, more introverted, and less dominant than a comparable hearing group; (2) hard of hearing differed significantly from hearing on sixteen items; (3) that there was no unique classification of items peculiar to the hard of hearing; (4) that no significance was found between test scores and number of years deafened, age at loss of hearing, residual hearing in better ear, difference in hearing between ears, hours of lip reading training, use of hearing aid, and tinnitus.

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Bindon examined the differences between thirty-six rubella deaf, thirty hearing, and fifteen children born deaf or deaf from causes other than maternal rubella. Children in control groups were paired for sex, educational stream, age, and approximate socioeconomic status as gauged by parental occupation. In addition to these criteria, the deaf group was tested for average degree of hearing loss. The Rorschach, MAPS test, and the Wechsler-Bellvue Performance Intelligence Scale were used for measuring personality and intelligence. The difference between the means was determined for the various groups.

The author concluded that (1) there was no significant difference between the rubella deaf and other deaf; (2) intelligence scores and personality scores of the hearing groups were higher than the deaf group although the differences were not significant. Bindon further expressed the opinion that the deaf function at a less mature level, that personality deviations are not abnormal but are, rather, subnormal; that retardation results from retarded language development which hinders progressive socialization.

Educational achievement of the deaf was examined by Goetzinger and Rousey to augment research available in this area and to approximate the maximum achievement of children who have suffered severe early deafness. One hundred one deaf students between the ages of fourteen


and twenty-one from a state residential school were used as subjects.

The group was composed of fifty-two males and forty-nine females of whom sixty-one were congenitally deaf and forty had suffered severe auditory impairment between the ages of one and three. Eighteen were deaf due to meningitis. The sum of ranks and Mann-Whitney "mu" test were used to determine the significance of differences between groups.

Conclusions drawn by Goetzinger and Rousey were that no educational difference between children suffering severe deafness prior to or at three years of age and congenitally deaf children existed; the congenitally deaf had a 5.6 point superiority in intelligence quotient, significant between the five per cent and one per cent level of confidence; no difference was found in educational achievement between the congenitally deaf and the meningitic deaf, between congenitally deaf and those with acquired deafness, or those deaf from other causes. Partial correlations (chronological age and years spent in school held constant) with Binet Vocabulary and four sub-tests of the achievement battery were: paragraph meaning .78, arithmetic reasoning .66, vocabulary .82, arithmetic computation .65. A Binet vocabulary score, therefore, afforded a quick estimate of deaf adolescents' educational level. The approximate maximum mean grade achievement of a group of twenty-two with I.Q. of 85-115 and twelve years of schooling in classes of ten or more was 5.1 for vocabulary, 7.0 for arithmetic reasoning, and 7.6 for arithmetic computation. No difference was found in achievement between children whose parents were deaf and children whose parents were hearing except in arithmetic computation where the former excelled.
In the area of employment testing, Stunkel examined test results of deaf persons on the Federal Service Entrance Examination. Subjects were sixty-seven juniors and seniors from Galludet College and 200 hearing persons who took the same examination. The Federal Service examination was sectioned according to grammar, reading comprehension, arithmetic reasoning, symbols and letter sequence. The deaf group was divided according to those born deaf or becoming deaf early in life and those who had developed language to some degree, and those who had developed language before becoming deaf. Analysis of variance of test results was determined with these three groups. Findings indicated that people handicapped with deafness, especially at an early age, react to environmental clues and problems in a manner somewhat different from the way in which hearing people react. It is likely they accomplish tasks by using skills different from those used by hearing people. Their thinking may be less in terms of words than in terms of symbols and things. Average scores of the deaf groups were significantly lower than the hearing group. However, the deaf group was higher in the letter series of the test. The only significant difference between deaf at birth or before developing a vocabulary and those becoming deaf at a later period was in vocabulary in favor of the latter group and symbols in favor of the former group. The subjects tested in this study were not typical of the deaf as they were among the very small minority who attend college.

The retarded deaf child was considered in a study by Frisina[^18] in an effort to make an holistic evaluation of the retarded deaf. He reported that ten to twelve per cent of the children in schools for the deaf were mentally retarded; that aphasia and emotional disturbances might be other factors causing learning difficulties. Etiology in forty per cent of the cases in his survey was congenital–unknown. Age at onset of deafness preceded five years in ninety-eight per cent of the cases, and genetic development, as reflected in age of sitting and walking resulted in significant retardation from the hearing and also from the average deaf child. The group Frisina studied was significantly more retarded than the average deaf child. This group had an average mental age of eight and a mean I.Q. of 62. The males were significantly superior to females in the tests of abstract intelligence.

Motor abilities of the deaf were investigated by Long[^19]. His purpose was to contribute to the evaluation of the motor skills of the deaf, the nature of these skills, and to compare to a hearing group equated in respect to age, sex, and race. Fifty-one boys and thirty-eight girls from a residential school for the deaf were compared to a similar group of hearing children from an orphanage in the same city. Evaluation of motor skills was accomplished by use of the Stanford Motor Skills unit, and statistical procedure involved the use of correlation between


paired scores and determination of significance of difference between correlated means.

There was so little correlation between different types of motor ability that it was not possible to specify a factor of general motor ability. There was little difference in the deaf and hearing groups compared except in the area of balance. Long concluded that there was no inferiority among the deaf in motor skills as measured in this study.

A study made at the Louisiana State School for the Deaf was a comparison of male students from the Louisiana State School for the Deaf with a similar sex-age group from one of the parish public schools on reaction time as measured by the Porto-Clinic. This device is used by the Department of Public Safety to time movement of the foot from a simulated accelerator to a simulated brake on receiving a light signal. Thirty-six students from the Louisiana school and thirty-six from Beauregard public school were used as subjects. Both groups were thoroughly oriented in the requirements of the test and were not tested until they showed complete knowledge of what was required. The groups were tested separately at approximately the same time of day. Subjects were given three trials, and the average of these trials was taken as the score. The difference between the mean scores was tested for significance by use of the t test. The means of .42 seconds for the hearing group and .56 for the deaf group were significantly different at the one

per cent level of confidence. It was suggested that this difference may be due to a slower threshold of comprehension on the part of the deaf group, although subjects were fully cognizant as to what was required and were not tested until their procedures were correct.

In a comparison of reaction time with balance for a group of sixty-one boys nine to thirteen years old at the Louisiana State School for the Deaf, a correlation of .35 was obtained. Tetrachoric correlation was used. The four cells of the correlation table were: above median on reaction and below median on balance; below median on reaction and above median on balance; below median on reaction and below median on balance; above median on reaction and above median on balance. A slight relationship was indicated between balance, as measured by the Heath test, and reaction time, as measured by the Porto-Clinic test.

Between athletic ability (YMCA Athletic Achievement Program) and static balance a correlation of .36 was obtained using the Tetrachoric method of correlation. Forty male students at the Louisiana State School for the Deaf, ages ten through fourteen, were subjects. They were classified as pass or fail on the basis of position above or below the median on each variable and placed in the cells of the correlation table according to these criteria. This correlation was below that of .5 as established for hearing children on motor ability and static and dynamic balance respectively.

The relationship between balance and vision of thirty-four male deaf students between the ages of ten and thirteen was determined by means of Tetrachoric correlation. Visual acuity was measured by a Snellen
chart, and depth perception, as measured by the Louisiana Department of Public Safety test in the Porto-clinic, was used for visual classification. Subjects' scores were placed in the four cells of the correlation table according to the following combinations: above median on balance and normal vision, below the median on balance and normal vision, above the median on balance and sub-normal vision, below the median on balance and sub-normal vision. A slight correlation of .25 indicated a possible relationship between these senses as measured in this study.

Gregory\textsuperscript{21} compared deaf and hearing groups on personality traits and interest items using paired subjects from the Minnesota School for the Deaf and the Minnesota School for Dependent Children. There were twenty-five pairs of boys and thirty-two pairs of girls. They were all retarded, institutional children whose reading age was nine, chronological ages thirteen to eighteen. The Minnesota Interest Blank and a combination of part of Roger's test of personality and Woodworth Cady test of emotional stability were administered to the paired groups.

By use of critical ratio of the difference, comparisons were made on the basis of a critical ratio of two. It was found that the most characteristic differences between the two groups were a tendency of the deaf to withdraw from social participation and responsibilities and an evidence of a desire to stay younger and isolate themselves from social pastimes. The deaf also showed less ability to get on with their teachers.

Summary. Four of the studies reviewed in this section found the deaf educationally retarded and below normal in adjustment as compared to hearing groups. There was no apparent difference in the characteristics of rubella deaf, meningitic deaf, and congenitally deaf and those who became deaf at or before the age of three, except a superiority of I.Q. for the congenitally deaf found in one study. A study with hard of hearing adults indicated that there are some areas of personality that appear to be unique to the deaf, but, in general, it is an individual matter. Responses to an employment examination involving a group of deaf from Galludet College showed the deaf below a hearing group on the total test but superior to it on some sections. It was inferred that the deaf approach the solution to problems in a different manner from that of hearing groups due to different perceptual skills.

Examination of motor skills in another study found the deaf on a par with hearing groups in all areas tested with the exception of balance, in which the deaf were inferior. A series of studies at the Louisiana State School for the Deaf found the deaf group equal to the hearing group on an athletic achievement test but slower in reaction time to a comparable hearing group. Investigation of balance indicated that practice and age, after the age of ten, did not affect balance scores on a static balance test and that static balance had a slight relationship with reaction time, athletic achievement, and vision.

Similar Studies Made with Hearing Groups

The following studies were conducted with hearing groups and involve various aspects of the present study.
Cowell developed an instrument to qualify the degree of social adjustment and screen out those students requiring special consideration and guidance.

Fifty junior high school students who participated freely in physical education and fifty who did not participate freely were selected as subjects.

A behavior trend index of twenty dichotomous behavior items and scale norms for the same were provided. Statistical purification of thirty-nine behavior trends with their paired opposites, checked by thirty teachers, resulted in selection of twelve paired behavior trends with the highest discriminating index. Validation was by means of factor analysis of items and biserial correlation for internal consistency and six ratings by teachers (three on positive aspects of adjustment and three on negative aspects of adjustment) were correlated with students' ratings on a personal distance scale and a Who's Who ballot. A correlation of .50 was obtained between the teachers' judgment and the Who's Who ballot. Correlation between Who's Who ballot and personal distance was .84.

Cowell concluded that selected groups of boys who were poorly adjusted socially made significantly lower scores than boys in general.

Items selected as trends indicating positive traits for good adjustment and incorporated in the Crowell Social Behavior Trend Index (Form A) were:

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1. Enters heartily and with enjoyment into the spirit of social intercourse.

2. Frank; talkative and sociable, does not stand on ceremony.


4. Quick and decisive in movement, pronounced or excessive energy output.

5. Prefers group activities, work or play; not easily satisfied with individual projects.

6. Adaptable to new situations, makes adjustments readily, welcomes change.

7. Is self-composed, seldom shows signs of embarrassment.

8. Tends to elation of spirits, seldom gloomy or moody.

9. Seeks a broad range of friendships, not selective or exclusive in games and the like.

10. Hearty and cordial, even to strangers, forms acquaintance-ships very easily.

These traits were rated on a scale of +3 for marked degree of the trait, +2 somewhat, +1 only slightly, and +0 for no indication of the trait.

The items selected as trends indicating a negative trait toward good adjustment and called the Cowell Social Behavior Trend Index (Form B) were:

1. Somewhat prudish, awkward, easily embarrassed in his social contacts.

2. Secretive, seclusive, not inclined to talk unless spoken to.

3. Lacking in self-confidence and initiative, a follower.

4. Slow in movement, deliberative or perhaps indecisive. Energy output moderate or deficient.

5. Prefers to work and play alone, tends to avoid group activities.
6. Shrinks from making new adjustments, prefers the habitual to the stress of reorganization required by the new.

7. Is self-conscious, easily embarrassed, timid or "bashful".

8. Tends to depression, frequently gloomy or moody.

9. Shows preference for a narrow range of intimate friends and tends to exclude others from his association.

10. Reserved and distant except to intimate friends, does not form acquaintanceships readily.

These negative traits were rated on a scale of -3 for a marked degree of the trait; -2 somewhat, -1 only slightly, and -0 not at all.

Other relationships found were: social adjustment and athletic participation, .424; athletic participation and academic rank, .280; and social adjustment and academic rank, .233.

McCloy and Hepp determined some general factors or components of character which are related to physical education.

They used three groups of subjects: (1) thirty-one junior and senior physical education students from George Williams College in Chicago (studied by McCloy), (2) 194 students from an English college studied by Webb and factored by McCloy, and (3) 211 subjects from the sixth grades of public schools in Duluth, Minnesota. This group was studied by Hepp.

