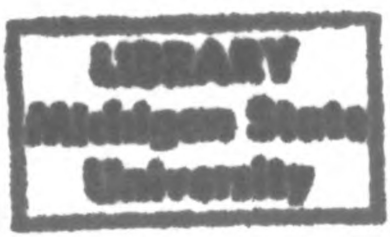
A STUDY OF SWIMMING ABILITY AND RELATED FACTORS

Thesis for the Degree of M. A.

MICHIGAN STATE UNIVERSITY

Jerome McFarland, Jr.

1960



A STUDY OF SWIMMING ABILITY AND RELATED FACTORS

by

JEROME McFARLAND, JR.

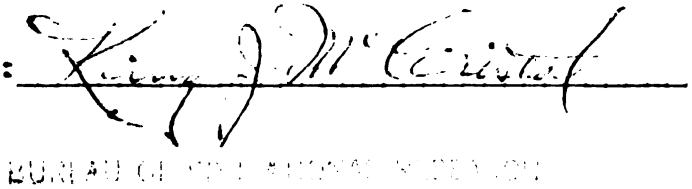
AN ABSTRACT

Submitted to the College of Education
Michigan State University of Agriculture and
Applied Science in partial fulfillment of
the requirements for the degree of

MASTER OF ARTS

Department of Health, Physical Education, and Recreation

1960

Approved: 

JEROME McFARLAND, JR. ABSTRACT

Statement of the Problem

The purpose of this study is to collect and analyze data pertaining to the relationship of swimming ability of white and non-white freshmen men at Michigan State University in relationship to the following factors: body type, father's employment, parents' ability to swim, attitudes toward swimming, type of swimming instruction, and the utilization of swimming facilities.

Methodology

Information was obtained by questionnaires distributed to the students who attended classes of Foundations of Physical Education during the week of October 6, 1959. The data were compiled, tabulated, and analyzed. The Chi Square statistic was used in the analysis.

Some of the Significant Findings

Listed are a summary of the findings in this study:

1. Non-white students are less frequently able to swim.

2. Body types do not seem to affect ability to swim.

3. Students whose fathers are business or professional persons are more likely to be able to swim when they enter college than the children of farmers, skilled and unskilled workers.

4. There does not seem to be a close relationship between parents' ability to swim and the son's ability to swim.

5. Negative attitudes such as the dislike of water and fear are more common among non swimmers than among swimmers.

6. Students who have had formal instruction in swimming are more likely to be able to swim when they enter college but the majority of swimmers have been self taught.

7. There appears to be a direct relationship between ability to swim and the utilization of swimming facilities.

Suggestions for Further Study

1. A study should be done to determine if the same factors affect swimming ability among both male and female college freshmen.

2. A study should be done to examine the swimming ability of boys and girls at the junior high school and senior high school levels.

3. A study of the methods of treating psychological aspects of the learning of swimming skills should be done.

4. A study should be done of the relationship of the specific gravity of the body to body type and to the ability to swim.

5. A study of the reasons for the more frequent dislike of the water by non-white students should be done.

6. A study should be done to explore further and to clarify the effects of specific attitudes upon the ability to swim.

A STUDY OF SWIMMING ABILITY AND RELATED FACTORS

by

JEROME McFARLAND, JR.

A THESIS

Submitted to the College of Education
Michigan State University of Agriculture and
Applied Science in partial fulfillment of
the requirements for the degree of

MASTER OF ARTS

Department of Health, Physical Education, and Recreation

1960

ACKNOWLEDGMENTS

The author would like to express his appreciation to Dr. King McCristal for his interest, advice, and criticisms during the preparation of this study. Appreciation is also extended to Dr. Roy Niemeyer who assisted the writer in the distribution of the questionnaires and also in his advice on the preparation of the study. The writer also appreciated the cooperation of the students who completed the questionnaires. He also wishes to thank his wife for her assistance in the preparation of the manuscript. He also wishes to acknowledge the cooperation of his children Mary Anne, Michael, and Joan during the period when he was engaged in the collecting and tabulating of the data since he necessarily had to neglect them during this time.

TABLE OF CONTENTS

CHAPTER PAGE

LIST OF TABLES

CHAPTER I

THE PROBLEM AND DEFINITIONS OF TERMS USED

I. THE PROBLEM

Statement of the Problem

The problem with which this thesis deals is the examination of the relationship of swimming of white and non-white freshmen at Michigan State University to such factors as body type, father's employment, parents' ability to swim, attitudes toward swimming, type of swimming instruction, and the utilization of swimming facilities and a comparison of these racial groups with respect to these factors.

This study is an attempt to discover the answers to the following questions:

1. Is there a significant difference in ability to swim between white and non-white students?

2. Is there a significant difference in ability to swim among men representing various body types?

3. Is there a relationship between the father's type of employment and the son's ability to swim? The answer to this question may demonstrate that there is a relationship between social-economic status and ability to swim.

4. Is there a relationship between the ability of the parents to swim and a son's ability to swim?

5. Do attitudes toward swimming affect one's ability to swim?

6. Does the availability of formal instruction in swimming have a positive relationship on the ability to swim?

7. Is there a significant relationship between the utilization of swimming facilities and ability to swim?

Importance of the Study

Swimming is a motor skill which is considered by most physical educators and recreation workers to be an important skill to teach all young people. It is generally believed that many tragic drownings might be avoided if all our school systems included swimming instruction in their physical education programs. Swimming is also considered to be a valuable leisure time activity since it is an activity in which an individual may participate most of his life. It offers opportunity to participate in a large muscle activity that is beneficial to the entire body, for both individual and group activities. Swimming is also frequently a part of physical education programs which are adapted for the physically, emotionally, socially, and mentally handicapped.

Since it is generally believed that swimming should be taught in our public school systems, many new junior and senior high schools have included pools in their structures. However, many physical education instructors have raised questions about the ability of all students to learn to swim. In addition, some have reported that Negroes have to "work

harder at learning" to swim and particularly learning to float due to higher specific gravity, muscularity, and heavy bone structure. Some instructors have also claimed that it is difficult for slender,linear body type individuals to learn to swim and float. There have also been reports that there is greater motivation to learn to swim in the upper social-economic groups in our society. It has been assumed that there would be greater motivation in learning if the parents could swim.[1] It is generally believed that negative attitudes, such as fear, may cause muscular tension and reduce capacity to swim.[2] Educators have frequently stressed the fact that lack of formal instruction and lack of facilities have limited the learning of swimming.

This study, therefore, is an attempt to explore the validity of these assumptions and to determine whether there are conditions which may seriously limit the learning of the motor skills necessary for swimming. It is believed that the findings of this study may be helpful to physical educators who are faced with the requirement of teaching swimming to all students except those who are excused on a medical basis. It should be of assistance to them in clarifying the relationships mentioned above as well as to help them to plan their instruction to meet the needs of individual students.

---

[1]William Clark Trow, Educational Psychology (Boston: Houghton-Mifflin Company, 1950), p. 587.

[2]Ibid., p. 189.

Hypothesis

Ability to swim is positively related to availability of swimming facilities, to attitudes toward swimming, to parents' ability to swim, to the social and economic status of the parents, to body types, and to the availability of formal instruction. There is no significant relationship between race and ability to swim.

This hypothesis may be divided into these minor hypotheses:

1. Lack of adequate swimming facilities reduces ability to swim.

2. Students who have had frightening experiences in the water and have had a fear of swimming are more frequently unable to swim than those students who have not had such experiences.

3. If the parents are able to swim, the child is able to swim.

4. Students whose fathers are business or professional persons are more likely to be able to swim when they enter college than the children of fathers who are in the lower social economic occupations.

5. Students who have had formal instruction in swimming are able to swim when they enter college.

6. A greater proportion of non-white students than of white students are unable to swim when they enter college.

7. Body type affects the ability to swim.

Plan of Study

To test the major and minor hypotheses, the writer decided to study the male freshman class which entered Michigan State University in September, 1959. Since practically all male students must register for a foundation course in physical education, it was decided to use a questionnaire to collect the desired data and to distribute and collect this questionnaire using all foundation students during the second week of the Fall quarter of 1959.

Limitations of the Study

Although the findings of this study might be applicable on a national basis, the writer will be able only to generalize for Michigan since most of the students who responded to the questionnaire are residents of the state of Michigan. Since this state is unique in the number of lakes and rivers, it is apparent that a greater proportion of swimming facilities should be available to Michigan residents than to residents of states which have a different geography and thus would have an effect upon the findings.

The study was based upon the data collected through the use of a structured questionnaire. There may be some misrepresentation on the part of the participants since they completed the questionnaire in an informal atmosphere in the gymnasium and communication was possible among the members of the sixty class groups to which the questionnaire was distributed. A few students treated the questionnaire in a

frivolous fashion and gave such responses for "race" as: "one-half mile," and "human." Others did not understand the terminology and included ethnic background in place of race. Some did not answer all the questions due to the pressure of time and their attitudes toward the questionnaire.

Another limitation was the lack of an exact tabulation of the number of students to whom questionnaires were distributed. The writer was prepared to meet 2400 students. Only about 1850 questionnaires were distributed; 1726 responses were returned. In checking with the physical education department it was found that the test results were available on 1649 students. With changes in students' schedules and absentees, it was found impossible to check the study questionnaire against the formal swimming test results. Thus, the data includes only the students' evaluations of ability to swim.

Since the data collected in the questionnaire has no means of being checked, there may be some discrepancies on some of the items. It is also difficult for an individual (particularly a male) to admit fear and frightening experiences so that the information on attitudes may not be accurate. In fact, in tabulating the data relating to fear it was noticed that there were many erasures.

The questionnaire did not include any evaluation of the facilities available. It might be that if the facilities were evaluated in terms of availability and adequacy, results might have been different.

In addition, the data which was collected on the father's employment presents only a rough estimate of the social and economic status of the students.

The writer also considered the fact that no figures on race were available at this university and this made it difficult to ascertain the accuracy of his figures. It was also impossible to compare results with other schools and the armed forces due to this same restriction on keeping records of racial background.

The writer was also limited in his search of the literature since both the University of Michigan and the University of Illinois refused to send theses on related material through the inter-library loan service.

Another limitation is that the problem with which this study is concerned is a broad one and there may be many other influences upon the ability to swim than those about which data have been collected. However, the writer decided to limit this study to the specific areas of available facilities, types of instruction available, body types, general attitudes toward swimming, parents' ability to swim, and father's employment.

Another limitation is the imbalance between the number of white and non-white students. Approximately 91 per cent were white, 3 per cent were non-white, and 6 per cent did not indicate their race.

II. DEFINITION OF TERMS USED

Ability to Swim

In this study ability to swim means the ability to swim fifty yards with one or several strokes without stopping or floating.

Race

Race means a group whose members' physical characteristics conform on an average to arbitrarily selected differentials. In this study the individual's statement on his race (white or Caucasion, Mongols, or Orientals, and Negroes or colored), has been accepted without any attempt to distinguish any sub groups.

