DOCUMENT RESUME

ED 302 032 EC 211 829

AUTHOR Winnick, Joseph P.; Short, Francis X.
TITLE The Physical Fitness of Adolescents with Cerebral Palsy. Project UNIQUE II. Final Report.
INSTITUTION State Univ. of New York, Brockport. Coll. at Brockport.
SPONS AGENCY Special Education Programs (ED/OSERS), Washington, DC.
PUB DATE Aug 88
GRANT G008630128
NOTE 129p.; Prepared by the Department of Physical Education and Sport.
PUB TYPE Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC06 Plus Postage.
DESCRIPTORS Ability Identification; Adolescents; Athletics; *Cerebral Palsy; Classification; *Mild Mental Retardation; *Physical Fitness
IDENTIFIERS *UNIQUE Physical Fitness Test.

ABSTRACT

The final report describes a 2-year project of the State University of New York, College at Brockport, to study the physical fitness of nonretarded and retarded adolescents with cerebral palsy. The UNIQUE Physical Fitness Test was administered to 203 cerebral palsied adolescents throughout the United States and from segregated and nonsegregated educational placements by 53 professional testers. Subjects were also classified on the basis of sport ability classifications used by the Cerebral Palsy International Sport and Recreation Association. A series of three way univariate analyses of covariance were performed utilizing intellectual classification, age, and gender as independent variables and functional ability as the covariate. A series of multiple regression analyses were also performed and factor analytic solutions were derived. Findings indicated: (1) mild mental retardation was not a significant factor on the physical fitness test performance of individuals with cerebral palsy; (2) the physical fitness factor structures of mildly retarded and nonretarded adolescents with cerebral palsy are virtually identical; and (3) the sport ability classification system was more discriminating in regard to physical fitness performance than the stationary or locomotor classification systems associated with the UNIQUE Physical Fitness Test. (DB)

The Physical Fitness of Adolescents with Cerebral Palsy

by
Joseph P. Winnick
and
Francis X. Short

Project UNIQUE II Final Report
August, 1988

Funded by
Special Education Programs
U.S. Department of Education

Department of Physical Education and Sport
State University of New York
College at Brockport
Brockport, New York 14420

This project was supported by Special Education Programs, U.S. Department of Education, Grant No. G008430128, Project No. 023CH60111. The contents presented in this final report are those of the authors and do not necessarily reflect the position or policy of Special Education Programs and no official endorsement of Special Education Programs should be inferred.

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with Cerebral Palsy

Printed at the
State University of New York
College at Brockport
Brockport, N.Y. 14420

PREFACE

From 1986 to 1988 the State University of New York, College at Brockport was awarded a grant from Special Education programs, Department of Education, Washington D.C. to study the physical fitness of nonretarded and retarded adolescents with cerebral palsy. The project, entitled The Physical Fitness of Adolescents with Cerebral Palsy, Project UNIQUE II, was directed by Joseph P. Winnick and coordinated by Francis X. Short. Specifically the study was funded to compare the physical fitness of mildly retarded and nonretarded adolescents.

To obtain the objectives of the project, systematic methods and procedures for the conduct of the study were established. Essentially the UNIQUE physical fitness test was administered to 203 subjects with cerebral palsy throughout the United States by 53 field testers. Although the time duration of the project was June 1, 1986 to August 31, 1988, the actual collection of data extended from approximately January 1987 to January 1988.

In this final report the activities associated with the project and results are presented. The first chapter of the report introduces the study, briefly reviews related literature, and presents the primary objective of the project. In the second chapter, the methods and procedures employed in the study are presented. The third chapter describes the methods used in analyzing data and presents the findings of the study. The fourth chapter includes a summary, findings, and conclusions.

In conducting the study, it was clear that many dedicated individuals, including the subjects themselves, became involved because of the belief and hope that the project would contribute something worthwhile to the lives of persons with cerebral palsy. If this belief and hope were satisfied, it was certainly all well worth the effort.

Joseph P. Winnick, Project Director

Francis X. Short, Project Coordinator

ACKNOWLEDGMENTS

This project was a team effort including the Project UNIQUE central staff at the State University of New York, College at Brockport, U.S. Department of Education, the project advisory board, professional organizations, various consultants, and field testers. The project could not have been completed without cooperation of many schools and agencies throughout the United States. Throughout the project, it was clear that the individuals and schools involved offered their help and cooperation because it was their hope that the results of the project would enhance the education of youngsters with cerebral palsy. To these individuals and institutions, very deep appreciation is extended.