Traits related to physical education were determined by means of factor analysis and factors resulting from these traits were selected. Twelve of the factors selected were considered desirable outcomes of

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23C. H. McCloy and Ferenc Hepp, "General Factors or Components of Character as Related to Physical Education," The Research Quarterly, XXVIII (October, 1957), 269-278.
physical education and three were considered undesirable and to be eliminated as much as possible. The desirable factors were: (1) individual social or individual good citizenship; (2) group social or group good fellowship; (3) self-mastery; (4) individual self-sufficiency; (5) good adjustment; (6) individuality ("standing out from the crowd"); (7) sociability; (8) conscientiousness; (9) buoyant individuality; (10) positive-action tendencies; (11) positive attitudes-energy; and (12) leadership. The factors considered undesirable and to be eliminated were: egotistical self-sufficiency, passive group responsiveness and anti-social dominance.

Greenberg and others compared students at a school for the blind with sighted age mates on several personality traits. They used 103 blind students, a cross section of the socioeconomic groupings of the state, with a wide range of academic ability. A similar sighted group was used for comparison.

Test scores on the Bernreuter Personality and California F scale were compared to those of the hearing group by use of t tests. It was concluded that blind students exhibited neurotic tendencies, subservience, lack of self-confidence and authoritarianism. The most widespread result obtained from the personal data form was the general dissatisfaction with the school, about fifty per cent showing dissatisfaction with the school as indicated by answers to the question of whether or not the subject would like to come back to school.

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The unhealthy personality may be due to handicap or to the school. Previous studies of students in public schools showed different patterns with personality on the healthy side. Other studies in residential schools showed patterns similar to that found by Greenberg and his associates.

In an effort to determine the nature and degree of relationship holding between certain measurable traits of personality and the incidence of somatic illness among men and women university students, Stanton and Rutledge25 checked on incidence of hospital visits and personality traits of 7400 college men and women at the University of Florida. Groups were classified according to incidence of visits to the infirmary. Those at the nineteenth percentile and above were classified as repeaters, and those at the tenth percentile and under were classified as non-repeaters. Relationship between repeated somatic illness and relative somatic health were determined, and the nine scales of the Minnesota Multiphasic Personality Inventory were determined. Critical ratios between the means of the groups on the nine scales were also determined.

Findings showed there was a positive and significant relationship holding between the existence of certain emotional problems and the frequency of somatic illness. This relationship was moderate in degree for hypochondriasis; low for hypomania, psychopathic personality, and depression. There appeared to be a greater tendency for these

relationships to occur among young women than young men.

Biddulph\(^{26}\) conducted a study with 461 sophomore and junior boys in physical education from two high schools in Salt Lake City to determine if higher athletic skills are found to be associated with better social or personal adjustment in high school level male students. The means and standard deviations were calculated and compared, using critical ratio techniques to determine significance of the difference of the means.

The superior athletic achievement group showed a higher mean self-adjustment score on the California Test of Personality, teachers' ratings, and sociograms at the one per cent level of confidence.

The athletes scored significantly higher on the interest (Mf) variable; varsity athletes scored significantly lower than other groups on anxiety (A) variable; the varsity athletes and upperclass non-athletes scored significantly higher on the dominance (DO) variable. On the social responsibility variable (Re) the upper class non-athletes scored significantly higher, and there was no significant difference among groups in team or individual sports. Varsity athletes in individual sports only scored significantly higher on the depression (D) variable. Varsity individual sports participants scored significantly higher on psychasthenia (Pt) than participants in varsity team sports. On the dominance (Do) variable, both poor and good varsity athletes scored higher than poor freshmen athletes. Analysis of the 550 items of

the Minnesota Multiphasic Personality Inventory resulted in the discrimination of twenty-two items which varied significantly between good and poor competitors.

Working with children in the fourth, fifth, and sixth grades of public schools in Leon County, Florida, Alexander compared scores on minimum muscular fitness and adjustment. Alexander used as subjects 714 boys and girls, 486 of whom were classified as well adjusted and 228 of whom were classified as non-well adjusted. Of 387 boys, 225 (58.1 per cent) were classified as well adjusted and 162 (41.9 per cent) were classified as non-well adjusted. Of 327 girls, 261 (79.8 per cent) were classified as well adjusted and 66 (20.2 per cent) were classified as non-well adjusted. Chi square was used to determine significance of the difference between variables.

The study indicated significantly more of the muscular fit were well adjusted. There was no difference in fitness or adjustment of rural and city students.

Clark and Jarman investigated the relationships between the academic achievement of boys and certain growth and physical measures. Subjects were 217 white male students from the Medford, Oregon public schools. There were seventy-three nine years of age, seventy-five twelve

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years of age, and sixty-nine fifteen years of age.

Scores on Otis Self-administering Test of Mental Ability, the California Test of Mental Maturity, Iowa Silent Reading Test, and grade point average were used to assess intelligence and achievement. The physical tests were: Roger's strength test, Physical Fitness Index, Roger's arm strength test, McCloy's Classification Index, and Wetzel development level. These were the experimental variables. High and low scoring groups on the strength and growth measures were established, with the groups being equated by I. Q. This process was repeated fifteen times, once at each age level (three) for each of the experimental variables (five). Twenty subjects were selected for each age group (about twenty-five per cent of the boys available at each age). Means were computed for each group, and significance was determined by t tests.

The means of high groups were larger than means of low groups on experimental variables. There was no consistent pattern at all ages between all tests. There were more and greater differences in scholastic achievement between the high and low Physical Fitness Index groups than there were for the other strength and growth measures compared. All ages were significant at the five or one per cent level. Roger's Strength Index was most effective in differentiating levels of academic performance at nine years of age (t .01). McCloy's Classification and the Standard Achievement Test showed significant differences in favor of the higher classification index group. Roger's arm strength and grade point average was at .05 level in favor of the stronger group. The Wetzel Development Level and Standard Achievement showed a significant
difference (.05 level) in favor of those at the higher level on Wetzel grid. Least significance for the experimental variables was for the twelve year olds. The only significant t was for Physical Fitness Index and grade point average.

Salz conducted a study for the purpose of discovering and analyzing personality differences between a group of boys who were in the little league championship in 1955, a group who played but did not take part in the post season tournament, and a comparable group who did not participate in little league baseball.

Statistical methods used involved assessment of personality by use of a "What I like to do" questionnaire, Behavior Preference Record, Classroom Social Distance Scale, and the California Test of Personality. Critical ratio of the means was used for comparison of the different groups.

Conclusions drawn from this study were that boys who played on the championship team were definitely superior to the other groups in most phases of personality measured; that boys on the championship team were taller and heavier; that there seemed to be a concomitant relationship between athletic success and exemplary personality; and that there was no evidence of ill effects suffered by participants in little league baseball.

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Seymour\(^3^0\) checked on the effects of little league baseball on participants using 114 participants and 114 non-participants equated as to age and grade. He used comparison of personality, as measured by a self-rating questionnaire, ratings by teachers on the Winnetka Rating Scale, sociograms, Ohio Social Acceptance Scale, and the Science Research Associates Junior Inventory and participation or non-participation in little league baseball. Significance was determined by means of t tests.

Conclusions of the study were that participation apparently had no effect on problems confronting boys; that participants scored slightly higher on personality traits and had higher social acceptance ratings than their peers; and that, as a child viewed himself and his needs, no significant difference was evident between participant and non-participant.

Skubic\(^3^1\) conducted a study to investigate further the effects of little league baseball on participants, to obtain attitudes of parents and players toward little league and middle league baseball, to ascertain extent of injuries to players in a season, and to determine effects of participation on daily living habits of players.

Subjects were players on teams in Santa Maria, California and a matched group of boys who volunteered to be in the study. Of 640 questionnaires sent to players, parents, and teachers, 470 were returned.


Questionnaires to players and parents involved such questions as reactions to game in terms of appetite, sleeping, attitude toward game, reaction to loss, excitement, et cetera. Teachers' questionnaire included such items as achievement in school subjects, skill in physical education classes, and social-emotional adjustment in school.

Conclusions from the questionnaires were that the boys involved in baseball were highly selected, possessed more physical skill, received better grades in school, and were emotionally better adjusted than boys who had not played in little league baseball. A minority of the players and parents indicated that participants were affected adversely before or after games as reflected in their eating and sleeping habits. There were 244 injuries reported by 100 players. The injuries were generally of a minor nature, most of them occurring to fingers. There were seventy-four cases of fractures or sprains. Participation in little league occupied about fifty per cent of the leisure time of most of the players throughout the year. The general consensus was favorable to participation with suggestions for some changes contributing to greater participation for all, less pressure on players, and more careful selection of coaches and directors of the program.

In order to differentiate more adequately between the terms "motor ability" and "athletic participation" in their relationship to some measurable aspects of personality, Keogh classified 167 junior and senior male students from Pomona College in California according to motor

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ability and participation in athletics. The California Psychological Inventory was administered to the groups. The subjects were then grouped according to ranking on the Inventory, and analysis of variance was used to test the significance of the difference between motor ability and athletic participation.

Conclusions drawn from the study were that there were no significant relationships between motor ability, athletic participation, and the eighteen scales of the California Personality Inventory.

Among the pioneer studies involving personality adjustment and achievement was that of Sperling to determine the relationship between personality adjustment and achievement in physical education activities among male college students from New York University. Sperling used 171 varsity athletes, 138 intramural athletes, and a third group none of whom had ever been a member of an athletic team in junior high school, high school or college.

All of the subjects were administered the following instruments as measures of personality: Human Behavior Inventory, Guilford Test, Allport's ascendance-submission scale, Allport-Vernon scale of social values, Harper social study scale, and a personal information sheet. Information concerning age, class, course, religion, A.C.E., psychological exam percentile, parental occupation, and nationality was obtained.

There was a statistical difference in pattern of varsity and

33A. P. Sperling, "Relationship Between Personality Adjustment and Achievement in Physical Education," Abstracts of Theses (New York University School of Education, October, 1939-June, 1941), 189-193.
intramural groups as related to non-athletic group in personality adjustment scores and ascendance-submission inventory with the varsity and intramural groups superior to the non-athletic group. The non-athlete proved to be more liberal minded, but the difference was not statistically significant. The varsity and intramural groups indicated more motivation for power, while the non-athletic group was more aesthetic and theoretical minded. Varsity groups with more experience had better scores in adjustment, and ascendance and extroversion with the football and basketball group receiving best scores on adjustment. There were no significant personality trait differences between intramural and varsity groups.

Bull, by means of factor analysis, examined the relationships between physique, general motor capacity, aspects of temperament and the cognitive factor of spatial ability. Social factors were also examined, the estimates of temperament being based on observations and judgments made by fellow pupils. Motor capacity was determined by use of the Iowa Brace test, squat-thrust test, Sargent jump, and a gymnastic attainment test. Temperament was measured by use of Highfield’s "Camp on an Island" device, and spatial ability was measured by use of a paper and pencil test.

Subjects used were 233 students in two secondary modern schools in Yorkshire, England. Centroid factor analysis was used to sort out factors.

Two factors were found: general motor capacity and agility. Cognitive surgency of temperament was of greater importance in motor activities requiring power and was seen most clearly in the Sargent jump. The Iowa Brace test was the most comprehensive test for measurement of agility capacities. Pupils whose motor capacity was high in agility and power tend to be regarded by contemporaries as best fitted for roles of foraging, exploration, and defense.

Clark and Clarke investigated the relationship between criteria of personal and social adjustment and the maturity, structural and strength characteristics of boys nine through fourteen years of age.

These investigators used 199 randomly selected boys from the Medford, Oregon public schools for subjects. Subjects were divided into six categories according to age, and the upper seven and lower seven scores for each age group were selected separately for each situation analyzed as follows: (1) sociometric questionnaire, (2) according to categories and sections of a mental health analysis. Fifteen subjects were given strength tests, and physical measurements were made on all. Different groups were made, with each classification consisting of twenty-one subjects, and an older and younger group made from these groupings. Means were determined for the experimental variables, and difference between means was tested for significance by use of t ratios.

Conclusions were that boys chosen most frequently on the sociometric questionnaire had greater arm strength than those not chosen as

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Significance was at the one per cent level for McCloy's test and at the five per cent level for Roger's strength test. A significant difference was found between the means of body weight, hip width, Roger's strength index, and cable tension strength test average, with boys chosen most frequently on sociometric questionnaire. Boys with large calf girth were chosen less frequently. Based on the number of boys each subject chose on the sociometric questionnaire, no significant difference was obtained between the means on the experimental variables of maturity, structure, and strength.

The purpose of Whittle's study was to determine the effects of elementary physical education upon certain aspects of physical development, motor fitness, motor educability, body flexibility, muscular explosive power and personality of 162 twelve year old boys from Oregon public schools. These subjects were selected on the basis of years in school, classification, Wetzel grid, and willingness to volunteer as subjects.

Significance of the difference between means of factors considered was determined by t tests.

Students from good and poor physical education programs were found to be essentially alike in chronological age, skeletal age, weight, height, Wetzel development level, and McCloy's classification index. Differences were found between groups on the Physical Fitness Index, the Indiana Physical Fitness Test, leg lift strength, back lift strength,

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vertical jump, and arm strength. This finding was attributed to the better physical education program. Participants in out-of-class physical activities evidenced superiority on Physical Fitness Index, Strength Index, Metheny-Johnson Test of Motor Educability, Indiana Physical Fitness Test, vertical jump, arm strength, grip strength, leg lift strength and back lift strength. There was no improvement of personality or social adjustment evidenced as a result of good physical education program or lots of out-of-class participation in physical activities.