Body Types

The instructors who "body types" the students used the Sheldon Classification system.[1] The writer grouped the data into ten classes: if an individual ranked six or above in a single area he was considered to be a "pure" representative of that group; if he was a four or five in any types, he was classified as a mixed type, with the stronger type preceding the lesser type in the classification; average was used to describe any combination of numbers under five.

Formal Instruction

Formal instruction includes individual or group teaching of the skills of swimming within a school system or a community agency program.

---

[1]See Appendix.

III. PLAN OF PRESENTATION

The writer reviewed the literature to develop a background for the study. Chapter II includes reports on similar and related studies.

Chapter III includes a review of research methods and statistics which were employed.

This study includes descriptive characteristics of the group studied, and data concerning ability to swim, type of instruction available, body types of the students in the study group, father's employment, attitudes toward swimming, and information on the ability of the parents to swim. This material is presented and analyzed in Chapter IV.

In Chapter V a brief summary of the study as well as conclusions, recommendations, and implications which might be drawn from the study will be presented.

CHAPTER II

REVIEW OF THE LITERATURE

This chapter is a review of the literature which pertains to the relationship of racial background to motor skills,and relationship of body types to swimming, and the relationship of emotional factors.to swimming.

Swimming is probably one of the oldest sports of mankind. We know from studies of ancient history that the residents of the countries around the Mediterranean "bathed" in the rivers and ocean. We know that their warriors had to swim across rivers in the course of their strategic attacks. However, we know little about how such skills were taught but can preseume that fathers taught sons, and also that formal instruction was available to the upper classes since such training was usually available for the other motor skills such as fighting, riding a horse, and javelin throwing. The study of the specifics of such motor skill training began late in the nineteenth century with the findings of psychologists on the learning patterns of men and animals. At first, there was emphasis upon the theory that satisfactory habits or skills might be learned if the individual was given a satisfying reward or an effective punishment. Later there was recognition that we learn some skills as "wholes" and

that one could not divide each skill into its many multiple parts. At the same time, during the second and third decade of the twentieth century there was a growing understanding that learning both academic skills as well as motor skills depended on a great variety of conditions and abilities. However, there has not been consensus on this latter theory, especially as regards the teaching of swimming skills.

In a search of the literature, only one article could be located which presented documentary evidence that socio-economic and cultural factors affected the development of swimming skills. Johnson[1] reported that among Negroes who were attending college in September of 1948, the percentage of non-swimmers was extremely high. He had done a survey at Howard University in 1947 and again in 1948. He had used a questionnaire to ascertain the physical background, interests, and needs of the students. However, he found that although seventy-three per cent of the 300 students who had participated in the study had been given formal instruction many still could not swim. The population which was studied considered themselves as Negroes and came from twenty-nine different states, the Virgin Islands, Puerto Rico, Bermuda, and British Guiana. Johnson also contacted ninety Negro institutions of higher learning. He found that eighty-two

---

[1]Thomas Johnson, "Survey of Swimming in Negro Colleges," Journal of the American Association of Health, Physical Education, and Recreation, June-July, 1949.

had no swimming facilities and that only eight included swimming as a course in their physical education program. Only three of these include competitive swimming meets and varsity swimming teams. However, the fact that these three colleges, Tennessee Agricultural and Technical College, Hampton Institute, and Virginia State College were able to carry out competitive swimming meets with other colleges, gave an indication that race was not the reason for the low percentage of swimmers among the student body at Howard University. Johnson, therefore, concluded that the lack of swimming skill is no doubt due primarily to the lack of sufficient encouragement in instruction and opportunities for swimming. He expressed extreme doubt about the effect of anatomical and physiological characteristics upon the basic ability to swim although such attributes might be important in competitive swimming.

According to James C. Evans of the Office of the Assistant Secretary of Defense no racial designations are now kept throughout the armed forces. However, in earlier Selective Service compilations studies of swimming ability of Negro and white service men yielded no significant differences.[1]

Captain T. M. Foster, of the Department of the Navy, reported that there have been no known studies conducted by the Navy in problems involved in teaching Negroes to swim.[2]

---

[1]See letter in Appendix.

[2]See letter in Appendix.

Most of the studies which have been published concerning the teaching and learning of motor skills of swimming have concentrated on the mechanics of the body motions. It has been extremely difficult, however, to isolate the variables in order to study them under laboratory conditions since individuals operate differently if any ropes or machinery are attached to their bodies while they are swimming. Researchers have depended rather heavily upon observation and motion pictures to understand the component parts of the skills involved in swimming.

Alley reported that he attempted to study the effect of drag or two upon a swimmer by the use of an apparatus placed at the edge of the pool.[1] He attached pulleys to the arms and legs of the swimmer who was being studied and recorded upon the machine the use of force and velocity of the swimmer. He was then able to establish a theoretical formula concerning the effect of water resistance and propulsion on the crawl stroke. He found that waves increase the drag, that normal arm and leg motions are more effective in propelling the body, that the bent arm reduces velocity, that water resistance increases with the decrease of an effective stroke, and that the swimmer was equally effective whether he swam using his arms alone or using only his legs for kicking. However, he tested only one subject, a member

---

[1]Louis Alley, "An Analysis of Water Resistance and Propulsion in Swimming the Crawl Stroke," Research Quarterly, October, 1952, p. 253.

of the Iowa varsity swimming team, who had also been chosen as a member of the "All American Swimming Team." One might judge that this individual might have special talents or qualities but Alley did not give any facts about the swimmer's sociological and psychological background. In addition, it would be difficult to evaluate whether the test results were biased or not since only one subject was used. However, one might conclude that condition of the water certainly would affect the stroke of most swimmers and that beginners might be discouraged or frightened if waves affect the drag or tow upon the body.

Karpovitch reported on his studies of teaching swimming at Springfield College.[1] He used a tow attached at one end to the swimmer being tested and at the other end to an electric motor. He used both men and women as subjects. Included were "Aryan" and "Japanese" subjects. He concluded that water resistance depended upon skin friction, eddy resistance, and wave-making resistance. In his study group, the men floated better on their backs than on their stomach. Karpovitch also found that head turning while swimming increased resistance. He found no difference in resistance which occurred while the swimmers were nude or when they were wearing silk suits.

---

[1]Peter Karpovitch, "Analysis of the Propelling Force in the Crawl Stroke," Research Quarterly, Vol. 6, No. 2 (May, 1935), pp. 49-58.

Karpovitch gave no indication that there were any observed differences in the racial groups which were included in this study. He also gave no indication that physical, social, and psychological characteristics were considered in the study.

Later, in an analysis of the propelling force in the crawl stroke, he concluded that excellence in the use of the crawl stroke depends on the subjective qualities of the coach's help on the utilization of the arm and leg actions.[1] He based this decision upon further study of the body mechanics in swimming. He tied a ball to the arms of the swimmer being tested and clocked his velocity. He then freed the arms and tied the ball to the legs of the swimmer being tested. He found that those who had less skill in swimming tended to have poor leg action and depended on their arms about seventy-seven per cent of the time. Swimmers who were effective in the use of the crawl stroke used their arms about seventy per cent of the time. He found that the length of the man's body had no effect on the validity of this study. However, he did not report on whether there was any correlation between body type and the effectiveness of the crawl stroke.

---

[1]Peter Karpovitch, "Water Resistance in Swimming," Research Quarterly, Vol. 4, No. 3 (October, 1933), pp. 21-28.

Again, one finds that there is an emphasis on the mechanics without any regard to variables which might affect the result. For example, the majority of the subjects in Springfield College were men who were preparing to teach in recreational and character building agencies and had been selected on the basis of physical, mental, and emotional characteristics.[1] Therefore, it might be assumed that they had greater motivation to be effective in swimming and that only those who might meet such requirements had been accepted in the program. In the first volume of Research Quarterly, in 1929, Cureton reported on an analysis he had made of the crawl stroke.[2] He indicated that there had been no published research up to that time on the body mechanics of swimming and that coaches needed an analysis to help them teach their teams. In observation of experiments on the use of a variety of kicking actions he concluded that the "up" motion on the kick was more important than the down motion, and that the flapping kick and hooked foot were both less efficient than the flutter kick. He found that kicking from the hips was more effective than kicking from the knee or ankle. He stressed the fact that ankle flexibility was very important.

---

[1]Discussion with Y.M.C.A. Staff Member.

[2]Thomas Cureton, "Mechanics and Kinesiology of Swimming," Research Quarterly, Vol. 1, No. 1 (1929), p. 87.

He concluded that the strength of the muscles of the back and abdomen were very important in effective swimming and that the thigh muscles carry the principal burden. On the basis of this conclusion he recommended land practice to increase hip strength. However, he noted that there seemed to be individual differences among the men tested and that such unstudied variables seemed to affect the results.

In this article, one might infer that there is greater recognition of the multiple components involved in swimming. Although there was no mechanical measuring of results since only motion pictures and observation were used in the research, the results seemed to have been validated by practice since performance according to his recommendations have generally been effective.

Cureton continued his study of the individual differences in swimming and later reported that he had found that swimmers with a high degree of mesomorphy in body type were record breakers in Olympic events.[1] However, swimmers with a combination of ecto-mesomorphy were better on long distance events in competitive swimming. He also found that champion swimmers were less strong and slower in reaction time than track stars. Some of the swimmers seemed to have enlarged hearts. The swimmers had better "floatability" and buoyancy,

---

[1]Thomas Cureton, Physical Fitness of Champion Athletes (Urbana: University of Illinois Press, 1951).

above average vital capacity, but there was no consistent pattern of strength. In general they had good patterns of rhythm but were not exceptional at flexibility. However, Cureton again recommended that there be more study on individual difference in relation to such variables as age, race, and body type.

Armbruster also stressed this point since his observations and experiments had let him to conclude that the human body does not always have buoyancy.[1] He indicated that the ability of the body to rise to the surface depended upon the relation of the amount of bone, muscle, and fats, and the air retained in the lungs because the specific gravity of the whole body is usually less than that of the water.

Thus, research on swimming has stressed body mechanics. Nevertheless, there has been recognition of factors other than those which have been measured or observed may affect ability to perform and to excel in this particular motor skill.

There have been a few studies on the relationship of the learning of general motor skills and race. Hipple summarized some of these studies:[2]

---

[1]Daniel Armbruster, "Teaching Beginners to Swim," Journal of the American Association of Health, Physical Education, and Recreation, Vol. 7 (April, 1936), pp. 242-244.

[2]Joseph Hipple, "Racial Differences in Motivation and Reaction Time," Research Quarterly, Vol. 25 (October, 1954), pp. 297-306.

1. Lambeth and Lanier found, in 1933, that on the Minnesota speed of movement test the two races' medians were practically identical.

2. Moore reported, in 1941, that there was no statistical difference between the races in a speed test. They used a test of putting marbles into appropriate rows.

3. Freeman found that during reaction time tests the subjects had faster reaction when they were told to get their muscles into a state of slight tension than when they were just instructed tomove as fast as they could.

4. Stroud found that his subjects exhibited an increase in muscular tension during effortful activity such as tracing a maze.