Central Staff at the State University of New York, College at Brockport

Project Director:	Joseph P. Winnick
Project Coordinator:	Francis X. Short
Secretaries:	Kathleen Fiddler
	Rikki Cannioto
Graduate Assistants:	Pam Maryjanowski
	Ray Stoldt

UNIQUE II Advisory Board

Claudine Sherrill - Texas Woman's University
Julian U. Stein - George Mason University
Geoffrey Broadhead - Kent State University
Diane Lewandowski - Chicago Public Schools

Special Commendations

This project could not have been successful without the help of many dedicated persons including several who made extraordinary efforts on behalf of the project. Individuals who made extraordinary efforts include:

Barbara Kielaszek, Houston Independent School District
Ronald W. French, Texas Woman's University
Garth Tymeson, Northern Illinois University

Professional Organization

American Alliance for Health, Physical Education, Recreation, and Dance

Project Consultants

David Porretta Julian Stein

Contributors

Erv Bader
Paul Roper

Field Testers

Leticia Aerola
Dianne Agostinelli
Patrick Barberio
Karen D. Bell
Barry Bernstein
Christopher Bourne
Lionel Brown
Chris Cardon
Barbara Cerrone
Mary Pat Dewey
John J. Dlabal III
Kim A. Duchane
Susan M. Faulhaber
David R. Fenlon
Michael Guerrieri
Wanda Hall
Jeniffer A. Hoeppner
Omar Holguin
Marian Huetinck
Gordie Jewett
Linnea M. Jonson
Steven Kaufmann
Sunny Kelner
Barbara E. Kielaszek
Ginny Knorr
Sharon Kounas
Ellen Kowalski
Melinda Landrieu
Lori Lee
Annabelle Lugo
Jill Mann
Virginia Matthews
Sy Nudell
Greg Packard
Dennis Pappalardi
Jocelyn Pare
Tracy Peterson
Carol H. Pizer
Lori Poor
Thomas J. Reeder
Janet Rogers
Gil Sanks
Donna Schaefer
Anthony Schiavitti
Bari Slatas
Patricia S. Smith
Ray Stoldt
Sam Strgacich
Marcia Taylor
Dave Templin
Joanne Trybulski
Yvonne S. Wooley
Carol L. Wright

Testing Sites

California

Bassett High School, La Puente, California
Castro School, El Cerrito, California
El Sereno Junior High School, Los Angeles, California
Fairmont School, El Cerrito, California
Frisbie Junior High School, Rialto, California
Kelley Elementary School, Rialto, California
Lake School, San Pablo, California
Richmond High School, Richmond, California
Thompson School for Orthopedically Handicapped, El Monte, California
Wilson High School, Los Angeles, California

Connecticut

Southern Connecticut State University, New Haven, Connecticut

Florida

Stilwell Junior High School, Jacksonville, Florida

Georgia

Groves High School, Garden City, Georgia

Illinois

Arthur S. Christopher School, Chicago, Illinois
Elgin High School, Elgin, Illinois
Hanson Park Elementary School, Hanson Park, Illinois
Huff Elementary School, Elgin, Illinois
Rolling Green/Muhl Center, Rockford, Illinois
Weisbrook Elementary School, Wheaton, Illinois

Louisiana

Colton Junior High School, New Orleans, Louisiana
Saint Joan of Arc School, New Orleans, Louisiana

New York

Auburn Enlarged School District, Auburn, New York
Brockport Middle School, Brockport New York
Chestnut Ridge Elementary School, Rochester, New York
Cicero-North Syracuse High School, Syracuse, New York
Dake Junior High School, Rochester, New York
Dake Middle School, Rochester, New York
Edison Technical & Occupational Education Center, Rochester, New York
Jefferson Junior-Senior High School, Rochester, New York
Kendall Elementary School, Kendall, New York
New York City Public Schools, New York, New York
Rochester School No. 29, Rochester, New York
School of the Holy Childhood, Rochester, New York
Center for the Disabled, Albany, New York
Wayne Central School, Ontario Center, New York

North Carolina

Angier Middle School, Angier, North Carolina
Gateway Education Center, Gateway, North Carolina

Ohio

Franklin D. Roosevelt High School, Cleveland, Ohio
Sunbeam School, Cleveland, Ohio

Texas

Alvarado Elementary North, Alvarado, Texas
Arthur Elementary School, Kenendale, Texas
Bruce Shulkey Elementary School, Fort Worth, Texas
Carter Junior High School, Arlington, Texas
Clifton Middle School, Houston, Texas
Deady Middle School, Houston, Texas
Denton High School, Denton, Texas
Felix Tijerina Elementary School, Houston, Texas
Forney Intermediate School, Forney, Texas
Handley Middle School, Fort Worth, Texas
Leonard Middle School, Fort Worth, Texas
North Garland High School, Garland, Texas
O.D. Wyatt School, Fort Worth, Texas
Parkview Elementary School, Keller, Texas
R. L. Turner High School, Fort Worth, Texas
Schimelpfening Middle School, Plano, Texas
Shackleford Junior High School, Arlington, Texas
T. H. Rogers, Houston, Texas
Whitney Young School, Dallas, Texas
Wilmer-Hutchins High School, Dallas, Texas