McGraw and Tolbert\textsuperscript{37} made an investigation for the purpose of determining the relationship between sociometric status and general athletic ability among junior high school boys and the extent to which this relationship compares with sociometric status and mental maturity.

The University High School at Austin, Texas furnished 438 junior high school boys for subjects. They were classified as stars, middle group, or rejectees on the basis of incidence of selection by other students. Subjects were also classified on a basis of athletic ability or criteria of athletic index, judgment ratings by other students and interschool and intramural athletic experience. Relationships were determined by use of contingency coefficients, rank correlations, and critical ratios between the groups.

Conclusions were that there appeared to be a substantial relationship among the criteria of general athletic ability, a moderately high relationship between athletic ability and sociometric status in almost

all of the groups, and participation and ability in athletics seemed the predominant factors in conditioning choices of best liked. There was no significant relationship between sociometric status and mental maturity.

Bonney\textsuperscript{38} investigated personality traits contributing to social success among eighty fourth grade students in three public schools of Denton, Texas. The study was carried out by use of sociometric techniques. Ratings were made by friends, and the group was sectioned into quartiles for comparison on social acceptance and personality traits.

Significance of the difference in means was determined by means of critical ratios. From the data it was concluded that strong positive traits were more important than negative ones; that popularity is not superficial but is tied up with the most basic traits of personality and character; that a socially strong child is generally drawn to a socially strong peer; and that a child is well accepted in a group because of what he is and what he does that wins the admiration of others rather than what he refrains from doing.

Cavanaugh\textsuperscript{39} examined the effects of recreational participation on personality adjustment and the influence of sex and intelligence on the amount of participation.

Three groups from Ohio University were used—362 in two elementary psychology courses, 297 in a remedial reading course, and sixty-five in

\textsuperscript{38}Merle E. Bonney, "Personality Traits of Socially Successful and Socially Unsuccessful Children," \textit{Journal of Educational Psychology}, XXXIV (November, 1943), 449-472.

\textsuperscript{39}Jean Ogden Cavanaugh, "The Relation of Recreation to Personality Adjustment," \textit{Journal of Social Psychology}, XV (February, 1942), 63-74.
an elective mental hygiene course. Cavanaugh compared the means for total knowledge, interest, membership and activity of individuals in the top ten centiles and the lower twenty centiles of the Ohio State Psychological Examination to determine the influence of intelligence on the number of activities in which the subjects participated. Amount of participation of the well adjusted and poorly adjusted was determined in the same way. The Bernreuter Personality Inventory was used to determine personality adjustment. The critical ratio of difference between means was used to determine the significance of difference between means.

It was concluded that the well adjusted tended to participate more. Differences were consistent, but not significant.

In an effort to measure and predict social participation, Gough used 459 senior high school students from Minnesota, and correlated the extent of participation in activities with a social participation scale. He found that feelings of self-confidence, assurance, poise, frankness, informality, liking for social interaction and intellectual and cultural activity were associated with participation.

The relationship of general intelligence and play ability and the effect of prolonged participation in organized games on mental development was studied by Reaney. Six hundred students from seven schools in and around London, England were used in the study. Correlations were

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made with ratings on athletic ability, school marks, and intelligence test scores. There was a significant correlation of .32 between play ability and general ability, and a correlation of .2 between play ability and age in favor of the older group. Other conclusions were that practice seemed to have a levelling effect; familiarity produced little change in correlation with intelligence—intelligence went with good play and lack of interest with poor ability; a definite motor factor existed common to play ability and the various tests; and that the estimate of teachers, if obtained by amalgamating several independent opinions, was very reliable.

In an attempt to determine how schools can best contribute to the development of personality, Symonds used the Symonds Picture-Story Test to examine forty normal boys and girls. Examination of test responses indicated these needs were most prevalent: (1) opportunity for social participation—of special importance for some pupils (both boys and girls) was opportunity to engage in the kind of competition provided by sports; (2) acceptance; (3) ten evidenced need for more freedom in school, and nine evidenced need for firmness and strictness. Other needs evidenced were opportunity to express emotions, success, avoidance of punishment, provision for responsibility, opportunity for pleasure, freedom from competition, provision for insight, and psychological help. Symonds concluded with a statement that each should be considered as an individual.

Resnick\(^4^3\) examined the relationship between high school grades and certain aspects of adjustment. A midwestern high school furnished 350 freshman and sophomore students for subjects. Adjustment tests and ratings of teachers were used to determine adjustment, and, on the basis of test scores, subjects were classified as high (top twenty-seven percent), middle (forty-six percent), and low (bottom twenty-seven percent). The \(t\) test was used to determine the difference between the groups.

It was concluded that school grades seemed to divide pupils in about the same manner as the various personality adjustment tests. It was suggested that, in evaluating pupils in a counselling program, more thorough insight into their adjustment was needed than is provided by typical published scales.

Through inquiring into past experiences of freshmen at North Carolina State, Smith\(^4^4\) desired to determine factors or elements affecting the student's level of motor skill. He used 300 freshmen from three representative groups within the freshman class for subjects.

Twenty-one factors were set up in hypotheses and analyzed to determine whether or not they had influenced the motor skill development of the students involved. Smith concluded these factors did not influence the development of motor skills:


intelligence, elementary school physical education program, size of graduating class, father's encouragement in sports, home environment, wearing glasses, scholastic rank, type of home community, and influence of brothers and sisters. The factors that did encourage the development of general motor skills were: body type, health, junior high physical education program, senior high school physical education program, physical education credits in grades nine through twelve, community influences and non-directed play participation in play and sports activities. The factors which acted to hinder development of general motor skill were: emotionality, domination by mother, and embarrassment when showering or dressing with others. Findings on areas of interest were: boys' greatest area of interest was dating; sports participation was second; hunting and fishing, third; and television and radio, fourth. The most pronounced difference in boys of different motor skills levels was in sports participation, with the highly skilled showing greater interest in participation.

Estep investigated the relationship between static equilibrium and ability in gross motor activities using 114 female sophomore, junior and senior high school students of Redwood City, California. The girls were selected on the bases of subjective ratings in motor ability in sports and rhythm and A and C team skill classifications in the after-school sports program.

Significant difference between means was determined by t tests.

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Static equilibrium was measured by the Miles Ataxiometer which measures the amount of sway of subject in maintaining equilibrium on a movable platform.

A significant difference at the one per cent level was found between the means of the sports ability group in favor of those who participated more; a difference significant at the five per cent level for the rhythm group; and at the five per cent level for the A and C teams.

Riesch\(^{46}\) conducted a three-month study with 258 seventh and eighth grade students to determine whether certain factors were related to the social and scholastic development of pupils. The factors used were intelligence, past achievement as measured by pre test scores on social adjustment, personality, conduct, attitude toward the teacher, type of school, and teaching efficiency.

Significant positive changes in conduct and achievement occurred during the three-month period, but no significant changes were noted in personality, adjustment, or attitude toward the teacher. Gain in achievement had low but significant correlations with a pre test of conduct, social adjustment, and personality. Teaching efficiency, measured in terms of residual pupil gains, was significantly related to pupil achievement (five per cent level).

Olsen\(^{47}\) made a study to determine whether significant difference

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existed in reaction time, depth perception, and visual span of apprehension between athletes, intermediate athletes and non-athletes at Boston University. Subjects were 300 male students from the university who were classified as the athletic group, intermediate group, and non-athletic group.

Analysis of variance and t tests were used to determine the significance of the difference between groups. Analysis revealed differences between groups at the one per cent point in the following areas: (1) athletes had fastest simple reaction time, choice reaction time, and discriminatory reaction time over the intermediate and non-athletic groups; (2) the intermediate athletes were faster in simple reaction time, choice reaction time, and discriminatory reaction time than non-athletes; (3) the athletes and intermediate athletes had better depth perception; (4) both athletes and intermediate athletes had a higher span of apprehension than non-athletes; (5) in comparisons using correlations with small groups of athletes, only two were significant at the five per cent level of confidence: +.477 for discriminatory reaction time and +.395 for simple reaction time and offensive hockey skill.

Merriman studied the relationship between motor ability (as measured by Phillip's JCR test) and personality traits (as measured by the California Psychological Inventory). A secondary purpose was to determine differences between personality scores of subjects in the upper twenty-five per cent of motor ability and the lower twenty-five per cent.

in motor ability; differences between personality scores of athletes and non-athletes and differences between scores of participants in individual sports, participants in team sports and those in team individual sports.

Eight hundred eight boys from Muscatine and Iowa City high schools were subjects. The difference between group means was determined by analysis of variance. Correlations were made between subjects in the upper twenty-five per cent in motor ability and those in the lower twenty-five per cent in California Psychological Inventory, for athletes and non-athletes, and between JCR scores and California Psychological Inventory scores.

Findings were that motor ability was related to personality traits; that the upper motor ability group was significantly higher than the lower group on measures of poise, ascendency, self-assurance, and on the measures of intellectual and interest modes; that there were few significant differences in personality traits when athletes and non-athletes matched according to motor ability. Inference was drawn that motor ability rather than participation in athletics is a potent factor in the development of personality traits.

A study was made at the Baton Rouge Y.M.C.A. for the purpose of determining the relationship between personality adjustment and swimming progress of beginners. The subjects were forty-three non-swimmers from elementary public schools in Baton Rouge. Relationship between

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personality, as determined by the Rogers Test of Personality, and swimming progress was determined by correlations.

It was concluded that there was a significant relationship (\( .44 \)) between the swimming progress of this group and total personality score. Personal Inferiority (as determined by Rogers' test) showed a higher relationship (\( .33 \)) with swimming progress than any other section of the personality test, an increase in feelings of inferiority showing a decrease in swimming progress.

Jones approached the problem of social adjustment versus physical ability by assessing the right and left grip strength, pulling strength, and thrusting strength and comparing to measures of social adjustment. Seventy-eight boys from a normal urban population were selected for the study. The top and bottom ten on strength were compared by means of X-rays, medical records, performance on physical tests, reputation tests, ratings, and personality test scores. Case studies were made of these two groups. Jones' conclusions were that the strongest were predominantly mesomorphic, more popular, and better adjusted than the weaker group; that individuals low in strength had an accumulative assortment of handicaps, and those high in strength a variety of physical advantages; that this is reflected in the individual attitudes and self-appraisal.

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Blanchard made a comparative analysis of the character and personality traits of boys and girls in physical education classes to ascertain whether or not character development is continuous and to determine whether boys or girls showed greater development. Blanchard conducted the study with 132 high school students in Florida using his revised rating scale to assess personality. Ratings were made by pupils on each other, and teachers' ratings were secured. Differences between means for each trait were compared. It was concluded that character and personality were improved by participation in physical education activities; greatest gains appeared to occur in the sophomore year; girls gained more in wholesome character and personality traits; that there was continuous growth in character and personality traits.

Ray examined the inter-relationships between physical and mental abilities and achievements to determine the value of physical education activities and effect on the individual. He used 432 boys enrolled in the Palo Alto, California high school. Measures of mental ability were the Terman Group Test, average grade in academic subjects during high school career; physical ability was measured by a decathlon involving skills and strength; athletic achievement was determined by annual improvement of the pupil; citizenship was measured by accumulation of service points as indicated by the school record; health was assessed by

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height and weight charts and school health record card. Subjects were grouped according to abilities in the variables considered, and correlations were made to determine the extent of relationships.

Ray's conclusions were: (1) I.Q. was a reliable predictor of grades; (2) rate of growth was related to I.Q. more than any factor except age but had some relation to extent of physical activity; (3) I.Q. of athletes was not lower than other groups; (4) achievement in any area was a more reliable predictor of achievement than an ability measure; (5) physical ability was a more reliable predictor of success than I.Q. within a particular grouping; (6) the athlete showed superiority in academic grade average.

A most interesting and thought provoking study was done by Oliver for the purpose of determining the effect of an intensified physical activity program on a group of educationally sub-normal boys at a special school in England. The study was conducted by forming two groups of twenty boys matched, as far as possible, in age, intelligence, size, and physical condition. The experimental group had an I.Q. range from fifty-seven to eighty-six with a mean of seventy; the control group had an I.Q. range from fifty-four to eighty-one with a mean of 65.7. Both groups were from special residential schools for the educationally sub-normal. Both groups were administered the following mental tests: Terman-Merrill, Goodenough Draw-a-Man, Raven's matrices, Porteus maze, and Goddard's form board. All but the Goodenough Draw-a-Man were given

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individually. The physical tests administered were: motor educability, athletic achievement, and a physical fitness test. The scores on the different tests were summed, and the significance of the gains were made by analysis of variance.

Significant gains at the one per cent point were made on athletic achievement, physical fitness, I.Q., Goodenough mental age, and gains at the five per cent point were made on Porteus maze, mental age, and motor educability by the experimental group. Reasons suggested for the gains were that they were largely emotional—probably a combination of: (1) the effect of achievement, success, and improved confidence associated with these feelings; (2) improved general fitness and the feeling that goes with it; (3) improved adjustment and the happier atmosphere that arises from it; (4) the effect of the feeling of importance that the boys must have had to have so much attention and interest centered on them. Increased physical activity caused no deterioration in their achievement in basic subjects. Oliver suggested that greater emphasis should be placed on physical activities for sub-normal children, and that more demands should be made on the children.