Hipple also reported that coaches comment that white boys are more likely to "tie up" in competition than non-whites. He also had found that there was a general impression that the mongolian and white races were different in emotions and motivation. He compared three Negroes and three whites and no significant differences in emotions and motivation could be discovered. He found that there might be some differences in the amount of motivation. He could find no differences in reaction time, movement time, or muscular tension. When information on progress and encouragement was given during the tests there was greater variability in the improvement of the Negroes but it was not statistically significant.

Thus, Hipple contradicts the speculation that Negroes are superior in performance in sprints and jumping due to racial background. He infers that motivation probably is the significant cause of differences.

Brown[1] also tested reaction times of whites and Negroes and found a small but significant difference between the patellar tendon reflex time of whites and Negroes. The fact that the Negroes showed some superiority suggested that the spinal responses might have a bearing on the speed of Negro athletes in sprints. However, Brown hastened to add that this conclusion was merely suggestive and that a more complete study of the neuro-muscular responses of Negroes was needed.

Muzzy[2] tested the hypothesis that an increase in speed of reaction time and/or movement time due to information would be accompanied by a rise in muscle tension. She found that this hypothesis was valid for the white boys but not for the Negro boys. There was far greater variance in the improvement among the Negroes when they were given information on progress. However, there was no significant difference between the white and Negro boys in reaction time, movement time, or muscular tension during the first and unmotivated part of the experiment.

---

[1]Robert Brown, "A Comparison of the Patellar Tendon Reflex Time of Whites and Negroes," Research Quarterly, Vol. 6 (May, 1935), pp. 121-126.

[2]Dorothy Muzzy, "Group Progress of White and Colored Children in Learning a Rhythm Pattern," Research Quarterly, Vol. 4 (October, 1933), pp. 62-70.

Thus, in spite of what Hipple described as the "legion" of speculative theories on the physical differences between the races, none were found under these laboratory conditions. There seemed to be some differences in emotional responses but the groups studies were so small and the information available on the subjects so limited that one could not draw any conclusion on the psychological or sociological differences.

Body Types

The study of body types started in early Greek days and has continued until the present. The most generally accepted technique and classification system are those developed by Sheldon. He designed a plan of classifying the three first order variables on a scale from 1-7. The three major classifications are endomorphy (soft and fat), mesomorphy (muscular), and ectomorphy (long, thin, and fragile). He found that patterns of interest and general abilities seemed to be similar for each of these general classifications.[1]

Cureton used this system in his evaluation of the fitness of champion athletes. In his study of body types Cozens found that tallness and heaviness were more generally characteristic of those individuals with better general performance ability.[3]

---

[1]W. H. Sheldon, S. S. Stevans, and W. B. Tucker, Varieties of Human Physique (New York: Harper and Company, 1940).

[2]Cureton, Physical Fitness of Champion Athletes, op.cit.

[3]Trow, op. cit., p. 624.

Psychological Aspects

According to Trow,

> Swimming is a peculiarly complex coordination which many of the lower animals do not have to learn but which for man is relatively difficult to acquire. From the point of view of learning it has special interest since it involves considerable emotional content (at first), new bodily orientation, and continuing overall bodily involvement.[1]

He suggested that fear might be overcome by a group situation, by having the water neither too cold nor deep, by permitting the use of rubber tubes, by not forcing, scaring, punishing, or scolding, but instead by developing a climate of confidence, interest, and enthusiasm.[2]

Copp indicated that there was no good answer to how to teach beginning swimmers to relax but that there are tricks which sometimes work, such as, overcoming fear and developing confidence in the water.[3]

Trow also indicated that in any motor skill which requires practice one must have a strong incentive for practice. The learner may fear the displeasure of parents, friends, and coaches or may want to work for their approbation. If the family and peer group expect the individual to learn to swim he will probably work harder at practicing than if his cultural group put little value on such a skill.

---

[1] Ibid., p. 624.

[2] Ibid.

3H. W. Copp, "Swimming as a Motor Skill" (unpublished doctoral dissertation, School of Education, University of Michigan, Ann Arbor, Michigan, 1937).

Thus, it is clear that the dispelling of fear seems to be of paramount importance in the initial instruction in swimming. In addition, one must have a desire for approbation from one's culture group to invest the time and energy in learning the skills. It would appear that the values may vary among different social economic groups, and that one's value scale would affect the emphasis on swimming.

Summary

In summary, swimming appears to be a motor skill which is greatly affected by the emotional status of the learner. There has been no documentary proof that there are physiological or anatomical differences in ability to swim or in any other motor skill. There has been some proof that champion swimmers are usually mesomorphs but no indication that persons with other body type could not effectively learn the basic fundamentals of swimming. As with other motor skills, attitudes and readiness affect the capacity of the learner and his progress in learning. In addition, most motor skills require that the learner find internal satisfaction in the skill and that social approbation may be a strong incentive.

CHAPTER III

METHODOLOGY

The relationship of ability to swim to race, to body types, to social-economic status, to parents' ability to swim, to selected attitudes toward swimming, to type of swimming instruction available, and to swimming facilities is being examined in this study. This chapter deals with themethod of compiling the data for this study. It deals with the selection of the setting in which the study was made, the developing and distributing of the questionnaire, the tabulation of the data, and the statistical methods employed in the compilation of the data.

Selecting of the Setting

In order to test the hypothesis that "ability to swim is positively related to availability of swimming facilities, to attitudes toward swimming, to parents' ability to swim, to social-economic status, to body type, and to the availability of formal instruction" and "there is no relationship between ability to swim and race," the writer decided to test the male freshman class which entered Michigan State University in the Fall of 1959. This group is required to take a swimming classification test and a foundation course in physical education. Therefore, it was expected that this

group would include a small proportion of non-white students and that the great majority would be white. The group might be considered as representative of a midwestern college population. According to the Registrar's Office there were 2399 freshmen men who entered college in the Fall of 1959. A number of these students were excused from the basic foundation course in physical education and, consequently, from the swimming classification tests. Others decided to postpone the tests until later in the year. Therefore, contact was made with about seventy-two per cent of the incoming freshmen males.

Development of the Questionnaire

In order to collect the desired data, a questionnaire was developed. Consultation was held with several faculty members of the Department of Health, Physical Education, and Recreation and permission was obtained to distribute the questionnaire during the week of October 6, 1959. A copy of the questionnaire is included in the Appendix.

Techniques of Distribution

The instructor in each of the sixty sections of the foundation course in physical education announced to each class that each student was being asked to complete a questionnaire during the general classification program. If a student inquired about the requirement, he was told that it was not mandatory to submit the questionnaire. The writer, with the help of the individual instructors and students,

distributed the forms and also collected them during the same class period. Extra copies were available in a box. A box was also left at the door for the deposit of questionnaires which were not completed at the time of the original collection.

Percentage of Returns

Questionnaires were returned by seventy-two per cent of the entering freshman class. Of the approximately 1850 questionnaires which were distributed, 1726 were returned. This return represented about ninety-three per cent of the questionnaires distributed.

According to the Department of Health, Physical Education, and Recreation, about 1677 students took the classification test so that it is presumed that after completing the first week of orientation some students dropped the course.

Tabulation of Results

The information on the questionnaires was tabulated by long hand and arranged in tables.

Analysis of Data

Percentages were computed for the tables and the Chi Square statistic was then used to analyze the material. The formula used was:

$$X^2 = \frac{(O - E)^2}{E}$$

Comparisons were made of swimmers with non-swimmers, white swimmers with non-white swimmers, white non-swimmers with non-white non-swimmers, white swimmers with white non-swimmers, and non-white swimmers with non-white non-swimmers.

An attempt was made to tabulate the nationality background of parents and grandparents. However, there appeared to be so much confusion between the meaning of race and nationality as well as a neglect of considering the four grandparents that the factors were eliminated from the focus of the study.

In tabulating the employment of the fathers, the Dictionary of Occupational Terms was used to assist the writer in the appropriate classification of the occupations. Teachers, engineers, doctors, lawyers, chemists, and clergy are considered as "Professional Workers." The category of sales, management, and selfemployed includes all the independent business men, contractors, insurance personnel, and administrative workers. Skilled workers included such jobs as welder, die maker, carpenter, and mechanic. Unskilled workers were generally the "laborers." Public Service included all governmental workers except those in the professions as well as service operators such as bus drivers and railroad workers. Farmer appears to be self-explanatory but there was no classification on the basis of size or type of farming.

In tabulating the racial background of the students the word of the student was accepted. Responses on which race was not given were not included in the analysis of the material.

This chapter has presented the method of selecting the setting in which the study was made, the developing and distributing of the questionnaire, the tabulation of the data, and the statistical methods employed in the compilation of the data.

CHAPTER IV

PRESENTATION AND ANALYSIS OF THE DATA

This chapter includes the summary of the descriptive characteristics of the groups studied and the data which were collected on ability to swim, body types, fathers' employment, parents' ability to swim, type of initial swimming instruction, attitudes toward swimming, and facilities utilized.

This study was an attempt to study the relationship of swimming ability of white and non-white college males in the freshman class at Michigan State University to such factors as body type, fathers' employment, parents' ability to swim, attitudes toward swimming, type of initial swimming instruction, and the utilization of swimming facilities and to compare the two racial groups with respect to these factors. A questionnaire was distributed to the men who attended the sixty sections of the required course on Foundations of Physical Education during the week of October 6, 1959. Responses were received from 1726 students (approximately seventy-two per cent of the male freshmen who were registered in college at that time and about ninety-three per cent of those who received questionnaires in the classes). This chapter will present the data and an analysis of it on

the basis of comparisons of (1) swimmers and non-swimmers, (2) white swimmers and non-white swimmers, (3) white non-swimmers and non-white non-swimmers, (4) white swimmers and white non-swimmers, and (5) non-white swimmers and non-white non swimmers on the selected factors mentioned above.[1]

General Characteristics

Age. In Table I the age and race of those who responded to the questionnaire are presented. Almost two-thirds of the total group are eighteen year olds. It would appear from this point of view the group was typical of the national picture of those entering college for the first time.[2]

TABLE I

AGE AND RACE OF RESPONDENTS

Age	Number of White	Negro	Other Non-White	No Information on Race	Total	% of Total
Under 17	7	2	0	0	9	1
17-18	298	14	2	21	335	19
18-19	1024	27	2	58	1111	64
19-20	146	5	3	4	158	9
20 and over	96	5	1	11	113	7
TOTAL	1571	53	8	94	1726	100

[1]Chi Square results and probabilities are noted under each table.

[2]U. S. Office of Education Reports, 1957.

Race. About ninety-one per cent of the study group indicated that they were white. Three per cent indicated that they were non-white. Of the non-white group (sixty-one students), fifty-three (eighty-seven per cent) indicated that they were Negro. The remaining eight included five orientals, two American Indians, and one "mixture." Since the number was so small the writer grouped the Negroes, Orientals, and others as "Non-White." About six per cent of the respondents gave no information concerning race or information which was not an appropriate answer such as "human," "American," and "fifty yards." According to the 1950 census, the non-whites accounted for about seven per cent of our national population. However, since this minority group has generally tended to be concentrated in the South, and since a lower percentage of the minority group attend college the three per cent proportion seemed to be representative of the non-white college population in the Mid-West.