Summary. The review of McCloy and Hepp was a factorial study of some of the character traits which may be influenced through physical education activities. Cowell provided a rating scale which may be used for the assessment of adjustment in physical education activities.

Eight of the reviews indicated that positive contributions may be made to personality adjustment through participation in physical activities, and three evidenced no effect from participation. Seven studies showed gains in social acceptance or adjustment.
Four studies examined the relationship of academic achievement to athletic achievement, and all showed positive relationships. A positive relationship between somatic illness and adjustment and a positive relationship with muscular fitness were shown in two other studies.

Two studies involving athletic participation in little league baseball showed that the participants were better adjusted, and the preponderance of evidence was that the benefits from participation far surpassed any ill effects. Of two studies involving certain aspects of physical education, both showed that a good physical education program in junior and senior high school increased participation in activities on the college level. Another study involving groups in good and poor physical education programs revealed that a good program increased strength and physical fitness but had no effect on human relations. A case history study investigating the needs of students resolved that opportunity for social participation and competitive sports, acceptance, greater freedom, more firmness, and opportunity to express emotions were among the most prevalent needs. Another found that positive aspects of character and physical abilities were admired by peer groups and contributed to social acceptance.

Studies involving motor skills showed relationship between this factor and body type, health, balance, reaction time, and visual span. One study indicated a moderate correlation between personality and swimming progress of beginners. In the final study reported, a significant improvement in intelligence quotient, physical fitness, and general abilities was found as a result of an intensified physical education program for a group of educationally sub-normal subjects.
Material from Disciplines Outside the Field of Physical Education

The following studies are from disciplines outside the field of physical education, and primarily from the field of psychology. They are concerned with environmental and sensory limitations of human and sub-human organisms and the possible implications of these limitations on the problems of the deaf.

Bayley\(^{54}\) considered that one of the perennial concerns of those trying to understand young human organisms is evaluation of their present status in light of their earlier development and the effect of this on future development. The problem is that of cause and effect relationships between various inherent factors and environmental situations—or between early manifestations and later development.

Bayley advocated that norms be set up on development based on central tendencies of normal, healthy children, because the growth of individuals is often unstable with fluctuations in height, weight and intelligence as compared to peers. The frequency of these shifts indicates they are normal, healthy patterns of growth. An understanding of the reasons might help promote optimal growth and development. It is an unusual child who follows the same course in all of the observed variables in all of his growth.

Bayley further emphasized that, by considering the early stages of the embryo and fetus, it becomes evident that the organisms do not begin with the discrete structures and functions that are observable and may be

classified later. With development there is a progressive differentiation of structures and function with a corresponding trend for each to become independent of the other. There is a continuous change in both structural and functional organization in early development. In studying the individual patterns of growth, one must understand the regular processes of changing organization to be able to adequately assess the relative importance of environmental variables in altering the process of development.

Drever\textsuperscript{55} said certain kinds of learning seem possible only during limited periods in early life. If learning does not occur at this time, it does not occur. He cited Hebb who published a group of facts and surmises indicating that the insightful learning of higher animals is a type of skill which must be learned. Hebb further suggested that organization occurs in the non-specialized cortical areas and that this organization acts as a basis for the perceptual skills and insights upon which later learning depends. He assumed that early learning is characteristically slow until the neural assembly necessary for sudden problem solving is developed. Hebb suggested that, in general, the length of the primary learning period is roughly proportional to the ratio of the total association to the total sensory cortex.

Drever found significant differences in institution children; found them retarded in intelligence, social maturity, and capacity for relationships.

The studies which follow are concerned with the effect of sensory

deprivation on other species.

Cooper and Zubeck\(^{56}\) reported that, in a restricted environment, dull rats showed no impairment as compared to dull controls, while bright rats were retarded to the level of the dull ones in learning. Dull animals benefited from enriched experience and reached a level of performance equal to bright animals reared under normal conditions.

In a study of laboratory rats raised in darkness, Lashley and Russell\(^{57}\) found that the rats raised in darkness quickly adjusted their force of jumping at a feed platform. The first trials were inferior to normal animals, but they quickly became as proficient.

Mowrer\(^{58}\) found that pigeons deprived of sight for the first six weeks, evidenced no fright reflex to hand or other objects passed in front of the eyes.

Studies by Siegel\(^{59}\) on ring doves and fish indicated that they had different patterns of behavior. Flight was difficult for the dove at first, and fish did not use visual cues in getting food if deprived of sight.

\(^{56}\)R. M. Cooper and J. P. Zubeck, "Effects of Enriched and Restricted Environments on the Learning Ability of Bright and Dull Rats," The Research Quarterly, XXX (March, 1959), 124.


Reisen, in a study with chimpanzees, kept in darkness for sixteen months, found they evidenced no optokinetic response when brought into light. Obstacle avoidance, on the basis of visual cues, was absent. In one case, fifty hours of visual experience elapsed before the first signs of visual learning appeared. Later examination gave evidence of severe retinal and optic nerve degeneration.

Hebb advanced the theory that animals exposed to a great deal of perceptual experience in early life will prove to be better learners; that the magnitude of this effect is (within limits) inversely related to the age at which this perceptual experience is gained.

Lemkau suggested that the absence of input of hearing signals to the brain during the critical period for language formation leaves a damaged capacity for communication skills.

Summary. The first of the articles reviewed in this part concerned the factors influencing development of the human organism, of the influence of environmental and inherent factors contributing to total development. Bayley pointed out that the organism does not begin with the discrete structures and functions that may be classified later and that development is an individual matter. Drever investigated the importance of learning at an early age and the importance of sensory and environmental experiences at this time. Drever suggested that learning

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is basically a slow organizational process involving gradual development within the non-specialized cortical areas. Drever found institution children retarded in intelligence, social maturity and capacity for relationships. Lemkau suggested that absence of the input of hearing signals to the brain during the critical period for language formation leaves a damaged capacity for communication skills.

The studies in the last section of this group examined the effect of restricted environmental or sensory experiences on the development of perceptual responses of sub-human organisms.
CHAPTER III

PROCEDURE

Selection of Subjects

One hundred eight male residential students of the Louisiana State School for the Deaf were used as subjects for this study of the relationships existing between school adjustment and age, motor capacity, physical fitness, incidence of hospital visits, athletic success and grade achievement. In order to obtain a homogeneous group in regard to school experiences, the following criteria were used for the selection of subjects:

1. Only students living in the dormitory were used. This criterion was used because students living off the campus do not have equal opportunity for the same experiences.

2. Only students in the Intermediate and Advanced Dormitories were used. This group included all students who had been at the school for three or more years. This criterion was used because many of the younger students have not been at the school long enough to have been greatly influenced by the school environment, and many had not gained enough experience or knowledge to participate in much of the testing which was a part of the study.

All subjects used in the study had equal opportunity for experience in the factors considered.
Factors Studied and Collection of Data

Age. Age, as considered in this study, was the chronological age of the student as recorded on the Students' applications for admission. This age was taken as of May, 1961 and recorded in months. Any portion of a month more than fifteen days was considered as a whole month. Whereas we can do nothing about accelerating or retarding age, experiences can and do change with age. Age was selected as one of the factors for the study in order to determine whether the experiences which were considered in this study had different relationships at different age levels. Subjects used were between the ages of ten and nineteen years, eight months. This restriction was made in order that all of the subjects might have equal opportunity for participation in junior or varsity athletics. Younger students, below the age of ten, are not permitted to participate in the junior sports program, and students who have reached their nineteenth birthdays prior to the opening of school cannot participate in the varsity sports program. The number of subjects at each age is shown in Table III.

Motor Capacity. A motor quotient index, as determined by McCloy's General Motor Capacity Test, was the second factor used in this study. McCloy\(^1\) defines this factor as a type of motor capacity basic to all motor performances involving large range movement, neuromuscular and psychomotor capacity. Capacity is used to indicate potentiality in contrast to achievement. The test for this factor consists of the

**TABLE III**

AGES AND FREQUENCIES OF 108 MALE STUDENTS AT THE LOUISIANA STATE SCHOOL FOR THE DEAF

<table>
<thead>
<tr>
<th>Age in Years</th>
<th>Number of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 to 10.9</td>
<td>7</td>
</tr>
<tr>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>13</td>
<td>12</td>
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<tr>
<td>14</td>
<td>19</td>
</tr>
<tr>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td>18</td>
<td>4</td>
</tr>
<tr>
<td>19</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>108</strong></td>
</tr>
</tbody>
</table>
following items:

1. **McCloy Classification Index** is $20 \times \text{age in years} + 6 \times \text{height in inches} + \text{weight}$. Age was based on school records and height and weight on school hospital records obtained in May, 1961. This item is a measure of size and maturity.

2. The **Sargent Jump** is a vertical jump performed in the following manner: the subject stands in an eighteen inch circle with his shoulder about six inches from a wall to which a chart was secured. Lines were drawn on the chart one centimeter apart using multicolored lines every five centimeters. A colored bath cap was placed upon the subject's head. Height of his jump was gauged by a judge who stood on a ladder about fifteen feet from the subject and checked the highest point jumped. The difference between the height of his jump and the height of the subject was his score. Three trials were given, and the best jump was recorded. Subjects were given a ten to fifteen minute practice session for five days prior to testing.

McCloy reports reliability coefficients for the Sargent Jump as .77 for the best of three jumps with no previous practice and .958 for the best of three jumps after practice.

3. Ten second **Squat Thrust** involves four movements: first, standing in a vertical position; second, squatting down; third, placing hands on the floor and extending feet straight behind; fourth, returning to standing position by bringing feet under shoulders and standing.

\[2\text{Ibid.}, \text{pp. 118-125}\]

\[3\text{Ibid.}\]

\[4\text{Ibid.}, \text{p. 69}\]

\[5\text{Ibid.}, \text{pp. 118-125}\]
Count one fourth for each completed movement made in ten seconds.

McCloy reported reliability coefficient of .921. The test is primarily a test of agility.

4. The Iowa Brace test consists of ten stunts which vary somewhat for different age levels. The first group of forty students was given the first four items in groups of ten with the remainder sitting in the same room. The remainder of the tests was given to groups of ten with no other subjects in the room. In both procedures, the test to be taken was demonstrated until all subjects were sure they understood what was required. The order of performance was rotated after completion of each item. This method was followed in order to equalize effects of any mental practice gained through observing others perform the test.

McCloy reported reliability coefficient of .885 on the Brace test using split-half method. This test is primarily a test of motor educability. McCloy reported a validity coefficient of .512 between these items and ratings made by competent teachers and coefficients of .969 between these items and the following: McCloy Classification Index, McCloy pull up strength score, sixty yard dash, standing broad jump, running high jump, eight pound shot put, Sargent Jump, McCloy pull up strength quotient, ten second squat thrust, Brace test and Otis self-administering intelligence quotient. Correlations are generally high

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6Ibid., pp. 118-125.
7See Appendix.
8McCloy, op. cit., p. 115.
with track and field events and moderate to high with sports requiring greater skill.  

The general motor capacity score was the total of the Classification Index, Sargent Jump, ten second squat thrust, and Iowa Brace test score. Scores made were converted to points according to McCloy's point system. The motor quotient was an index score based on total points divided by the norm for the Classification Index of the subject.

Physical Fitness. Physical fitness was based on the American Association for Health, Physical Education and Recreation Youth Fitness Test. The test and manner of execution were as follows:

1. Pull-ups executed with an overhand grasp, legs extended and without kipping or jerking movements. Score was number of times subject succeeded in placing chin over a horizontal bar after pulling from a vertical position with complete extension of the arms.

2. Sit-ups executed in the following manner: from a prone position on the back, bend trunk forward alternately touching left knee with right elbow and right knee with left elbow. Heels must remain flat; elbows must touch the floor after each execution and cannot be used to initiate the sit-up. Fingers must be interlaced behind the head at all times. One point was scored for each complete sit-up. No points were awarded for sit-ups performed other than as specified above.

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\(^{9}\text{Ibid.}, p. 117.\) \(^{10}\text{Ibid.}, pp. 118-125.\)

\(^{11}\text{American Association for Health, Physical Education, and Recreation, AAHPER Youth Fitness Test Manual (Washington: American Association for Health, Physical Education, and Recreation, 1958), 4-44.}\)
3. For the shuttle-run parallel lines thirty feet apart were used. Two blocks of wood 2" x 2" x 4" were placed behind one of the lines. Subjects started from the opposite line, retrieved one block and placed it behind the starting line, retrieved the second block and crossed the starting line. Two trials, with rest between, were executed, and the better of the two trials was recorded as the score. Timing was done with tenth of a second stop watches, and subjects were run two at a time.

4. Standing broad jump was executed in the following manner: Subjects stood behind a restraining line of tape placed on a mat. Each subject's jump was measured from the back of the restraining line to the heel of the foot or other part of the body closest to the restraining line at the completion of the jump. The jump was measured in feet and inches by use of a steel tape. Five tenths of an inch was counted as one inch; anything less was dropped. The best of three trials was recorded as the score.

5. Fifty yard dash was run on a grass playground adjacent to the football field. Distance was marked by use of powdered oyster shell. Subjects were timed, two at a time, with tenth of a second stop watches. The start was made by arm signals. Vertical position of the arm was the signal for "ready", horizontal position for "set", and a sharp downward movement was used for "go". One trial was given on this test.

6. Six hundred yard walk-run distance was marked off adjacent to the football field. Two complete circuits of a rectangle 120 yards by thirty yards was made by each subject. The starting point of the rectangle was marked by powdered oyster shell. The long sides of the
rectangle were marked by the outer line of the football field and a side-
walk, and the distant corners of the rectangle were marked by pole vault
standards with flags on top of the standards. Subjects were run five at
a time, and each was timed separately with a tenth of a second stop
watch. The members of the physical education staff assisted in timing
the runners. Practically all subjects ran the total distance with the
exception of a few of the smaller boys.

7. For the softball throw for distance, two parallel lines six
feet apart were marked on a grass playground adjacent to the football
field. Subjects were required to throw from between these lines using
an overhand throw. A twelve inch rubber covered softball was used for
the test. Each subject was given three throws. At the completion of
each throw, the point at which the ball made first contact with the
ground was marked. After the completion of three throws, a numbered
stake was driven into the ground to mark the subject's best throw. The
subject then stood by his stake until five of the group had completed
their throws. Distances were then measured by use of a steel tape
extended perpendicular from the restraining line, and the distances were
recorded to the nearest foot.

All testing was done by the writer or a physical education staff
member under his direct supervision.

A subject's physical fitness score was the average percentile of
all of the tests in the battery. These percentiles were based on the
Neilson-Cozens Classification Plan which uses age, height, and weight to
determine classification. Due to the fact that these subjects were not
comparable to a public school population in age-grade achievement, all
subjects under the age of fifteen were graded according to the elementary-
junior high school scale, and those fifteen and over according to the high school scale.

**Incidence of Hospital Visits.** Incidence of hospital visits was included because of frequent excuses from physical education and the high incidence of calls to the school infirmary. These calls numbered more than thirty a day, generally, with as many as forty or fifty on occasion. This incidence is more than ten per cent of the school population. The greater incidence is among girls and the younger children, but these calls do include most of the students. Some of the factors contributing to this high incidence could be homesickness (particularly among the younger children), a desire for attention, or a general feeling of inadequacy which would be contributed to by the handicap of deafness. Hospital calls which were due to definite illness, injury, or for the purpose of obtaining special medicine were not included, because indications of hypochondriasis rather than health status was investigated in this study. Incidence was counted from the daily call book kept by the nurse on duty. A total of 575 calls was made—an average of 5.3 per subject. For causes and incidence of hospital visits see Table IV. The "miscellaneous" item on Table IV includes such things as mosquito bite, listless, sleepy, feel bad, as well as visits recorded without cause stated. Many of the minor cuts and injuries are treated by the coaches or physical education staff members in the training room. None of these was included in this count.

**Athletic Success.** Athletic success was determined by ratings of coaches, physical education instructors, and the investigator. Each
### TABLE IV

**CAUSES AND INCIDENCE OF HOSPITAL VISITS BY 108 MALE STUDENTS AT THE LOUISIANA STATE SCHOOL FOR THE DEAF**

<table>
<thead>
<tr>
<th>Cause</th>
<th>Visits</th>
<th>Cause</th>
<th>Visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapped lips</td>
<td>40</td>
<td>Earache</td>
<td>10</td>
</tr>
<tr>
<td>Minor cuts</td>
<td>30</td>
<td>Bruise</td>
<td>55</td>
</tr>
<tr>
<td>Sore throat</td>
<td>28</td>
<td>Eyes</td>
<td>7</td>
</tr>
<tr>
<td>Stomach ache</td>
<td>6</td>
<td>Pain</td>
<td>8</td>
</tr>
<tr>
<td>Cold</td>
<td>46</td>
<td>Blister</td>
<td>10</td>
</tr>
<tr>
<td>Minor sore</td>
<td>56</td>
<td>Headache</td>
<td>37</td>
</tr>
<tr>
<td>Cough</td>
<td>73</td>
<td>Minor infection</td>
<td>14</td>
</tr>
<tr>
<td>Sore muscles</td>
<td>5</td>
<td>Miscellaneous</td>
<td>150</td>
</tr>
</tbody>
</table>
subject was rated primarily according to his ability within the age group in which he participated, whether it was varsity, junior varsity, intramural, or physical education class participation. Ratings were a composite judgment of all who had knowledge of a subject's ability in any of the activities used as criteria for determining athletic success. The activities used in rating athletic success were: football, basketball, gymnastics (which included tumbling, trampolining, and long horse), softball, swimming, and track. All raters had known the subjects a minimum of one year, and some of the raters had known many of the subjects from three to five years.

Names of the subjects were listed on a blackboard, and ratings were made in conference. Where there was not complete agreement on a rating, the average of the ratings was recorded as the rating. Subjects were rated on a scale of zero to ten. A zero was awarded to any subject who did not participate at all in a particular activity, and a rating of ten was given for most successful participation in an activity. The ratings were totaled for a subject's score on athletic success. All subjects had equal opportunity for participation in all of the activities used for rating.

Grade Achievement. Grade achievement was an index score computed as follows: grade level, as determined by subject's Stanford Achievement Test\textsuperscript{12} score, divided by the subject's age minus six then multiplied by 100 (i.e., a test level of grade 1, age 10 would give a grade achievement

index of 25: \( \frac{1}{(10-5)} \times 100 = 25 \). Teachers considered five of the subjects incapable of taking the Stanford Achievement Test, and these subjects were arbitrarily assigned a test level score of one. The Stanford Achievement Test level was taken from school records of tests administered in May, 1961 by the faculty of the school. Form J of the primary, elementary, intermediate and advanced batteries of the Stanford Achievement Test was used. The primary battery is for use at the end of grade one to the middle of grade three and includes five tests: paragraphing, word meaning, spelling, arithmetic reasoning and arithmetic computation. The elementary battery is for grades three and four and includes these six tests: paragraph meaning, word meaning, spelling, language, arithmetic reasoning, and arithmetic computation. The intermediate battery for grades five and six and the advanced battery for grades seven, eight, and nine include nine tests: paragraph meaning, word meaning, spelling, language, arithmetic reasoning, arithmetic computation, social studies, science, and study skills. All of these tests are heavily loaded with verbal factors which make it difficult for the deaf child.

Test norms were based on over 460,000 pupils throughout the United States in 1952, and the test is regarded as one of the best of its type. Cronbach\(^{13}\) recommended it, his only criticism being that the test lags in curricula content.

**School Adjustment.** School adjustment was determined by ratings in three different areas of school life: teachers' ratings, which were

primarily assessment of adjustment in a classroom situation; supervisors' ratings, which were assessments of adjustment in the dormitory, the dining room, recreation room, and other phases of school life not involving the classroom; and the principal's rating, which was an assessment of the students' adjustment to administrative authority with an additional assessment of personal problems of the students of which the principal was aware or which had been brought to her attention by a student, parents, or others. The principal had been associated with the school during the entire school life of all of the students involved in this study. The six dormitory supervisors had been associated with the school for a period of from two to twenty years, and all except two of the teachers had been associated with the school for at least six years.

The teachers' adjustment ratings were based on the final grades given to the students in their home classrooms. The traits and the weighting used for assessing adjustment by the teacher are shown in Table V. These traits were categorized as "Citizenship" on the report card and were graded "A" for excellent, "B" for good, "C" for satisfactory, "D" for poor, and "F" for failure. These grades were converted to numeric values on the basis of $A = 5, B = 4, C = 3, D = 2, F = 1$. The average of these was taken as the teachers' adjustment ratings.

The supervisors' ratings were made on dormitory reports. See Table VI, page 70, for traits rated with the weights assigned to each. These traits were graded by letter grades and these grades were converted to numerical values on the same basis as the teachers' ratings. Grades on each major trait heading were added separately, and the sum of these main trait categories was averaged. This average was used as the
<table>
<thead>
<tr>
<th>Trait</th>
<th>Weight Assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperation</td>
<td>2</td>
</tr>
<tr>
<td>Courtesy</td>
<td>1</td>
</tr>
<tr>
<td>Accepts just criticism</td>
<td>2</td>
</tr>
<tr>
<td>Respects rights of others</td>
<td>1</td>
</tr>
<tr>
<td>Work habits</td>
<td>1</td>
</tr>
<tr>
<td>Uses time wisely</td>
<td>1</td>
</tr>
<tr>
<td>Care of property</td>
<td>1</td>
</tr>
<tr>
<td>Social adjustment</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>
# TABLE VI

## TRAITS RATED BY SUPERVISORS ON 108 MALE STUDENTS AT THE LOUISIANA STATE SCHOOL FOR THE DEAF WITH WEIGHTS ASSIGNED TO EACH TRAIT

<table>
<thead>
<tr>
<th>Trait</th>
<th>Weight Assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperation</td>
<td>3</td>
</tr>
<tr>
<td>Works well with others</td>
<td></td>
</tr>
<tr>
<td>Follows instructions of houseparents</td>
<td></td>
</tr>
<tr>
<td>Courtesy</td>
<td>1</td>
</tr>
<tr>
<td>Is polite to older people</td>
<td></td>
</tr>
<tr>
<td>Is polite to others in dormitory</td>
<td></td>
</tr>
<tr>
<td>Does not &quot;talk back&quot;</td>
<td></td>
</tr>
<tr>
<td>Personal habits</td>
<td>1</td>
</tr>
<tr>
<td>Keeps self neat in appearance</td>
<td></td>
</tr>
<tr>
<td>Keeps surroundings neat</td>
<td></td>
</tr>
<tr>
<td>Uses time wisely</td>
<td></td>
</tr>
<tr>
<td>Self control</td>
<td>3</td>
</tr>
<tr>
<td>Is not easily angered</td>
<td></td>
</tr>
<tr>
<td>Is not quarrelsome</td>
<td></td>
</tr>
<tr>
<td>Accepts just criticism</td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td>2</td>
</tr>
<tr>
<td>Does right without being watched</td>
<td></td>
</tr>
<tr>
<td>Is honest and truthful</td>
<td></td>
</tr>
<tr>
<td>Respects property of others</td>
<td></td>
</tr>
</tbody>
</table>
subject's score for supervisor's rating. Each subject had only one dormitory supervisor.

In weighting items on dormitory and teachers' reports, an effort was made to assign weights in accordance with the importance attached to these characteristics at the school as an indication of how well the student was adjusting to his environment there. Cronbach\textsuperscript{14} stated:

"The experts are most deeply concerned by signs that the pupil has been having general trouble in adjustment to others or to every day demands."

Cronbach also stated that the core of adjustment is based on realism, self-acceptance, and commitment. The items which were weighted were those which were most closely related to these factors. Additional weighting was given to cooperation and self control in dormitory rating because of the fact that there is greater opportunity and greater need for this characteristic in dormitory life.

The principal's rating was a subjective rating made by the principal over a period of five days. Ratings were on a scale of one to five, with higher values being given to better adjustment. This rating was based on the incidence of disciplinary problems involving the subject, how well the student got along with those in authority and other students, and any personal problems of which the principal, through her function in counselling and guidance, was aware.

\textbf{Statistical Methods}

Calculations were made, by use of matrix and inverse matrix methods

\textsuperscript{14}Cronbach, \textit{Educational Psychology}, p. 558.
as described by Bryant,\textsuperscript{15} on an IBM 1032 computer by the Louisiana State University Computer Center from data provided on an IBM code sheet.

Standard error of multiple correlations was calculated according to Guilford:\textsuperscript{16}

\[
1 - R^2 \over \sqrt{N - M}
\]

Intercorrelations were obtained for the following variables: age, motor quotient index,\textsuperscript{17} physical fitness index,\textsuperscript{18} incidence of hospital visits, athletic success, grade achievement index, total adjustment rating, teachers' adjustment rating, supervisors' adjustment rating, and principal's adjustment rating. Multiple correlations were determined for total adjustment rating, teachers' adjustment rating, supervisors' adjustment rating, and principal's adjustment rating with the independent variables: age, motor quotient index, physical fitness index, incidence of hospital visits, athletic success, and grade achievement index.

Regression coefficients were obtained for each of the independent variables with each of the dependent variables. Significance for the regression coefficients was obtained from T Square\textsuperscript{19} provided by computer calculations.


\textsuperscript{17}McCloy and Young, \textit{Tests and Measurements in Health and Physical Education}, p. 125.

\textsuperscript{18}American Association for Health, Physical Education, and Recreation, AAHPER Youth Fitness Manual.