Ability to swim. In Table II the data on ability to swim are presented. It may be seen that there was a statistically significant difference between the two racial groups in reference to their own evaluation of swimming ability. In Table III the per cent of swimmers and non-swimmers in each racial group is presented. It is apparent that there was a considerable difference between the white and non-white students' ability to swim. The data support the theory that the non-white students in this area were more frequently unable to swim.

TABLE II

COMPARISON OF ABILITY TO SWIM FIFTY YARDS
ON THE BASIS OF RACE

Response	Number of White	Number of non-White	Number That Gave No Information on Race	Total
Yes	1342	40	74	1456
No	217	21	18	256
No Information on Ability	12	0	2	14
TOTAL	1571	61	94	1726

$X^2 = 24.82$ P = less than .001

TABLE III

COMPARISON OF ABILITY TO SWIM FIFTY YARDS
ON THE BASIS OF RACE IN PER CENT

Response	Per Cent White	Per Cent Non-White	Per Cent No Information on Race	Total Number of Cases
Able to swim	85	66	79	1456
Unable to swim	14	34	19	256
No Information on Ability	1	0	2	14
Number of Cases	1571	61	94	1726

In examining the background of the non-white students it was found that twenty students (thirty-eight per cent) were from Michigan. Of this Michigan group it was found that sixty-five per cent could swim. There was one swimmer and one non-swimmer from each of the following states: Alabama, Indiana, New Jersey, Ohio, and Washington, D. C. There was one non-swimmer from the Virgin Islands and two swimmers. In addition, there were seven swimmers from the states on the East Coast and three non-swimmers from the South (two from Arkansas and one from Louisiana). One student from East Africa could not swim, while two from Illinois and one from Oklahoma could swim. Thus it appeared that state of residence was not directly related to ability to swim.

In examining the background of the white non-swimmers about seventy per cent came from Michigan while the others came predominantly from New York, Connecticut, and the states which are geographically close to Michigan.

Relationship of Swimming Ability to Selected Factors

Body type. In Tables IV through IX the data on the comparison of body types of the white and non-white students in relation to the ability to swim are presented. When swimmers were compared with non-swimmers, it appeared that the differences were statistically significant. The fact that so few swimmers were classified as ectomorphs or endomorphs gave considerable weight to the Chi Square results. However,

TABLE IV

COMPARISON OF PERCENTAGE OF BODY TYPES OF WHITE AND NON-WHITE SWIMMERS AND NON-SWIMMERS

Body Type	% White Swimmers	% Non-White Swimmers	% White Non-Swimmers	% Non-White Non-Swimmers
Average	.40	.30	.45	.12
Mesomorph	.04	.15	.02	.20
Ectomorph	.04	--	.04	.05
Endomorph	.01	--	.01	.05
Meso-Ectomorphy	.13	.18	.09	.15
Meso-Endomorph	.04	.02	.03	--
Ecto-Mesomorph	.14	.08	.17	.05
Ecto-Endomorph	--	--	.01	.10
Ecto-Mesomorph	.03	--	.15	.05
Endo-Ectomorph	.01	.02	.01	.05
No Information on Body Type	.16	.25	.12	.05
Number of Cases	1342	40	217	21

TABLE V

COMPARISON OF BODY TYPES OF SWIMMERS AND NON-SWIMMERS

Body Type	Swimmers	Non-Swimmers	Total
Average	572	110	682
Mesomorph	63	10	73
Ectomorph	55	12	67
Endomorph	18	6	24
Meso-Ectomorph	189	25	214
Meso-Endomorph	49	7	56
Ecto-Mesomorph	209	41	250
Ecto-Endomorph	10	3	13
Ento-Mesomorph	42	13	55
Endo-Ectomorph	11	2	13
No Information on Body Type	238	27	265
Total Number of Cases	1456	256	1712

$X^2 = 25.13$ P = .01-.001 10 degrees of freedom

TABLE VI

COMPARISON OF BODY TYPES OF WHITE SWIMMERS AND NON-WHITE NON-SWIMMERS

Body Type	White Swimmers	Non-White Swimmers	Total
Average	531	12	543
Mesomorph	56	6	62
Ectomorph	52	0	52
Endomorph	18	0	18
Meso-Ectomorph	171	7	178
Meso-Endomorph	47	1	48
Ecto-Mesomorph	193	3	196
Ecto-Endomorph	9	0	9
Endo-Mesomorph	39	0	39
Endo-Ectomorph	10	1	11
No Information on Body Type	216	10	226
TOTAL	1342	40	1382

$X^2 = 24.35$ P = .01 - .001 10 degrees of freedom

TABLE VII

COMPARISON OF BODY TYPES OF WHITE NON-SWIMMERS AND NON-WHITE NON-SWIMMERS

Body Type	White Non-Swimmers	Non-White Non-Swimmers	Total
Average	98	5	103
Mesomorph	5	5	10
Ectomorph	9	1	10
Endomorph	3	1	4
Meso-Ectomorph	20	3	23
Meso-Endomorph	6	0	6
Ecto-Mesomorph	38	1	39
Ecto-Endomorph	1	2	3
Endo-Mesomorph	12	1	13
Endo-Ectomorph	1	1	2
No Information on Body Type	24	1	25
Number of Cases	217	21	238

$X^2 = 14.07$ P = .10 - .20 10 degrees of freedom

TABLE VIII

COMPARISON OF BODY TYPES OF WHITE SWIMMERS AND WHITE NON-SWIMMERS

Body Type	White Swimmers	White Non-Swimmers	Total
Average	531	98	629
Mesomorph	56	5	61
Ectomorph	52	9	61
Endomorph	18	3	21
Meso-Ectomorph	171	20	191
Meso-Endomorph	47	6	53
Ecto-Mesomorph	193	38	231
Ecto-Endomorph	9	1	10
Endo-Mesomorph	39	12	51
Endo-Ectomorph	10	1	11
No Information on Body Type	216	24	240
Total Number of Cases	1342	217	1559

$X^2 = 20.82$ P = .02 - .05 10 degrees of freedom

TABLE IX

COMPARISON OF BODY TYPES OF NON-WHITE SWIMMERS AND NON-WHITE NON-SWIMMERS

Body Type	Non-White Swimmers	Non-White Non-Swimmers	Total
Average	12	5	17
Mesomorph	6	5	11
Ectomorph	0	1	1
Endomorph	0	1	1
Meso-Ectomorph	7	3	10
Meso-Endomorph	1	0	1
Ecto-Mesomorph	3	1	4
Ecto-Endomorph	0	2	2
Endo-Mesomorph	0	1	1
Endo-Ectomorph	1	1	2
No Information on Body Type	10	1	11
TOTAL	40	21	61

$X^2 = 4.63$ P = .90 - .95 10 degrees of freedom

there was a wide range of body types among both swimmers and non-swimmers.

In comparing the white swimmers with the non-white swimmers the Chi-Square was also statistically significant due primarily to the fact that there was a much higher proportion of mesomorphs and no ideal ectomorphs or endomorphs in the non-white group. However, if one groups the average and mesomorph types together, these classifications account for forty-four to forty-five per cent of both the white and non-white swimmers. The only classification which had distinctly fewer swimmers was in the ecto-endomorph group.

The differences between the white and non-white non-swimmers in body types were statistically insignificant. Again the average and mesomorph classification accounted for practially half of each group. The differences between the white swimmers and white non-swimmers appeared to be statistically significant. The major differences occurred in the greater number of endo-mesomorphs who could not swim and in the greater number of meso-ectomorphs who could swim.

The differences between the non-white swimmers and non-white non-swimmers were statistically non-significant. Again, the average and mesomorphs accounted for about forty-five per cent of both swimmers and non-swimmers.

Thus body type does not seem to limit the ability to swim although body type may account for some of the difficulties which those who have heavy muscles and less buoyance may

meet in learning to swim. It may be that the non-white non-swimmers were somewhat hindered in their learning to swim due to heavy muscular bodies.

Employment of Fathers. In Tables X through XV the data on the comparison of the employment of the fathers of the swimmers and non-swimmers are presented. There appeared to be a number of significant differences among the study groups in relation to the employment of fathers. In comparing swimmers with non-swimmers, the fathers of the swimmers were concentrated in the professional, sales, management, and self-employed classification, while the fathers of the non-swimmers tended to be in the skilled, unskilled, and farmer categories. In comparing the white and non-white swimmers there were also statistically significant differences. The non-white group had few fathers in sales, management, self-employed, and the farmer category but had a much higher proportion in professional positions and in public service employment.

In the comparison of the employment of the fathers of the white non-swimmers and the non-white non-swimmers there were also statistically significant differences. The non-white group had few fathers in professional or sales categories. More than twenty per cent of the white non-swimmers had come from homes where the main occupation was farming. The non-white group also had proportionately more fathers in public service employment.

TABLE X

COMPARISON OF EMPLOYMENT OF FATHERS OF WHITE AND NON-WHITE SWIMMERS AND NON-SWIMMERS

Occupational Classification	% White Swimmers	% Non-White Swimmers	% White Non-Swimmers	% Non-White Non-Swimmers
Professional	17	28	12	05
Sales, Management, and Self-Employed	30	05	15	--
Skilled	19	22	21	14
Unskilled	7	10	9	24
Farmer	5	--	22	5
Public Service	8	18	5	19
Deceased	4	05	2	9
No Information on Employment	10	12	13	24
Number of Cases	1342	40	217	21

TABLE XI

COMPARISON OF EMPLOYMENT OF FATHERS OF SWIMMERS AND NON-SWIMMERS

Occupational Classification	Number of Swimmers	Number of Non-Swimmers	Number Total
Professional	263	29	292
Sales, Management, and Self-Employed	432	38	470
Skilled	275	49	324
Unskilled	102	24	126
Farmer	67	56	123
Public Service	120	15	135
Deceased	37	12	49
No Information on Employment	120	33	193
Number of Cases	1456	256	1712

$X^2 = 75.24$ $P = .001$ 7 degrees of freedom

TABLE XII

COMPARISON OF EMPLOYMENT OF FATHERS OF WHITE SWIMMERS AND NON-WHITE SWIMMERS

Occupational Classification	Number of White Swimmers	Number of Non-White Swimmers	Number Total
Professional	236	11	247
Sales, Management and Self-Employed	406	2	408
Skilled	259	9	268
Unskilled	90	4	94
Farmer	66	0	66
Public Service	110	7	117
Deceased	34	2	36
No Information on Employment	141	5	146
Number of Cases	1342	40	1382

$X^2 = 22.92$ P = .01 - .001 7 degrees of freedom

TABLE XIII

COMPARISON OF EMPLOYMENT OF FATHERS OF WHITE NON-SWIMMERS AND NON-WHITE NON-SWIMMERS

Occupational Classification	Number of White Non-Swimmers	Number of Non-White Non-Swimmers	Total Number
Professional	25	1	26
Sales, Management, and Self-Employed	34	0	34
Skilled	45	3	48
Unskilled	19	5	24
Farmer	47	1	48
Public Service	11	4	15
Deceased	8	2	10
No Information on Employment	28	5	33
Number of Cases	217	21	238