\textsuperscript{19}Guilford, op. cit., p. 542.
Since regression coefficients cannot be compared directly unless the independent variables are in the same units, standard partial regressions, or Beta weights, were used to convert coefficients to comparable units. Standard partial regressions were obtained from the ratio of the standard deviation of the predictors to the dependent variable times the partial regression coefficients\(^{20}\) obtained from the IBM 1620 computer.

\[ t = b \frac{s_x}{s_y} \]

Per cent of contribution of each predictor to the total multiple correlation was obtained by multiplying the Beta weights of each predictor by its correlation with the dependent variable.\(^{21}\) The coefficient of determination was computed by squaring the multiple correlations.\(^{22}\)

\(^{20}\) Bryant, op. cit., p. 213.

\(^{21}\) Guilford, op. cit., p. 410.

\(^{22}\) Ibid., p. 397.
CHAPTER IV

ANALYSIS OF DATA

In this study the following factors were used as independent variables: age, motor quotient index, physical fitness index, incidence of hospital visits, athletic success ratings, and grade achievement index. The dependent variables were: total adjustment rating, (a composite of the other dependent variables) teachers' adjustment rating, supervisors' adjustment rating, and principal's adjustment rating.

For the purpose of assessing relationships, multiple correlations (Table VII) were made with total adjustment rating, teachers' adjustment rating, supervisors' adjustment rating, principal's adjustment rating and the independent variables. Intercorrelations were made for all variables used (Table VIII, page 76). Partial regressions were computed for the predictors with each criterion (Table IX, page 77), standard partial regression coefficients and per cent of contribution of each predictor to the multiple correlation (Table X, pages 78 and 79).

Multiple Correlation

The multiple correlation coefficient for total adjustment was .65 (S.E. .06), significant at the one per cent level of confidence.¹

TABLE VII
COEFFICIENTS OF MULTIPLE DETERMINATION AND MULTIPLE CORRELATIONS BETWEEN CRITERIA AND PREDICTORS* FOR 108 MALE STUDENTS AT THE LOUISIANA STATE SCHOOL FOR THE DEAF

<table>
<thead>
<tr>
<th>Criteria</th>
<th>$R^2$</th>
<th>$R$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Adjustment Ratings</td>
<td>.42</td>
<td>.65</td>
</tr>
<tr>
<td>Teachers' Adjustment Ratings</td>
<td>.32</td>
<td>.57</td>
</tr>
<tr>
<td>Supervisors' Adjustment Ratings</td>
<td>.19</td>
<td>.44</td>
</tr>
<tr>
<td>Principal's Adjustment Ratings</td>
<td>.34</td>
<td>.59</td>
</tr>
</tbody>
</table>

*Age, motor quotient index, physical fitness index, incidence of hospital visits, athletic success ratings, and grade achievement index.
TABLE VIII
INTERCORRELATIONS OF FACTORS IN STUDY OF 108 MALE STUDENTS AT THE LOUISIANA STATE SCHOOL FOR THE DEAF

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.15</td>
<td>0.01</td>
<td>-0.22</td>
<td>0.16</td>
<td>-0.03</td>
<td>-0.01</td>
<td>0.09</td>
<td>0.04</td>
<td>-0.09</td>
<td></td>
</tr>
<tr>
<td>Motor Quotient</td>
<td>0.15</td>
<td>0.75</td>
<td>-0.14</td>
<td>0.61</td>
<td>0.51</td>
<td>0.32</td>
<td>0.29</td>
<td>0.19</td>
<td>0.26</td>
<td></td>
</tr>
<tr>
<td>Physical Fitness</td>
<td>0.01</td>
<td>0.75</td>
<td>-0.18</td>
<td>0.73</td>
<td>0.48</td>
<td>0.36</td>
<td>0.32</td>
<td>0.18</td>
<td>0.28</td>
<td></td>
</tr>
<tr>
<td>Hosp. Visits</td>
<td>-0.22</td>
<td>-0.14</td>
<td>-0.18</td>
<td>-0.08</td>
<td>-0.03</td>
<td>-0.24</td>
<td>-0.24</td>
<td>-0.19</td>
<td>-0.13</td>
<td></td>
</tr>
<tr>
<td>Athl. Success</td>
<td>0.16</td>
<td>0.61</td>
<td>0.73</td>
<td>0.52</td>
<td>0.42</td>
<td>0.30</td>
<td>0.32</td>
<td>0.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade Achvmt</td>
<td>-0.03</td>
<td>0.51</td>
<td>0.48</td>
<td>-0.03</td>
<td>0.52</td>
<td>0.55</td>
<td>0.48</td>
<td>0.27</td>
<td>0.53</td>
<td></td>
</tr>
<tr>
<td>Total Adj.</td>
<td>-0.01</td>
<td>0.32</td>
<td>0.36</td>
<td>-0.24</td>
<td>0.42</td>
<td>0.55</td>
<td>0.81</td>
<td>0.71</td>
<td>0.82</td>
<td></td>
</tr>
<tr>
<td>Tchr. Adj. Rating</td>
<td>0.09</td>
<td>0.29</td>
<td>0.32</td>
<td>-0.24</td>
<td>0.30</td>
<td>0.48</td>
<td>0.81</td>
<td>0.38</td>
<td>0.54</td>
<td></td>
</tr>
<tr>
<td>Supvr. Adj. Rating</td>
<td>0.04</td>
<td>0.19</td>
<td>0.18</td>
<td>-0.19</td>
<td>0.32</td>
<td>0.27</td>
<td>0.71</td>
<td>0.38</td>
<td>0.46</td>
<td></td>
</tr>
<tr>
<td>Prin. Adj. Rating</td>
<td>-0.09</td>
<td>0.26</td>
<td>0.28</td>
<td>-0.13</td>
<td>0.37</td>
<td>0.53</td>
<td>0.82</td>
<td>0.54</td>
<td>0.46</td>
<td></td>
</tr>
</tbody>
</table>
TABLE IX

PARTIAL REGRESSION COEFFICIENTS OF INDEPENDENT VARIABLES, PURE CONSTANTS FOR DEPENDENT VARIABLES, AND F RATIOS OF DEPENDENT TO INDEPENDENT VARIABLES FOR 108 MALE STUDENTS AT THE LOUISIANA STATE SCHOOL FOR THE DEAF

| Dependent Variables | Pure Constant | Independent Variables | | | | | | | |
|---------------------|---------------|-----------------------|-----|-----|-----|-----|-----|-----|
| Total Adj.          | 10.72         | -.004                 | -.022        | -.005        | -.084         | .049           | .065          |
| F Ratio             | .48           | .57                   | .11          | 7.87a        | 3.46a         | 31.97a         |
| Tchr. Adj. Rating   | 3.18          | .003                  | -.01         | .004         | -.028         | -.0009         | .026          |
| F Ratio             | 1.07          | .57                   | .44          | 4.43a        | .006          | 25.9a          |
| Supvr. Adj. Rating  | 3.75          | -.001                 | -.001        | -.009        | -.027         | .029           | .011          |
| F Ratio             | .23           | .008                  | 2.19b        | 4.71a        | 6.95a         | 4.93a          |
| Prin. Adj. Rating   | 3.35          | -.005                 | -.007        | -.008        | -.027         | .028           | .030          |
| F Ratio             | 2.08          | .22                   | .89          | 2.84b        | 4.17a         | 24.23a         |

\(^a\)Significant at .01 point of confidence.

\(^b\)Significant at .05 point of confidence.
### TABLE X

PARTIAL AND STANDARD PARTIAL REGRESSION COEFFICIENTS, CORRELATIONS BETWEEN PREDICTORS AND CRITERIA, AND APPROXIMATE PERCENTAGES OF CONTRIBUTION OF EACH PREDICTOR FOR 108 MALE STUDENTS AT THE LOUISIANA STATE SCHOOL FOR THE DeAF

#### A. For Total Adjustment Rating

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$SD_x$</th>
<th>$SD_y$</th>
<th>Ratio of $SD_x/SD_y$</th>
<th>$b$</th>
<th>$\beta$</th>
<th>$r$</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>30.0355/2.2167</td>
<td>13.5496</td>
<td>-.0043</td>
<td>-.0583</td>
<td>-.0122</td>
<td>+.07</td>
<td></td>
</tr>
<tr>
<td>Motor Quotient Index</td>
<td>9.2577/2.2167</td>
<td>4.1763</td>
<td>-.0223</td>
<td>-.0931</td>
<td>3.216</td>
<td>-2.99</td>
<td></td>
</tr>
<tr>
<td>Physical Fitness Index</td>
<td>20.4345/2.2167</td>
<td>9.2184</td>
<td>-.0050</td>
<td>-.0461</td>
<td>3.556</td>
<td>-1.64</td>
<td></td>
</tr>
<tr>
<td>Incidence of Hosp. Visits</td>
<td>5.9453/2.2167</td>
<td>2.6685</td>
<td>-.0839</td>
<td>-.2239</td>
<td>-.2438</td>
<td>+5.46</td>
<td></td>
</tr>
<tr>
<td>Athletic Success Rating</td>
<td>10.0303/2.2167</td>
<td>3.6257</td>
<td>.0488</td>
<td>.2208</td>
<td>4.154</td>
<td>+9.17</td>
<td></td>
</tr>
<tr>
<td>Grade Achievement Index</td>
<td>17.5650/2.2167</td>
<td>7.9239</td>
<td>.0648</td>
<td>.5135</td>
<td>.5541</td>
<td>+28.45</td>
<td></td>
</tr>
</tbody>
</table>

$^*$Discrepancy between $R^2$ computed by this method and $R^2$ from the IBM computer is due to rounding errors.

#### B. For Teachers’ Adjustment Rating

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$SD_x$</th>
<th>$SD_y$</th>
<th>Ratio of $SD_x/SD_y$</th>
<th>$b$</th>
<th>$\beta$</th>
<th>$r$</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>30.0355/.8995</td>
<td>33.3913</td>
<td>.0028</td>
<td>.0935</td>
<td>.0924</td>
<td>+.86</td>
<td></td>
</tr>
<tr>
<td>Motor Quotient Index</td>
<td>9.2577/.8995</td>
<td>10.2921</td>
<td>-.0098</td>
<td>-.1009</td>
<td>.2909</td>
<td>-2.94</td>
<td></td>
</tr>
<tr>
<td>Physical Fitness Index</td>
<td>20.4345/.8995</td>
<td>22.7176</td>
<td>.0044</td>
<td>.1000</td>
<td>.3156</td>
<td>+3.16</td>
<td></td>
</tr>
<tr>
<td>Incidence of Hosp. Visits</td>
<td>5.9153/.8995</td>
<td>6.5762</td>
<td>-.0276</td>
<td>-.1815</td>
<td>-.2415</td>
<td>+4.38</td>
<td></td>
</tr>
<tr>
<td>Athletic Success Rating</td>
<td>10.0303/.8995</td>
<td>11.1510</td>
<td>-.0009</td>
<td>-.0100</td>
<td>.3006</td>
<td>-0.3</td>
<td></td>
</tr>
<tr>
<td>Grade Achievement Index</td>
<td>17.5650/.8995</td>
<td>19.5275</td>
<td>.0256</td>
<td>.4999</td>
<td>.4846</td>
<td>+24.23</td>
<td></td>
</tr>
</tbody>
</table>

$^*$Discrepancy between $R^2$ computed by this method and $R^2$ from the IBM computer is due to rounding errors.
### C. For Supervisors' Adjustment Rating

<table>
<thead>
<tr>
<th></th>
<th>$SD_x$</th>
<th>$SD_y$</th>
<th>Ratio of $SD_x/SD_y$</th>
<th>$b$</th>
<th>$\beta$</th>
<th>$r$</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>30.0355/7886</td>
<td>38.0871</td>
<td>-.0012</td>
<td>-.0457</td>
<td>.0422</td>
<td>-.19</td>
<td></td>
</tr>
<tr>
<td>Motor Quotient Index</td>
<td>9.2577/7886</td>
<td>11.7394</td>
<td>-.0011</td>
<td>-.0129</td>
<td>.1879</td>
<td>-.24</td>
<td></td>
</tr>
<tr>
<td>Physical Fitness Index</td>
<td>20.4345/7886</td>
<td>25.9124</td>
<td>-.0094</td>
<td>-.2436</td>
<td>.1772</td>
<td>-4.32</td>
<td></td>
</tr>
<tr>
<td>Incidence of Hosp. Visits</td>
<td>5.9153/7886</td>
<td>7.5010</td>
<td>-.0273</td>
<td>-.2048</td>
<td>-.1941</td>
<td>+3.98</td>
<td></td>
</tr>
<tr>
<td>Athletic Success Rating</td>
<td>10.0303/7886</td>
<td>12.7191</td>
<td>.0291</td>
<td>.3701</td>
<td>.3214</td>
<td>+11.90</td>
<td></td>
</tr>
<tr>
<td>Grade Achievement Index</td>
<td>17.5650/7886</td>
<td>22.2736</td>
<td>.0107</td>
<td>.2383</td>
<td>.2672</td>
<td>+6.37</td>
<td></td>
</tr>
</tbody>
</table>

$R^2 = 17.50^*$

*Discrepancy between $R^2$ computed by this method and $R^2$ from the IBM computer is due to rounding errors.

### D. For Principal's Adjustment Rating

<table>
<thead>
<tr>
<th></th>
<th>$SD_x$</th>
<th>$SD_y$</th>
<th>Ratio of $SD_x/SD_y$</th>
<th>$b$</th>
<th>$\beta$</th>
<th>$r$</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>30.0355/1.098</td>
<td>27.3547</td>
<td>-.0047</td>
<td>-.1286</td>
<td>-.0890</td>
<td>+1.14</td>
<td></td>
</tr>
<tr>
<td>Motor Quotient Index</td>
<td>9.2577/1.098</td>
<td>8.4314</td>
<td>-.0074</td>
<td>-.0624</td>
<td>.2621</td>
<td>-1.64</td>
<td></td>
</tr>
<tr>
<td>Physical Fitness Index</td>
<td>20.4345/1.098</td>
<td>18.6106</td>
<td>-.0075</td>
<td>-.1396</td>
<td>.2773</td>
<td>-3.87</td>
<td></td>
</tr>
<tr>
<td>Incidence of Hosp. Visits</td>
<td>5.9153/1.098</td>
<td>5.3873</td>
<td>-.0266</td>
<td>-.1433</td>
<td>-.1338</td>
<td>+1.92</td>
<td></td>
</tr>
<tr>
<td>Athletic Success Rating</td>
<td>10.0303/1.098</td>
<td>9.1351</td>
<td>.0283</td>
<td>.2585</td>
<td>.3666</td>
<td>+9.48</td>
<td></td>
</tr>
<tr>
<td>Grade Achievement Index</td>
<td>17.5650/1.098</td>
<td>15.9973</td>
<td>.0298</td>
<td>.4767</td>
<td>.5309</td>
<td>+25.31</td>
<td></td>
</tr>
</tbody>
</table>

$R^2 = 32.34^*$

*Discrepancy between $R^2$ computed by this method and $R^2$ from the IBM computer is due to rounding errors.*
The coefficient of multiple determination ($R^2$) was .42. This showed the proportion of variance in the total adjustment ratings associated with or predicted by the independent variables combined with the regression weights and accounted for forty-two per cent of the variance in total adjustment. Approximately twenty-eight per cent of the variance was accounted for by grade achievement, nine per cent by athletic success, and five per cent by incidence of hospital visits. Some negative variance was present in physical fitness and motor quotient index, two and three per cent respectively. Both of these variables had positive and significant correlations of .36 and .32 with total adjustment, but both had negative regression coefficients, indicating some negative relationship with the criterion. Guilford refers to such variables as suppressor variables, whose function is to suppress whatever variance in other independent variables may not be represented in the criterion but is present in some variable that does otherwise correlate with the criterion. Age contributed only .07 per cent to prediction. Incidence of hospital visits made small contribution to prediction on all of the adjustment ratings and had a consistent negative correlation and negative regression with the criteria, which indicated that, as incidence of hospital visits increased, adjustment ratings decreased. The contribution of incidence of hospital visits was a unique contribution, having but one significant intercorrelation with the predictors—a correlation of -.22 with age, significant at the five per cent level of confidence. The contribution of this variable was small, but consistent

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2 Guilford, ibid., p. 403.
throughout the multiple correlations. Grade achievement accounted for more than fifty per cent of the variance in the total adjustment ratings. Prediction would be almost as good using grade achievement index, athletic success, and incidence of hospital visits as it was by using six predictors. Age made no appreciable contribution in any of the multiple correlations.

The multiple correlation coefficient for teachers' adjustment rating was .57 (S.E. .07), coefficient of determination .32 which accounted for thirty-three per cent of the variance in teachers' adjustment ratings. Grade achievement index again contributed the greatest portion to prediction with twenty-four per cent. Incidence of hospital visits contributed four per cent, physical fitness index three per cent, motor quotient index a negative three per cent, and athletic success a negative three tenths per cent. Physical fitness was the only one of the physical variables which made any contribution to the prediction; however all of the physical variables had positive and significant intercorrelations with teacher adjustment rating and grade achievement index, the negative contribution resulting from negative regression coefficients. There was again evidence that these variables had some variance not shared by the criterion and acted as suppressor variables, as indicated by the negative regressions, although having moderate correlations with the predictors which contributed. Grade achievement was again the major contributor to prediction, and, again, prediction would have been almost as effective using two or three of the predictors.

The multiple correlation coefficient for supervisors' adjustment rating was .44 (S.E. .08), significant at the one per cent level of
confidence. This was the smallest of the multiple correlations found in this study. Coefficient of determination was .19, which accounted for approximately nineteen per cent of the variance in supervisors' adjustment ratings. The importance of the variables in this prediction was quite different from the others. Athletic success was the major contributor in this prediction, providing twelve per cent of the prediction. Grade achievement contributed approximately six per cent, and incidence of hospital visits four per cent. Physical fitness contributed a negative four per cent, and age and motor quotient index made contributions of only .02 per cent each. Age, motor quotient index, physical fitness index and incidence of hospital visits all had negative regression weights.

The Principal's adjustment rating had a multiple correlation of .59 (S.E. .07) with the predictors. Coefficient of determination was .34 which accounted for approximately thirty-four per cent of the variance in principal's adjustment ratings. Contributions to prediction were a blend of supervisors' and teachers' ratings, although following the pattern on prediction for teachers' adjustment rating more closely than supervisors' adjustment rating. Grade achievement contributed the most prediction with twenty-five per cent. Athletic success contributed nine per cent, incidence of hospital visits two per cent, and age one per cent. Physical fitness and motor quotient indeces again acted as suppressor variables, having negative regression weights and contributing a negative four and two per cent respectively. Athletic success assumed much more importance in prediction of principal's adjustment rating than in prediction of teachers' adjustment rating, contributing nine per cent to the
prediction. Again, prediction would have been almost as efficient using only grade achievement index, athletic success rating, and incidence of hospital visits.

The percentages reported in the foregoing paragraphs were relative to this correlational situation, with the influences of overlapping among the six predictors taken into account, but the variables predicted in the same rank order as indicated.  

**Intercorrelations**

Correlations of .195 are significant at the five per cent level, and correlations of .254 are significant at the one per cent level of confidence with two variables and 100 degrees of freedom.

Intercorrelations with age were all insignificant except that of -.22 with incidence of hospital visits, significant at the five per cent level of confidence.

Motor quotient index had significant correlations with physical fitness index, .75; athletic success rating, .61; grade achievement index, .51; total school adjustment rating, .32; teachers' adjustment rating, .29; and principal's adjustment rating, .26. The intercorrelations with supervisors' adjustment rating was .19, which was not significant.

Intercorrelations with physical fitness index had significant correlations with athletic success rating, .73; grade achievement index, .48; total school adjustment rating, .36; teachers' adjustment rating,

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.32; and principal's adjustment rating, .28. The only insignificant intercorrelation was with supervisors' rating which was .18.

Incidence of hospital visits had significant negative intercorrelations with total school adjustment, -.24 (five per cent level), and teachers' adjustment rating, -.24 (five per cent level). Intercorrelations with supervisors' adjustment rating was -.19, which was not significant at the five per cent level. Increased incidence of hospital visits was associated with poor adjustment ratings.

Athletic success rating had significant intercorrelations with motor quotient index, .61; physical fitness index, .73; grade achievement index, .52; total adjustment rating, .43; teachers' adjustment rating, .30; supervisors' adjustment rating, .32; and principal's adjustment rating, .37. The only insignificant correlations were with age, .16, and incidence of hospital visits, -.08.

Grade achievement index had significant intercorrelations with motor quotient index, .51; physical fitness index, .48; athletic success rating, .52; total school adjustment, .55; teachers' adjustment rating, .48; supervisors' adjustment rating, .27; principal's adjustment rating, .53. The only insignificant intercorrelations were with age, -.03, and incidence of hospital visits, -.03.

Total adjustment rating had significant intercorrelations with motor quotient index, .32; physical fitness index, .36; incidence of hospital visits, -.24 (five per cent level); athletic success rating, .42; grade achievement index, .55; teachers' adjustment rating, .81; supervisors' adjustment rating, .71; and principal's rating, .82. The intercorrelation with age, -.01, was insignificant.
Teachers' adjustment rating had significant correlations with: motor quotient, .29; physical fitness index, .32; incidence of hospital visits, -.24 (five per cent level); athletic success, .30; grade achievement index, .48; total adjustment rating, .81; supervisors' adjustment rating, .38; and principal's adjustment rating, .54. The only insignificant correlation was with age, .09.

The supervisors' adjustment rating had significant intercorrelations with athletic success rating, .32; grade achievement index, .27; total adjustment rating, .71; teachers' adjustment rating, .38; and principal's adjustment rating, .46. Insignificant intercorrelations were with age, .04; motor quotient index, .19; physical fitness index, .18; and incidence of hospital visits, -.19.

Principal's adjustment rating had significant intercorrelations with motor quotient index, .26; physical fitness index, .28; athletic success rating, .37; grade achievement index, .53; total adjustment rating, .82; teacher adjustment rating, .54; and supervisors' adjustment rating, .46. Insignificant correlations were with age, -.09; and incidence of hospital visits, -.13.

Regressions

Only regressions beyond the five per cent level of confidence were reported in this section. For the complete tabulation of regression coefficients refer to Table IX, page 77. Standard deviations of the variables should be considered when examining the regression coefficients, as partial regression coefficients are the ratio of the dependent variable to the independent variable times the Beta weight and
will increase or decrease in size in proportion to this ratio. These may be found in Table I, page 78.

Significant regression coefficients for total adjustment rating were incidence of hospital visits, -.084; athletic success, .049; and grade achievement, .065.

Significant regressions for teachers' adjustment rating were incidence of hospital visits, -.028; and grade achievement, .026.

Significant regressions for supervisors' adjustment rating were physical fitness index, -.009; incidence of hospital visits, -.027; athletic success, .029; and grade achievement, .01.

Significant regressions for principal's adjustment rating were incidence of hospital visits, -.027; athletic success, .028; and grade achievement, .030.

Discussion of findings

Guilford\(^\text{4}\) gives the following interpretations for correlations: less than .20, slight; .20 to .40, low but definite; .40 to .70, moderate substantial; .70 to .90 high, marked relationship; and .90 to 1.00 very high, very dependable. Correlations in this discussion are referred to according to this interpretation.

Moderate to substantial multiple correlations were obtained with all of the adjustment ratings and the predictors used. See Table VII, page 75. Grade achievement was the largest contributor to adjustment in all areas, followed by incidence of hospital visits and athletic success.

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\(^{4}\)Guilford, \textit{ibid.}, p. 145.
None of the other predictors made any appreciable contribution. Low but consistent correlations were obtained between incidence of hospital visits and adjustment ratings, but very small correlations were obtained with the predictors. This indicated incidence of hospital visits made a unique contribution to prediction. The size of the multiple correlation is increased primarily by high correlations between dependent and independent variables and by small intercorrelations between independent variables.\(^5\)

Intercorrelations and regressions of teachers' and principals' adjustment ratings were in much closer agreement than supervisors' ratings in the same areas. Intercorrelation of supervisors' adjustment ratings were generally lower with the predictors than the other ratings. This aspect of school adjustment seemed quite different from adjustment as reflected by intercorrelations and regressions of principal's and teachers' adjustment ratings. The intercorrelation with teachers' adjustment rating and supervisors' adjustment rating was .38, with the teachers' and principal's .54, and the supervisors' and principal's adjustment ratings .46. The principal's adjustment rating apparently reflected more cognizance of the students' adjustment problems in all areas.

Grade achievement made the greatest contribution to prediction on both the teachers' adjustment rating and the principal's adjustment rating as well as to the total adjustment rating. The contributions to correlations for supervisors' adjustment rating were primarily athletic

\(^5\) Guilford, ibid., p. 401.
success with slightly less contribution made by grade achievement and incidence of hospital visits. Other contributions were small.

The physical variables of motor quotient index, physical fitness index, and athletic success were all moderately related to each other. The moderate correlation of motor quotient index with physical fitness indicated that those with more ability participate more, which is in accordance with most studies made in this area. Physical fitness had a higher correlation than motor quotient index with athletic success, which could indicate that desire for achievement and hard work can offset lesser ability. Athletic success rating had a higher intercorrelation with grade achievement than any of the other predictors.

Means and Standard Deviations for the variables considered are recorded in Table XI. The mean for the group in grade achievement index indicated that the group achieved approximately fifty per cent of groups of the same age level in public schools. The means of the group in physical fitness places the group studied above the fiftieth percentile, which is somewhat above the mean for those upon whom norms were established. The Louisiana State School for the Deaf boys have achieved considerable success in track, basketball, football, and gymnastics.