$X^2 = 26.62$ P = .001 7 Degrees of freedom

TABLE XIV

COMPARISON OF EMPLOYMENT OF FATHERS OF WHITE SWIMMERS AND WHITE NON-SWIMMERS

Occupational Classification	Number of White Swimmers	Number of White Non-Swimmers	Total Number
Professional	236	25	261
Sales, Management and Self-Employed	406	34	440
Skilled	259	45	304
Unskilled	90	19	109
Farmer	66	47	113
Public Service	110	11	121
Deceased	34	8	42
No Information on Employment	141	28	169
Number of Cases	1342	217	1559

$X^2 = 64.33$ P = .001 7 degrees of freedom

TABLE XV

COMPARISON OF EMPLOYMENT OF FATHERS OF NON-WHITE SWIMMERS AND NON-WHITE NON-SWIMMERS

Occupational Classification	Number of Non-White Swimmers	Number of Non-White Non-Swimmers	Total Number
Professional	11	1	12
Sales, Management and Self-Employed	2	0	2
Skilled	9	3	12
Unskilled	4	5	9
Farmer	0	1	1
Public Service	7	4	11
Deceased	2	2	4
No Information on Employment	5	5	10
Number of Cases	40	21	61

$X^2 = 11.66$ P = .0 - .20 7 degrees of freedom

When the white swimmers' fathers' employment was compared with that of white non-swimmers, there were statistically significant differences. The non-swimmers' fathers tended to be predominantly in skilled work and farming while the swimmers' fathers were in the professional or business categories.

There were no statistically significant differences between the non-white swimmers and non-white non-swimmers in reference to fathers' employment. In examining Table X it is apparent that a greater proportion of the fathers of the swimmers were in professional positions and skilled jobs while more of the fathers of non-swimmers were unskilled workers or farmers. However, in comparing the two groups one must keep in mind that in almost one-fourth of the cases of the non-white non-swimmers no information was given on the father's employment.

In general, it appears that the sons of professional and business persons generally were able to swim while the sons of farmers and unskilled workers appeared to be more frequently unable to swim.

Father's ability to swim. In Tables XVI through XXI the data on the comparison of the ability to swim of the fathers of the swimmers and the non-swimmers are presented. Statistically significant differences were found in comparing the ability to swim of the fathers of the swimmers and non-swimmers. It is clear that the swimmers' fathers

TABLE XVI

COMPARISON OF FATHER'S ABILITY TO SWIM OF WHITE AND NON-WHITE SWIMMERS AND NON-SWIMMERS

Response	% White Swimmers	% Non-White Swimmers	% White Non-Swimmers	% Non-White Non-Swimmers
Able to swim	84	58	61	62
Unable to swim	13	28	35	28
No Information on Ability	3	14	4	10
Number of Cases	1342	40	217	21

TABLE XVII

COMPARISON OF FATHER'S ABILITY TO SWIM OF SWIMMERS AND NON-SWIMMERS

Able to Swim	Number of Swimmers	Number of Non-Swimmers	Total Number
Yes	1207	155	1362
No	194	90	284
No Information	55	11	66
TOTAL	1456	256	1712

$X^2 = 37.08$ P = .001 3 degrees of freedom

TABLE XVIII

COMPARISON OF FATHER'S ABILITY TO SWIM OF WHITE AND NON-WHITE SWIMMERS

Able to Swim	Number of White Swimmers	Number of Non-White Swimmers	Total Number
Yes	1127	23	1150
No	170	11	181
No Information	45	6	51
TOTAL	1342	40	1382

$X^2 = 19.95$ P = .001

TABLE XIX

COMPARISON OF FATHER'S ABILITY TO SWIM OF WHITE NON-SWIMMERS AND NON-WHITE NON-SWIMMERS

Able to Swim	Number of White Non-Swimmers	Number of Non-White Non-Swimmers	Total Number
Yes	133	13	146
No	75	6	81
No Information	9	2	11
TOTAL	217	21	238

$X^2 = 1.525$ P = .30 - .50

TABLE XX

COMPARISON OF FATHER'S ABILITY TO SWIM OF WHITE SWIMMERS AND WHITE NON-SWIMMERS

Able to Swim	Number of White Swimmers	Number of White Non-Swimmers	Total Number
Yes	1127	133	1260
No	170	75	245
No Information	45	9	54
TOTAL	1342	217	1559

$X^2 = 68.79$ P = .001

TABLE XXI

COMPARISON OF FATHER'S ABILITY TO SWIM OF NON-WHITE SWIMMERS AND NON-WHITE NON-SWIMMERS

Able to Swim	Number of Non-White Swimmers	Number of Non-White Non-Swimmers	Total Number
Yes	23	13	36
No	11	6	17
No Information	6	2	8
TOTAL	40	21	61

$X^2 = 26.12$ P = .001

were generally able to swim while less than two-thirds of the non-swimmers' fathers could swim. In comparing the ability to swim of the fathers of white swimmers and non-white swimmers there were also statistically significant differences. Over four-fifths of the white swimmers' fathers could swim while less than three-fifths of the non-white swimmers' fathers could swim.

In comparing the non-swimmers of the two racial groups there were no significant differences. In both groups about three-fifths of the fathers could swim. In comparing the white swimmers and non-swimmers there was a considerable difference which was significant according to the Chi Square statistical comparison. Over four-fifths of the swimmers' fathers could swim and about three-fifths of the non-swimmer's fathers could swim.

There was a statistically significant difference between the non-white swimmers and non-white non-swimmers fathers' ability to swim. In both groups the data revealed that twenty-eight per cent of the fathers were unable to swim. The Chi Square comparison showed a difference, apparently significant due to the lack of information on the part of the respondents in both groups which gave weight to the amount of difference. However, there were similar proportions of fathers who could and who could not swim.

Thus, it would appear that the fathers of the white swimmers were more generally able to swim than the fathers of the non-white swimmers, non-white non-swimmers, and the white non-swimmers.

Mother's ability to swim. In Tables XXII through XVII the data on the comparison of the ability to swim of the mothers' of the swimmers and non-swimmers are presented. In making the general comparison of the mothers' of swimmers and non-swimmers statistically significant differences were found. Almost two-thirds of the mothers of white swimmers were able to swim. This fact made the difference statistically significant. In comparing the white swimmers with the non-white swimmers it appeared that proportions were almost reversed in respect to the mothers' ability to swim. There was less difference in the ability of the mothers to swim among white non-swimmers than among the non-white non-swimmers. In this instance the differences seemed to be caused by the numbers of respondents who did not answer this part of the questionnaire since there were similar proportions of mothers who could not swim (sixty-one per cent).

In comparing the non-white swimmers' mothers swimming ability with the mothers of the non-white non-swimmers there was no statistically significant difference of the swimming ability.

It appeared that there was considerable similarity among the two non-white groups and the white non-swimmer group in reference to the swimming ability of the mothers.

TABLE XXII

COMPARISON OF THE ABILITY TO SWIM OF THE WHITE AND NON-WHITE SWIMMERS AND NON-SWIMMERS MOTHERS

Response	% White Swimmers	% Non-White Swimmers	% White Non-Swimmers	% Non-White Non-Swimmers
Able to swim	61	33	35	29
Unable to swim	37	60	61	61
No Information on Ability	2	7	4	10
Number of Cases	1342	40	217	21

TABLE XXIII

COMPARISON OF THE ABILITY TO SWIM OF THE MOTHERS OF SWIMMERS AND NON-SWIMMERS

Able to Swim	Number of Swimmers	Number of Non-Swimmers	Total Number
Yes	872	88	960
No	540	159	699
No Information	44	9	53
TOTAL	1456	256	1712

$X^2 = 58.35$ $P = .001$

TABLE XXIV

COMPARISON OF THE ABILITY TO SWIM OF THE MOTHERS OF WHITE SWIMMERS AND NON-WHITE SWIMMERS

Able to Swim	Number of White Swimmers	Number of Non-White-Swimmers	Total Number
Yes	816	13	829
No	488	24	512
No Information	38	3	41
TOTAL	1342	40	1382

$X^2 = 60.46$ $P = .001$

TABLE XXV

COMPARISON OF THE ABILITY TO SWIM OF THE MOTHERS OF WHITE NON-SWIMMERS AND NON-WHITE NON-SWIMMERS

Able to Swim	Number of White Non-Swimmers	Number of Non-White Non-Swimmers	Total Number
Yes	76	6	82
No	134	13	147
No Information	7	2	9
TOTAL	217	21	238

$X^2 = 6.50$ P = .05 - .10

TABLE XXVI

COMPARISON OF THE ABILITY TO SWIM OF MOTHERS OF WHITE SWIMMERS AND WHITE NON-SWIMMERS

Able to Swim	Number of White Swimmers	Number of White Non-Swimmers	Total Number
Yes	816	76	892
No	488	134	622
No Information	38	7	45
TOTAL	1342	217	1559

$X^2 = 59.99$ P = .001

TABLE XVII

COMPARISON OF THE ABILITY TO SWIM OF MOTHERS OF THE NON-WHITE SWIMMERS AND NON-WHITE NON-SWIMMERS

Able to Swim	Number of Non-White Swimmers	Number of Non-White Non-Swimmers	Total Number
Yes	13	6	19
No	24	13	37
No Information	3	2	5
TOTAL	40	21	61

$X^2 = 3.65$ P = .10 - .20

Type of initial instruction. The data on initial instruction in swimming are presented in Tables XXVIII through XXXIII. The study groups were given the choice of three answers in respect to the type of instruction: self taught, taught by family or friends, and formal instruction. About ninety-two per cent of the respondents answered this section of the questionnaire.

In comparing the swimmers with the non-swimmers it was found that in the white and non-white swimmer groups over half of the students considered themselves as "self taught," while in the non-swimmer group over half gave no information on the type of instruction. There appeared to have been generally a higher proportion of students in the swimmer group who had received instruction than in the non-swimmer group. However, when the two swimmer groups were compared the differences were not as great although they still may be regarded as statistically significant. When the white swimmers were compared with the white non-swimmers, it is again apparent that the swimmers had reported a much greater proportion of all types of instruction.

There were few statistically significant differences in the comparison of the two non-swimmer groups. Over one-half of each group gave no information on instruction and both reported only limited instruction by other sources. The largest number indicated that they were self taught. In comparing the two non-white groups there were some significant differences. More than twice as high a proportion of

TABLE XXVIII

COMPARISON OF THE PER CENT OF SELECTED TYPES OF INITIAL INSTRUCTION OF THE WHITE AND NON-WHITE SWIMMERS AND NON-SWIMMERS

Type of Instruction	% White Swimmers	% Non-White Swimmers	% White Non-Swimmers	% Non-White Non-Swimmers
Self	50	58	31	24
Family or Friends	21	4	10	5
Formal Instruction	28	38	10	14
No Information on Instruction	1	0	49	57
Number of Cases	1342	40	217	21

TABLE XXIX

COMPARISON OF THE TYPES OF INITIAL INSTRUCTION OF THE SWIMMERS AND NON-SWIMMERS

Type of Instruction	Number of Swimmers	Number of Non-Swimmers	Total Number
Self	739	78	817
Family or Friends	293	23	316
Formal Instruction	419	25	444
No Information on Instruction	5	130	135
TOTAL	1456	256	1712

$X^2 = 775.80$ $P = .001$ 3 degrees of freedom

TABLE XXX

COMPARISON OF THE TYPES OF INITIAL INSTRUCTION OF THE WHITE SWIMMERS AND THE NON-WHITE SWIMMERS

Type of Instruction	Number of White Swimmers	Number of Non-White Swimmers	Total Number
Self	677	23	700
Family or Friends	279	2	281
Formal Instruction	382	15	397
No Information on Instruction	4	0	4
TOTAL	1342	40	1382

$X^2 = 7.15$ P = .05 - .10 3 degrees of freedom

TABLE XXXI

COMPARISON OF THE TYPES OF INITIAL INSTRUCTION OF WHITE NON-SWIMMERS AND NON-WHITE NON-SWIMMERS

Type of Instruction	Number of White Non-Swimmers	Number of Non-White Non-Swimmers	Total Number
Self	68	5	73
Family or Friends	21	1	22
Formal Instruction	20	3	23
No Information on Instruction	108	12	120
TOTAL	217	21	238

$X^2 = 1.64$ P = .50 - .70 3 degrees of freedom

TABLE XXXII

COMPARISON OF THE TYPES OF INITIAL INSTRUCTION OF THE WHITE SWIMMERS AND WHITE NON-SWIMMERS

Type of Instruction	Number of White Swimmers	Number of White Non-Swimmers	Total Number
Self	677	68	745
Family or Friends	279	21	300
Formal Instruction	382	20	402
No Information on Instruction	4	108	112
TOTAL	1342	217	1559

$X^2 = 209.19$ P = .001 3 degrees of freedom

TABLE XXXIII

COMPARISON OF THE TYPES OF INITIAL INSTRUCTION OF THE NON-WHITE SWIMMERS AND NON-WHITE NON-SWIMMERS

Type of Instruction	Number of Non-White Swimmers	Number of Non-White Non-Swimmers	Total Number
Self	23	5	28
Family or Friends	2	1	3
Formal Instruction	15	3	18
No Information on Instruction	0	12	12
TOTAL	40	21	61

$X^2 = 29.71$ P = .001 3 degrees of freedom

swimmers indicated that they had been self taught. In addition over one-half of the non-white non-swimmers listed no information on instruction.

It would appear that the swimmers had generally been self taught, that the non-white swimmers and non-white non-swimmers had only limited instruction from family and friends, and that the non-swimmers had more frequently not had the advantage of some type of instruction.

Utilization of swimming facilities. In Tables XXXIV- through XXXIX the data on the comparison of the facilities for swimming which were used by the study group are presented. The respondents were given an opportunity on the questionnaire to check one or more facilities which they had used for swimming. The swimmers indicated that they had used an average of twice as many facilities as the non-swimmers. When the figures were analyzed there was a statistically significant difference. It is apparent that the large difference was due to the limited facilities such as streams, lakes, and ocean which the non-swimmers reported. In addition, six per cent of the non-swimmers also did not give any information on whether they had used any facilities or not.

When the white and non-white swimmers were compared in reference to the facilities used for swimming, there was a statistically significant difference. This difference might be due to the fact that the non-whites reported less use of swimming holes but a greater proportion had the use of pools and the ocean.

TABLE XXXIV

COMPARISON OF THE PER CENT OF FACILITIES UTILIZED FOR SWIMMING BY WHITE AND NON-WHITE SWIMMERS AND NON-SWIMMERS

Facility	% White Swimmers	% Non-White Swimmers	% White Non-Swimmer	% Non-White Non-Swimmer
Swimming Hole	31	10	16	19
Streams or Rivers	48	25	18	10
Lakes	92	55	29	19
Pools	74	80	43	29
Ocean	40	53	16	14
No Resource	0	0	12	33
No Information on Facilities	0	0	6	5
Number of Swimmers	1342	40	217	21
Number of Facilities	3821	89	304	27
Average Number of Facilities	2.8	2.2	1.4	1.28

TABLE XXXV

COMPARISON OF THE FACILITIES UTILIZED FOR SWIMMING BY SWIMMERS AND NON-SWIMMERS

Facility	Number of Swimmers	Number of Non-Swimmers	Total Number
Swimming Holes	432	40	472
Streams or Rivers	674	46	720
Lakes	1321	80	1401
Pools	1078	109	1187
Ocean	592	40	632
No Facility	0	31	31
No Information on Facilities	7	19	26
Number of Facilities	4104	365	4469

$X^2 = 615.58$ P = less than .001 6 degrees of freedom

TABLE XXXVI

COMPARISON OF THE FACILITIES UTILIZED FOR SWIMMING BY WHITE SWIMMERS AND NON-WHITE SWIMMERS

Facility	Number of White Swimmers	Number of Non-White Swimmers	Total Number
Swimming Holes	412	4	416
Streams or Rivers	640	9	649
Lakes	1231	23	1254
Pools	988	32	1020
Ocean	543	21	564
No Facility	0	0	0
Number of Facilities	3814	89	3903

$X^2 = 17.85$ 5 degrees of freedom

TABLE XXXVII

COMPARISON OF THE FACILITIES UTILIZED FOR SWIMMING BY WHITE NON-SWIMMERS AND NON-WHITE NON-SWIMMERS

Facility	Number of White Non-Swimmers	Number of Non-White Non-Swimmers	Total Number
Swimming Holes	33	4	37
Streams or Rivers	40	2	42
Lakes	64	4	68
Pools	94	6	100
Ocean	35	3	38
No Facility	24	7	31
Number of Facilities	290	26	316

$X^2 = 8.40$ P = .10 - .20 5 degrees of freedom

TABLE XXXVIII

COMPARISON OF THE FACILITIES UTILIZED FOR SWIMMING BY WHITE SWIMMERS AND WHITE NON-SWIMMERS

Facility	Number of White Swimmers	Number of White Non-Swimmers	Total Number
Swimming Holes	412	33	445
Streams or Rivers	640	40	680
Lakes	1231	64	1295
Pools	988	94	1082
Ocean	543	35	578
No Facility	0	24	24
Number of Facilities	3814	290	4104

$X^2 = 153.61$ P = .001 5 degrees of freedom

TABLE XXXIX

COMPARISON OF THE FACILITIES UTILIZED FOR SWIMMING BY NON-WHITE SWIMMERS AND NON-WHITE NON-SWIMMERS

Facility	Number of Non-White Swimmers	Number of Non-White Non-Swimmers	Total Number
Swimming Holes	4	4	8
Streams or Rivers	9	2	11
Lakes	23	4	27
Pools	32	6	38
Ocean	21	3	24
No Facility	0	7	7
Number of Facilities	89	26	115

$X^2 = 25.22$ P = .001 5 degrees of freedom

There were fewer differences between the two non-swimmer groups except that the non-white group reported that they had "no resource" more frequently. The white non-swimmers reported that they also had used more pools (Ninety-four compared with six reported by the non-whites).

There appeared to be considerable difference in the use of facilities for swimming between the white swimmers and white non-swimmers. The latter group had used a much lower proportion of all facilities. The same situation was true in comparing non-white swimmers and non-white non-swimmers. The former group reported a much higher utilization of lakes, pools, and ocean beaches.

The major difference in the use of the facilities occurred between swimmers and non-swimmers. The white

non-swimmers had similar facilities available but not as frequently while the non-white non-swimmers had reported "no resource" most frequently.

Attitudes toward swimming. In Tables XL through XLV the attitudes which were reported in the questionnaire are presented. The students had been asked, "Doyou like to go swimming?" and were asked to check "Yes" or "No." Ninety-two per cent of the respondents indicated that they liked to swim. In comparing the swimmers with the non-swimmers the differences appeared statistically significant. The non-swimmers indicated that over seventeen per cent did not like to swim. In addition, about ten per cent of this group did not answer this section of the questionnaire. However, there seemed to be no significant difference when the white swimmers and non-white swimmers were compared, when the two non-swimmer groups were compared, and when the two non-white groups were compared. A rather significant difference was apparent in comparing the white swimmers with the non-white swimmers.

It appeared that swimmers generally liked the water while the non-swimmers were not as enthusiastic. About thirty per cent of the non-white non-swimmers indicated a dislike for the water.

The students were next asked to answer "Yes" or "No" to "Have you ever had a fear of water?" Although only forty had not given information on whether they liked the

TABLE XL

COMPARISON OF THE ATTITUDES OF SWIMMERS AND NON-SWIMMERS (BY PER CENT)

Response	% White Swimmers	% Non-White Swimmers	% White Non-Swimmers	% Non-White Non-Swimmers
A. Response to the inquiry: "Do you like to swim?"				
Like Swimming	94	100	75	57
Do Not Like Swimming	4	0	16	29
No Information on Attitude	2	0	9	14
Number of Cases	1342	40	217	21
B. Response to the inquiry: "Have you ever had a fear of the water?"				
Fear of Water	13	9	39	43
No Fear of Water	80	78	53	57
No Information on Fear	7	13	8	0
Number of Cases	1342	40	217	21
C. Response to the inquiry: "Have you ever been frightened in the water?"				
Frightened in Water	27	32	35	38
No Frightening Experiences	71	68	56	52
No Information on Fright	2	0	9	10
Number of Cases	1342	40	217	21

TABLE XLI

COMPARISON OF THE ATTITUDES OF SWIMMERS AND NON-SWIMMERS

Response	Number of Swimmers	Number of Non-Swimmers	Total Number
A. Response to the inquiry: "Do you like to swim?"			
Yes	1383	184	1567
No	60	45	105
No Information	13	27	40
Total	1456	256	1712
$X^2 = 71.40$	P = .001		
B. Response to the inquiry: "Have you ever had a fear of the water?"			
Yes	189	101	290
No	1150	132	128
No Information	117	23	140
Total	1456	256	1712
$X^2 = 110.15$	P = .001		
C. Response to the inquiry: "Have you ever been frightened in the water?"			
Yes	397	87	484
No	1036	141	1177
No Information	23	28	51
Total	1456	256	1712
$X^2 = 150.$	P = .001		

TABLE XLII

COMPARISON OF THE ATTITUDES OF WHITE SWIMMERS AND NON-WHITE SWIMMERS

Response	Number of White Swimmers	Number of Non-White Swimmers	Total Number
A. Response to the inquiry: "Do you like to swim?"			
Yes	1274	40	1314
No	57	0	57
No Information	11	0	11
Total	1342	40	1382
	$X^2 = 3.24$	P = .10 - .20	
B. Response to the inquiry: "Have you ever had a fear of the water?"			
Yes	177	4	181
No	1064	31	1095
No Information	101	5	106
Total	1342	40	1382
	$X^2 = 1.95$	P = .30 - .50	
C. Response to the inquiry: "Have you ever been frightened in the water?"			
Yes	364	13	377
No	958	27	985
No Information	20	0	20
Total	1342	40	1382
	$X^2 = 2.71$	P = .20-.30	