Conclusions

The following facts may be concluded from an analysis of the findings in this study:

1. There are different factors involved in adjustment within the classroom and adjustment out of the classroom. Although these two adjustments are related and are influenced to some extent by the same
**TABLE XI**

MEANS AND STANDARD DEVIATIONS OF FACTORS IN STUDY OF 108 MALE STUDENTS AT THE LOUISIANA STATE SCHOOL FOR THE DEAF

<table>
<thead>
<tr>
<th>Factors</th>
<th>Means</th>
<th>Standard Deviations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in months)</td>
<td>181.9</td>
<td>30.04</td>
</tr>
<tr>
<td>Motor Quotient Index</td>
<td>97.89</td>
<td>9.26</td>
</tr>
<tr>
<td>Physical Fitness Index</td>
<td>58.82</td>
<td>20.43</td>
</tr>
<tr>
<td>Hospital Visits</td>
<td>5.3</td>
<td>5.92</td>
</tr>
<tr>
<td>Athletic Success</td>
<td>24.5</td>
<td>10.03</td>
</tr>
<tr>
<td>Grade Achievement</td>
<td>42.15</td>
<td>17.57</td>
</tr>
<tr>
<td>Total Adjustment</td>
<td>11.02</td>
<td>2.22</td>
</tr>
<tr>
<td>Teachers' Adjustment Rating</td>
<td>3.93</td>
<td>.90</td>
</tr>
<tr>
<td>Supervisors' Adjustment Rating</td>
<td>3.89</td>
<td>.79</td>
</tr>
<tr>
<td>Principal's Adjustment Rating</td>
<td>3.2</td>
<td>1.10</td>
</tr>
</tbody>
</table>
student experiences, the contributions of these experiences will vary in intensity between these two adjustments.

2. Athletic success was more of a factor in prediction of adjustment outside the classroom than to adjustment within the classroom. Adjustment within the classroom is more dependent on academic success, as evidenced by grade achievement, than it is on pupil experiences outside the classroom.

3. Physical abilities, as measured by physical fitness index and motor quotient index, showed no impairment as compared to equated hearing groups; however, the educational level of the group was much below that of a comparable hearing group.

4. There is no significant relationship between the incidence of hospital visits and physical fitness.

5. There is a substantial relationship between academic success, as evidenced by grade achievement, and certain physical factors such as physical fitness, motor quotient, and athletic success.

6. The extent of problems that appear to exist for adjustment within the classroom and out of the classroom are consistent at all ages.
CHAPTER V

RECOMMENDATIONS FOR FURTHER STUDY

Approximately forty per cent of the variance in adjustment was accounted for by the factors considered in this study. Sixty per cent is not accounted for. Some of the factors not considered are parent-child relationships, teacher-student relationships, church affiliation and interests, size of class, dormitory and classroom physical environment, club affiliations, recreational activities, dining room and dietary factors, student-supervisor ratio, intelligence quotient, age at onset of deafness and causes of deafness. All of these could be factors contributing to adjustment and to academic or athletic success. Further study of these factors and their effects on the student are to be recommended, and similar studies of girls made.

There were significant relationships between certain physical factors and academic achievement. Studies involving control and experimental groups could provide further knowledge as to the nature of this relationship.

The physical abilities of the group studied compared favorably to others. Further study is needed in the area of motor skills in order to better assess the abilities and limitations of the deaf in this area and provide opportunities for success in areas where deafness is less handicapping.
Longitudinal studies involving the factors considered in this study could determine the importance of these factors on success in post graduate life.

There is a scarcity of research in all areas of the deaf. Through continued research knowledge may be increased and the effects of deafness reduced to an extent that the deaf may compete more nearly on a par with hearing groups in every way.
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BIBLIOGRAPHY

A. BOOKS


B. PERIODICALS


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Symonds, Percival M. "Education for the Development of Personality," Teachers College Record, L (December, 1948), 163-169.


C. GOVERNMENT PUBLICATIONS, TESTS, AND UNPUBLISHED THESSES


IOWA BRACE TEST FOR BOYS 9-13 YEARS OF AGE

1. Hop-Backward Test. Stand on either foot. Close eyes and take 5 hops backward. F: (a) open eyes; (b) touch floor with other foot.

2. One-Knee-Balance Test. Right face. Kneel on one knee with other leg raised and with arms raised sideward to shoulder level. Hold position for 5 counts. F: (a) touch floor with other part of body than 1 lower leg; (b) fall over.

3. Half-Turn-Jump-Left-Foot Test. Stand on left foot. Jump, making 1/2 turn to left. Keep balance. F: (a) lose balance; (b) fail to complete 1/2 turn; (c) touch floor with right foot.

4. Forward-Hand-Kick-Test. Jump upward, swinging legs forward. Bend trunk forward and touch toes with both hands before landing. Keep lower legs in as straight a line as possible with upper legs. F: (a) not to touch toes with both hands before landing; (b) bend lower legs more than 45 degrees.

5. Full-Left-Turn Test. Stand with feet together. Jump upward making full turn to left. Land approximately same place from start. (Feet may be separated when landing). Do not lose balance or move feet after they have touched floor. F: (a) not to make full turn to left; (b) move feet after returned to floor; (c) lose balance.

6. Side-Leaning-Rest Test. Sit on floor with lower legs extended and feet together. Put right hand on floor behind body. Turn to right and take side leaning-rest position, resting body on right hand and right foot. Raise left arm and left leg and hold for 5 counts. F: (a) not to take proper position; (b) not to hold position for 5 counts.

7. Grapevine Test. Stand with heels together. Bend trunk forward, extend both arms down between legs and behind ankles and hold fingers of hands together in front of ankles. Hold 5 seconds. F: (a) to lose balance; (b) not to hold fingers of both hands together; (c) not to hold position for 5 seconds.

8. Cross-Legged-Squat Test. Fold arms across chest. Cross feet and sit down. Get up without unfolding arms and without moving feet about to regain balance. F: (a) unfold arms; (b) lose balance; (c) not to get up.

9. Kneel-Jump-to-Feet Test. Kneel on both knees. Rest backs of toes on floor. Swing arms and jump to standing position. Do not rock backwards on toes or lose balance. F: (a) curl toes and rock back on them; (b) not execute jump and not stand still after standing position reached.
10. Russian Dance Test. Squat. Raise one leg forward. Perform a Russian-dance step by extending legs alternately while in squat position. Perform 4 such steps (2 with each leg). Heel of forward foot may touch floor. Heel of rear foot should strike hip on that side of body. Failure: (a) to lose balance; (b) not do stunt twice with each leg.
IOWA BRACE TEST FOR BOYS 14-15 YEARS OF AGE

1. One-Foot-Touch-Head Test. Stand on left foot. Bend trunk forward and place both hands on floor. Raise right leg and extend backward. Touch head to floor and return to standing position without losing balance. F: (a) not touch head to floor; (b) lose balance.

2. Three Dip Test. Take front leaning-rest position. Bend arms, touch chest to floor and push body up until forearms in straight line with upper arms. Execute 3 in succession. Do not touch floor with legs or abdomen. F: (a) not push body up 3 times; (b) not touch chest to floor; (c) touch floor with part of body other than hands, feet and chest.

3. Half-Turn-Jump-Left-Foot Test. Stand on left foot and jump, making 1/2 turn to left. Keep balance. F: (a) lose balance; (b) fail to complete 1/2 turn; (c) touch floor with right foot.

4. Top Test. Sit, lower legs flexed, on floor. Put arms between legs and under and behind knees and grasp ankles. Roll rapidly around to right with weight first over right knee; then over right shoulder, then on back, then on left shoulder and on left knee. Sit up facing opposite direction from start. Repeat from this position and finish facing direction test started. F: (a) release hold of ankles; (b) not complete circle.

5. Double Heel Click Test. Jump upward, clap feet together twice and land with feet apart (any distance). F: (a) not clap feet together twice; (b) land with feet touching each other.

6. Side Leaning-Rest Test. Sit, lower legs extended, feet together. Put right hand on floor behind body. Turn right to side leaning-rest position (body rests on right hand and foot). Raise left arm and leg. Hold for 5 counts. F: (a) not take proper position; (b) not hold five counts.

7. Grapevine Test. Stand, heels together. Bend trunk forward extending both arms down between legs and behind ankles and hold fingers together in front of ankles. Hold 5 seconds. F: (a) not hold fingers together; (b) not hold position for 5 seconds; (c) lose balance.

8. Full-Squat-Arm-Circles Test. Full-squat position, arms raised sideward to shoulder level. Wave arms to make one foot circles and at the same time jiggle body up and down. Continue for 10 counts. F: (a) move feet; (b) lose balance; (c) touch floor with any part of body other than feet; (d) not move hands in circle; (e) not jiggle up and down.

of toes on floor. Swing arms and jump to standing position. Do not rock backwards on toes or lose balance. F: (a) curl toes and rock back on them; (b) not execute jump and not stand still after standing position reached.

10. Russian-Dance Test. Squat. Raise one leg forward. Perform a Russian-dance step by extending legs alternately while in squat position. Perform 4 such steps (2 with each leg). Heel of forward foot may touch floor. Heel of rear foot should strike hip on that side of body. F: (a) to lose balance; (b) not do stunt twice with each leg.
1. One-Foot-Touch-Head Test. Stand on left foot. Bend trunk forward and place both hands on floor. Raise right leg and extend backward. Touch head to floor and return to standing position without losing balance. F: (a) not touch head to floor; (b) lose balance.

2. Forward Hand Kick Test. Jump upward, swinging legs forward. Bend trunk forward and touch toes with both hands before landing. Keep lower legs in as straight a line as possible with upper legs. F: (a) not to touch toes with both hands before landing; (b) bend lower legs for more than 45 degrees.

3. Kneel-Jump-to-Feet Test. Kneel on both knees. Rest backs of toes on floor. Swing arms and jump to standing position. Do not rock backward on toes or lose balance. F: (a) curl toes and rock back on them; (b) not execute jump and not stand still after standing position reached.

4. Stork-Stand Test. Stand on left foot. Hold bottom of right foot against medial side of left knee. Place hands on hips. Shut eyes and hold position for 10 seconds without moving left foot. F: (a) lose balance; (b) not hold right foot against left knee; (c) open eyes or move hands off hips.

5. Single Squat Balance Test. Squat on either foot. With hands on hips, raise one leg forward. Hold position for 5 counts. F: (a) move hands from hips; (b) touch floor with raised leg; (c) not hold 5 seconds.

6. Grapevine Test. Stand with heels together. Bend trunk forward, extend both arms down between legs and behind ankles and hold fingers of hands together in front of ankles. Hold 5 seconds. F: (a) lose the balance; (b) not hold fingers of both hands together; (c) not hold the position for 5 seconds.

7. Three Dip Test. Take front leaning-rest position. Bend arms, touching chest to floor and push body up again until forearms are in a straight line with upper arms. Execute 3 performances in succession. Do not touch floor with legs or abdomen. F: (a) not push body up 3 times; (b) not touch chest to floor; (c) touch floor with part of body other than hands, feet, and chest.

8. Side Kick Test. Swing left leg sideways to left, jump up with right leg. Strike feet together in air and land with feet apart. Feet should strike together in line that would go to left of left shoulder. F: (a) not swing leg enough to side; (b) not strike feet together in air to left of left shoulder; (c) not land with feet apart.
9. Russian Dance Test. Squat. Raise one leg forward. Perform a Russian-dance step by extending legs alternately while in squat position. Perform 4 such steps (2 with each leg). Heel of forward foot may touch floor. Heel of rear foot should strike hip on that side of body. F: (a) to lose balance; (b) not do stunt twice with each leg.

10. Jump-Foot Test. Hold toes of one foot in opposite hand. Jump upward with free foot jumping over foot held. Do not release hold of foot. F: (a) release foot that is held; (b) not jump through loop made by foot and arm.
AUTOBIOGRAPHY

Benjamin Louis Ruhl was born in Plaquemine, Louisiana, completed high school at Baton Rouge High School, and obtained a B. S. degree from Louisiana State University in June, 1940.

Following graduation, he was employed as coach and physical education instructor at the Louisiana State School for the Deaf.

In June, 1941 he joined the R.C.A.F. where he completed pilot training and served with the Canadian Air Force in Canada and England until December, 1943. At this time he transferred to the United States Air Force in London, England. Ruhl served as a single engine fighter pilot with the United States in England, France, Germany, Austria, Japan and Korea and had additional duty as athletic officer.

Upon separation from the service in March, 1946, he became Boys' Athletic Director at the New Orleans Y.M.C.A. and served until September, 1949 when he enrolled at Louisiana State University to obtain a master of science degree. During this period he was employed at the Baton Rouge Y.M.C.A. as aquatic director. The M. S. degree, with a major in recreation and a minor in physical education, was awarded in August, 1950.

Ruhl continued work at the Baton Rouge Y.M.C.A. serving as Physical Director and, later, Program Director until September, 1953 when he was employed by the Louisiana State School for the Deaf as Director of Physical Education, Recreation and Athletics, in which position he is employed at present.
EXAMINATION AND THESIS REPORT

Candidate: Benjamin Louis Ruhl

Major Field: Physical Education

Title of Thesis: A STUDY OF SCHOOL ADJUSTMENT AS RELATED TO CERTAIN PHYSICAL AND PSYCHOLOGICAL CHARACTERISTICS POSSESSED BY MALE STUDENTS AT THE LOUISIANA STATE SCHOOL FOR THE DEAF

Approved:

Francis A. Nixey
Major Professor and Chairman

Max Goodrich
Dean of the Graduate School

EXAMINING COMMITTEE:

J. W. Kistler
Henry O. Dresser
George J. Packer, Jr.
Mary E. Moore

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