TABLE XLIII

COMPARISON OF THE ATTITUDES OF WHITE NON-SWIMMERS AND NON-WHITE NON-SWIMMERS

Response	Number of White Non-Swimmers	Number of Non-White Non-Swimmers	Total Number
A. Response to the inquiry: "Do you like to swim?"			
Yes	162	12	174
No	34	6	40
No Information	21	3	24
Total	217	21	238
	$X^2 = .31$	P = .80 - .90	
B. Response to the inquiry: "Have you ever had a fear of the water?"			
Yes	85	9	94
No	114	12	126
No Information	18	0	18
Total	217	21	238
	$X^2 = 2.29$	P = .30 - .50	
C. Response to the inquiry: "Have you ever been frightened in the water?"			
Yes	75	8	83
No	121	11	132
No Information	21	2	23
Total	217	21	238
	$X^2 = 2.49$	P = .20 - .30	

TABLE XLIV

COMPARISON OF THE ATTITUDES OF WHITE SWIMMERS AND WHITE NON-SWIMMERS

Response	Number of White Swimmers	Number of White Non-Swimmers	Total Number
A. Response to the inquiry: "Do you like to swim?"			
Yes	1274	162	1436
No	57	34	91
No Information	11	21	32
Total	1342	217	1559
$X^2 = 292.77$	P = .001		
B. Response to the inquiry: "Have you ever had a fear of the water?"			
Yes	177	85	262
No	1064	114	1178
No Information	101	18	119
Total	1342	217	1559
$X^2 = 96.92$	P = .001		
C. Response to the inquiry: "Have you ever been frightened in the water?"			
Yes	364	75	439
No	958	121	1079
No Information	20	21	41
Total	1342	217	1559
$X^2 = 59.02$	P = .001		

TABLE XLV

COMPARISON OF THE ATTITUDES OF NON-WHITE SWIMMERS AND NON-WHITE NON-SWIMMERS

Response	Number of Non-White Swimmers	Number of Non-White Non-Swimmers	Total Number
A. Response to the inquiry: "Do you like to swim?"			
Yes	40	12	52
No	0	6	6
No Information	0	3	3
Total	40	21	61
$X^2 = 3.67$	P = .0 - .20		
B. Response to the inquiry: "Have you ever had a fear of the water?"			
Yes	4	9	13
No	31	12	43
No Information	5	0	5
Total	40	21	61
$X^2 = 5.34$	P = .05 -.10		
C. Response to the inquiry: "Have you ever been frightened in the water?"			
Yes	13	8	21
No	27	11	38
No Information	0	2	2
Total	40	21	61
$X^2 = 21.48$	P = .001		

water or not, 140 did not give any information on whether they had a fear of the water or not. In addition, in tabulating the data it was noticed that this answer had been corrected and erased in many instances. In comparing swimmers and non-swimmers a statistically significant difference was established. About two-fifths of the non-swimmers had indicated a fear of the water compared with approximately one-tenth of the swimmers. There were few significant differences in comparing the two swimming groups or the two non-swimming groups. Both white and non-white swimmers indicated less fear of the water than the non-swimmers. In comparing the white swimmers with the white non-swimmers, a significant difference may be observed. Over two-thirds of the white non-swimmers admitted fear while approximately only one-eighth of the swimmers indicated fear. The comparison of the non-white swimmers and non-white non-swimmers in reference to fear showed differences which were not statistically significant although the swimmers expressed less fear of the water. The major differences in reporting fear were between swimmers and non-swimmers, and these differences lie in the fact that there was less frequent reporting of fear by the swimmers.

The study groups were also asked to answer "Yes" or "No" to "Have you ever been frightened while swimming?" They were also given an opportunity to expand on this answer. The data was shown in Tables XL through LXV, pages 59 through 64. Approximately ten per cent of the

non-swimmers did not answer any part of this question.

In comparing the swimmers with the non-swimmers a significant difference was observed. Seventy per cent of the swimmers indicated no frightening experiences while only slightly more than fifty per cent of the non-swimmers reported that they had no frightening experiences. There were no significant differences between white swimmers and non-white swimmers or between the white non-swimmers and the non-white non-swimmers. The differences between the swimmers and non-swimmers make the Chi-Square of the other comparisons appear more significant.

Swimmers thus seem to have had some frightening experiences but less frequently than non-swimmers. Race did not seem to affect the results.

A number of the respondents, both swimmers and non-swimmers, described situations when they had been forced into the water, had observed water accidents, or had been in dangerous situations in the water. The material was so varied and so limited that it could not be tabulated.

Summary

This chapter has presented the findings on the characteristics of the groups studied. In general there appeared to be significant differences between white swimmers and non-swimmers. The differences in attitudes did not seem to be related to ability to swim or to race. The white swimmers' fathers were more frequently business or professional

workers. The white swimmers' parents were more frequently able to swim. The white swimmers had used more facilities for swimming and more frequently had received instruction in swimming. The swimmers had more positive attitudes toward swimming, than the non-swimmers.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

A questionnaire was developed to study the relationship of swimming ability of white and non-white male college freshmen at Michigan State University to such factors as body type, father's employment, parents' ability to swim, attitudes toward swimming, type of initial swimming instruction, and the utilization of swimming facilities. Questionnaires were distributed to the members of the required course in foundations of physical education. Two thousand twenty-nine students were registered in the class but only about 1850 accepted the questionnaires and 1766 questionnaires were completed. This number represented seventy-two per cent of the entire entering male freshmen group and approximately ninety-three per cent of those to whom questionnaires were given. The responses were tabulated and the Chi Square statistic was applied to comparisons of swimmers and non-swimmers, white swimmers and non-white swimmers, non-white swimmers and non-white non-swimmers, white swimmers, and white non-swimmers, and white swimmers and white non-swimmers on each of the characteristics mentioned above. The study groups included 1342 white swimmers, thirty-five

other non-white swimmers, 217 white non-swimmers, eighteen Negro non-swimmers, and three other non-white non-swimmers. The Negroes and other non-white groups were considered as one group in the analysis of the data. Ninety-one per cent of the study group were white, three per cent were non-white, and six per cent gave no information on race.

Findings

Ability to swim. It was found that eighty-four per cent of the respondents were able to swim, fifteen per cent were unable to swim, and one per cent gave no information on the ability to swim.

Body types. There did not appear to be any significant relationship between body type and ability to swim since similar proportions on body types occurred in both the swimming groups and the non-swimming groups. There appeared to be statistically significant differences due to the fact that few swimmers were classified as ectomophs and endomorphs. There was greater similarity between the white non-swimmers and the non-white non-swimmers and the non-white swimmers and the non-white non-swimmers. It appeared that there was no direct relationship between body type and ability to swim. Between forty and forty-five per cent of all the respondents had average or mesomorph body types whether they could swim or not. However, the percentage of non-white students in the average classification was less than in the white group. There were no ideal estomorph or

endomorph types in the non-white swimmer group and the proportion of these types was low in the white swimmer group. There were also no ecto-endomorphs in either the white swimmer or non-white swimmer groups.

Thus body type would not seem to limit ability to swim, but, as Sheldon has suggested, the endomorph and ectomorphs may not be as interested in muscular activity.

Employment of fathers. The differences among the four groups in reference to the employment of fathers were statistically significant except in comparing the two non-white groups. In general, the swimmers' fathers tended to be in the professional and business occupational classifications. The non-swimmers parents tended to be in the skilled, unskilled, and farmer categories. The non-white swimmers' fathers as well as the non-white non-swimmers' fathers were most frequently in public service positions. The highest single category for white non-swimmers was "farmer."

It appeared that the children of those individuals who had higher incomes or more secure incomes (public service jobs) tended to be more likely able to swim. It seemed that farmers' sons were less frequently able to swim. Social and economic status thus appears to affect but not limit the ability to swim.

Father's ability to swim. The fathers' of the swimmers were generally able to swim. The proportion of fathers who

could swim was lower for the non-white group than for the white group. On the other hand, when the two non-swimmers groups were compared the responses were similar. It appears that race did not affect the relationship. There was a slightly lower proportion of fathers who could swim in the non-white swimming group than in the two non-swimmergroups. However, responses were lacking in almost ten per cent of the non-white groups.

It appears that three-fifths of the fathers of the non-swimmers could swim. Thus, parent's ability to swim does not appear to be directly related to the son's ability to swim.

Mother's ability to swim. It was found that close to two-thirds of the mothers of the non-swimmers (both white and non-white) as well as of the nonwhite swimmers could not swim. However, about three-fifths of the mothers of the white swimmers could swim.

It also appeared that the mothers of the respondents were less frequently able to swim than the fathers. Race did not seem to affect the relationships except thatmore of the mothers of white swimmers were able to swim than the mothers of the other groups.

Initial instruction. Approximately fifty per cent of the white and non-white swimmers reported that they were self taught. About thirty per cent reported that they had formal instruction. The non-swimmers indicated only a

limited amount of instruction on a formal basis or from families or friends. Since the non-swimmers gave no information it is assumed that they had no instruction or did not utilize the instruction available. The non-white swimmers reported less instruction by family than the white group but a greater proportion of formal instruction. This may mean that they learned to swim in junior or senior high school while the white group may have learned earlier from family and friends or by themselves.

There seemed to be more similarity in type of instruction among the swimmers than between the racial groups.

Facilities utilized for swimming. The swimmers had on an average about twice as many facilities. The swimmers seemed to have utilized more lakes, pools, and ocean beaches for swimming. The non-white swimmers had a greater proportion of pools than the white swimmers but a much lower proportion of swimming holes, rivers, and lakes. Thirty-three per cent of the non-white non-swimmers reported that they had used "no resource" while only twelve per cent of the white non-swimmers made such a report. There seemed to be more similarities between the non-swimmer groups than between the same racial groups. The fact that about five per cent of the non-swimmers did not give any information on this question may have affected the results.

Attitudes toward swimming. There were significant differences between swimmers and non-swimmers in response to

the question on whether they liked the water or not. Ninety-four per cent of the swimmers reported that they liked the water while only fifty to seventy-five per cent of the non-swimmers gave an affirmative answer. In addition, about ten per cent of the non-swimmers did not give information on this question. Almost thirty per cent of the non-white non-swimmers reported that they did not like the water compared to only sixteen per cent of the white non-swimmer group.

Not quite one per cent of the study group failed to answer the question on liking the water, but three per cent of the white group did not answer the question on whether they had ever had a fear of the water. In addition it was noticed there were many erasures and corrections on this answer.

White swimmers and non-white swimmers were similar to one another in reporting that only two per cent had any fear of the water. About forty per cent of the non-swimmers reported fear of the water. The non-white groups tended to be more similar according to the statistical analysis. Thus the greater differences occurred between the swimmer and non-swimmer groups.

About seventy per cent of the swimmers reported no frightening experiences, while fifty per cent of the non-swimmers reported no frightening experiences. In addition, the non-swimmers neglected to answer this question in about ten per cent of the cases. There did not seem to be any

similarities between racial groups, but rather more similarities among the swimmers. Frightening experiences did not seem to deter many from learning to swim since 364 of the white swimmers had reported frightening experiences and were still able to learn to swim.

Conclusions

1. Since eighty-four per cent of the respondents could swim, it appears that there is no great need for instruction in beginning swimming for all males at the college level. The fact that only two-thirds of the non-white group could swim may be due to many factors. They apparently have had less instruction, have used fewer swimming facilities, and have less positive attitudes toward swimming. However, this group is a very small minority in the group which was studied.

2. Body types do not seem to affect ability to swim, although according to Cureton's studies they may affect ability to participate successfully on a competitive level. There did not seem to be any significant differences in the body types of the white and non-white groups.

3. Students whose fathers are business or professional persons have more likely learned to swim before they entered college than the children of farmers, skilled, and unskilled workers.

4. There does not seem to be a close relationship between parents' ability to swim and the sons' ability to

swim except that white swimmers' parents are more frequently able to swim.

5. Most students who had previous formal instruction in swimming were able to swim when they entered college but the majority of swimmers were self taught. Among the non-swimmers, over ten per cent had received formal instruction. Therefore, it would appear that there was not a close relationship between ability to swim and the availability of instruction on a formal or informal basis. It would appear that motivation might be a more conclusive factor in the ability to swim since so many claimed to have been self taught.

6. There appeared to be a direct relationship between ability to swim and the utilization of swimming facilities. However, some of the non-swimmers had several facilities available but did not use them. Therefore, again, motivation to learn may be an important factor which affects the ability to swim.

7. Negative attitudes such as dislike of the water and fear of the water were more common among non-swimmers.

On the basis of these conclusions, the hypothesis, "Ability to swim is positively related to availability of swimming facilities, to attitudes toward swimming, to parents' ability to swim, to the social and economic status of the parents, to body types, and to the availability of formal instruction. There is no relationship between race and ability to swim," cannot be completely accepted. One

may accept the facts that there is a relationship between utilization of facilities and the social and economic status of the family. There does not seem necessarily to be a positive relationship between attitudes toward swimming, parents' ability to swim, body type, nor availability of instruction to the ability to swim. One may accept the hypothesis that there is no relationship between race and ability to swim.

Recommendations

1. There is an apparent need for equal swimming facilities for all social and racial groups.

2. There is a need to develop interest in swimming and provide encouragement with non-white groups at the elementary school level since these students apparently do not have the help of family or friends.

3. There is a need to encourage the learning of swimming among the lower social economic groups and among the children of farmers.

4. Positive attitudes toward swimming, confidence in the water, and increased motivation seem to be needed in order to have a greater number of the population learn to swim.

5. Efforts should be made to educate teachers and coaches that there is no relationship between body type and the ability to swim, or between race and the ability to swim. However, there should be greater appreciation of

the need to develop positive attitudes and encouragement of swimming skills (especially to non-whites).

6. Since the results of this study have been inconclusive in some areas it is suggested that further study be done. Among these studies are:

A. A study should be done to determine if the same factors affect swimming ability among both male and female college freshmen.

B. A study of swimming ability of boys and girls at the junior high school and senior high school levels.

C. A study of the methods of treating psychological aspects of the learning of swimming skills should be done.

D. A study of the relationship of the specific gravity of the body to body type and to the ability to swim.

E. A study of the reasons for the more frequent dislike of the water by the non-white groups.

F. A study to explore further and to clarify the effect of attitudes upon the ability to learn to swim.

BIBLIOGRAPHY

BIBLIOGRAPHY

Alley, Louis. "An Analysis of Water Resistance and Propulsion in Swimming the Crawl Stroke," Research Quarterly, October, 1953, p. 253.

Armbruster, Daniel. "Teaching Beginners to Swim," Journal of the American Association of Health, Physical Education, and Recreation, Vol. 7 (April, 1936), pp. 242-244.

Boyd, William C. andAsimov Isaac. Races and People. New York: Abelard Schumann Co., 1955. Pp. 189.

Brown, Robert. "A Comparison of the Patellar Tendon Reflex Time of Whites and Negroes," Research Quarterly, Vol. 6 (May, 1935), pp. 121-126.

Comas, Juan. Racial Myths. Paris: UNESCO, 1951. Pp. 55.

Copp, H. W. "Swimming as a Motor Skill." Unpublished Doctoral Dissertation, School of Education, University of Michigan, Ann Arbor, Michigan, 1937.

Cureton, Thomas. "Mechanics and Kinesiology of Swimming," Research Quarterly, Vol. 1 No. 1 (1929), p. 87.

_____. Physical Fitness of Champion Athletes. Urbana: University of Illinois Press, 1951.

DiGiovanni, Vincent, "The Relation of Selected Structural and Functional Measures in College Athletics," Research Quarterly, Vol. 22, No. 2 (March,1951),pp.288.

Dunn, L. C. Race and Biology. Paris: UNESCO, 1951. Pp.48.

Forsythe, Charles E. State Director of Athletics, Michigan Department of Public Instruction. Personal interview.

Frazier, E. Franklin. Black Bourgeosis. Glencoe: Free Press, 1957. Pp. 264.

_____. Negro Family in the United States. New York: Citadel Press, 1948. Pp. 374.

Gross, A. E. "Relationship of Dynamic Balance to Speed and to Ability in Swimming," Research Quarterly, Vol. 6 (December, 1957), p. 218.

Hrdlicka, Aes. Anthropometry. Philadelphia: Wistar Institute of Anatomy and Biology, 1920. Pp. 163.

Johnson, Thomas. "Survey of Swimming in Negro Colleges," Journal of the American Association of Health, Physical Education, and Recreation, June, 1949.

Karpovitch, Peter. "An Analysis of the Propelling Force in the Crawl Stroke," Research Quarterly, Vol. 6, No. 2 (May, 1935), pp. 49-58.

_____. "Water Resistance in Swimming," Research Quarterly, Vol. 4, No. 3 (October, 1933), pp. 21-28.

Klineberg, Otto. Race and Psychology. Paris: UNESCO, 1951. Pp. 39.

Leiris, Michel. Race and Culture. Paris: UNESCO, 1951. Pp. 46.

Maxwell, Moreau. Curator of the Museum, Michigan State University, East Lansing, Michigan. Personal interview.

McCaffree, Charles. Head Swimming Coach, Michigan State University, East Lansing, Michigan. Personal interview.

Muzzy, Dorothy. "Group Progress of White and Colored Children in Learning a Rhythm Pattern," Research Quarterly, Vol. 4 (October, 1933), pp. 62-70.

Rose, Arnold. The Roots of Prejudice. Paris: UNESCO, 1951. Pp. 44.

Sheldon, W. H., S. S. Stevans, and W. B. Tucker. Varieties of Human Physique. New York: Harper and Company, 1940.

Sills, F. D. "Factor Analysis of Somatotypes and Their Relationship to Achievement in Motor Skills," Research Quarterly, Vol. 21 (December, 1950), pp. 424-437.

Trow, William Clark. Educational Psychology. New York: Houghton Mifflin Company, 1951. Pp. 624.

Useem, John. Professor of Sociology and Anthropology, Michigan State University, East Lansing, Michigan, Personal interview.

APPENDIX

QUESTIONNAIRE ON ABILITY TO SWIM

Name _____Age___Class____ Race_____

Height_____ft., _____ins. Weight_____ lbs.

Nationality of father_____of grandfather_____
of mother_____of grandmother_____

Father's employment_____

Can you swim at least 50 yeards? Yes____ No____

If not, do you want to learn? Yes_____ No____

How did you first learn to swim? Self taught_____

Taught by family or friends _____

Formal instruction _____

Do you like to go swimming? Yes_____ No _____

Have you ever had a fear of swimming? Yes _____ No _____

Have you ever been frightened while swimming? Yes____No___

If so, explain where, by whom, or by what.

Which of these facilities did you use for swimming?

Swimming hole _____, Streams or rivers _____,

Lakes _____, Pools _____ Ocean Beach_____,

None_____.

Can your father swim? Yes___ No___ Can your mother swim?

Yes_____ No _____

List your body type:_____ _____ _____

BODY TYPES

Sheldon delineated three somewhat different body types on the basis of seventeen diameter measurements. The three major types are:

1. The endomorph is usually fat, his body is soft, and he has round contours.
2. The mesomorph has well-developed bone, muscle, and connective tissue. He is usually sturdy, erect, and firm. He has tough thick skin.
3. The ectomorph is of a slender and fragile build, is apt to be tall, with a flat chest, delicate bones, and weak muscle.

Twenty characteristics of each type were established on which an individual may be rated on a seven point scale with one low and seven high.

In the present study the writer used the following classifications:

1. Average
2. Mesomorph
3. Ectomorph
4. Endomorph
5. Ectomorph-mesomorph
6. Endomorph-mesomorph
7. Endomorph-Ectomorph
8. Ectomorph-Endomorph
9. Mesomorph-ectomorph
10. Mesomorph-endomorph

Copy of letter from: Department of the Navy
Bureau of Naval Personnel
Washington 25, D.C. Feb. 18,1959

Dear Mr. McFarland:

Your letter of 7 February 1959 has been referred to the Chief of Naval Personnel for reply.

There have been no known studies conducted by the Navy on problems involved in teaching Negroes to swim. A standard test is given to all recruits. Those who do not pass this test are classified non-swimmers. All non-swimmers are given instruction in fundamental swimming skills but no study is made of personal capability by race.

Enclosed herewith is a copy of NAVPers91804, The Assembly Line Method of Swimming Instruction for Recruit Training. This publication details techniques employed in teaching fundamental skills. It is requested that this publication be returned in approximately ninety days or as soon as it has served its purpose.

The U. S. Navy enlists, classifies, trains and assigns all enlisted personnel on the basis of individual capabilities, all other factors notwithstanding.

Your interest in the Navy's training methods is appreciated.

Sincerely yours,

T.M.FOSTER
CAPTAIN, USN
ASSISTANT DIRECTOR, TRAINING DIVISION

Mr. Jerome McFarland
1440 F Sparton Village
East Lansing, Michigan

Enclosure (1)

Copy of letter from: Office of the Assistant Secretary
of Defense
Washington, D. C.
Manpower, Personnel and Reserve

20 February 1959

Dear Mr. McFarland:

Your inquiry of February 7th is acknowledge, and I regret that we cannot assist you with data for your researchproject. Dr. Hannah contributed significantly to the elimination of racial differentiations and racial designations throughout the Armed Services.

As a generalization I may suggest that information such as you seek, appearing in earlier Selective Service compilation, yielded no significant differences. Today, frogmen, and other specialists related, exclude no groups as such.

I regret that we cannot be more directly helpful.

Sincerely yours,

JAMES C. EVANS
Civilian Assistant

Mr. Jerome McFarland
1440 F Spartan Village
East Lansing, Michigan

J. McFarland. Jr. 1960.

M.A.