Virginia

Bayside High School, Virginia Beach, Virginia
Virginia Beach City Schools, Virginia Beach, Virginia

Washington

Covington Junior High School, Vancouver, Washington
Des Moines Elementary, Seattle, Washington
Evergreen High School, Vancouver, Washington
Shortwood Elementary School, Seattle, Washington
Skyline Elementary School, Tacoma, Washington
Truman Middle School, Tacoma, Washington

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CHAPTER 1

INTRODUCTION

Importance and Purpose

The positive value of physical fitness is widely accepted in the United States today. Physical fitness is important for enhancing the quality and length of life. It is important in the play and development of children and youth and enhances their participation in leisure time pursuits and athletic endeavors. It helps in carrying out the requirements of daily living. Although physical fitness is important for all persons, it is particularly important for children and youth with handicapping conditions. Although persons with handicapping conditions require physical fitness for reasons of health and physical performance, it is also important for their social and emotional development. In cases where high levels of physical fitness are attained, individuals are more likely to participate in play and sport activities and receive the same physical and social benefits from these activities as nonimpaired children and youth.

Although it is clear that physical fitness is at least as, if not more important to persons with cerebral palsy, little attention has been given to the development of physical fitness for these individuals. This lack of attention exists in schools and continues beyond the school years. Winnick and Short (1982) and Short and Winnick (1986) have previously reported that the physical fitness of boys and girls with cerebral palsy at school-age is significantly below that of able-bodied peers and that the physical fitness test scores of cerebral palsied youngsters often do not improve with age and may decline in some instances. The results of these studies also supports the belief that persons with cerebral palsy may need test items and normative data for the measurements of physical fitness modified.

The physical fitness of mentally retarded children and adolescents has been the focus of study in several investigations (Francis & Rarick, 1959; Howe, 1959; Johnson & Londeree, 1976; Rarick & Dobbins, 1972; Rarick, Dobbins, & Broadhead, 1976; Rarick and McQuillan, 1977; Sengstock, 1966). The results of these investigations have been very informative and will be presented in some detail in a subsequent part of this section. The point to be emphasized here is that considerable evidence exists that the performance of mentally retarded youngsters is significantly below that of their nonretarded peers, the gap between these groups increases with age, the gap between retarded and normal girls is generally greater than the gap between retarded and normal boys, and that the performance of retarded boys increases with age whereas the performance of retarded girls levels off at about age 13 or 14. In spite of underachievement, by retarded youngsters these investigators have found that mentally

retarded youngsters are nearer to normal performance physically than mentally, that mentally retarded youngsters can perform at levels equal to or above those attained by nonretarded youngsters, and that their physical fitness can be improved and approximate the performance of nonretarded youngsters.

Although some research has been conducted to study the influence of mental retardation and cerebral palsy on physical fitness, little or no research has been conducted using field-based quantitative measures and studying the simultaneous influences of both mental retardation and cerebral palsy. Since mental retardation accompanies cerebral palsy in a high percentage of cases, this is unfortunate. This information has many implications for teachers, coaches, and persons in allied medical professions. For example, should classifications for sport competition consider level of retardation? Are separate items on physical fitness tests required for retarded and nonretarded youngsters with cerebral palsy? Should norms on physical fitness tests be grouped according to level of retardation? Are the factors which constitute physical fitness the same for both retarded and nonretarded populations?

To effectively implement quality programs for both retarded and nonretarded individuals with cerebral palsy, teachers and program leaders must have knowledge and skills to assess performance, determine unique needs, set objectives and goals to improve performance, and implement and evaluate quality programs. Information is needed about the physical fitness abilities of these groups. Valid and reliable instruments to measure the components of physical fitness which are relevant and appropriate for these groups must be developed and used. Teachers and program leaders must recognize differences and the implications that differences suggest in implementing programs. They need to know how to make adaptions to meet individualized unique needs. This project has been designed to shed light on the physical fitness of retarded and nonretarded boys and girls with cerebral palsy. In the next section, studies relevant to these topics are reviewed.

Physical Fitness and Mental Retardation

The physical fitness of retarded and normal subjects has been identified and compared in a number of studies. The areas of physical fitness which have been analyzed and are relevant to this study include muscular strength and endurance, flexibility, cardiorespiratory endurance and body composition. The following paragraphs review results of several studies using field-based measures of physical fitness.

Muscular Strength and Endurance

Grip Strength and Flexed Arm Hang

Results obtained by Rarick, Dobbins, and Broadhead (1976) and those reported by Francis and Rarick (1959) clearly demonstrate that intellectually normal subjects of both sexes exceed the performance levels of educable mentally retarded subjects, that the performance slopes of both groups are similar, and that significant sex differences favoring boys exist on measures of grip strength. Rarick, Dobbins and Broadhead (1976) reported that the rank order of normal boys (NB), normal girls (NG), educable mentally retarded boys (EMR-B), and educable mentally retarded girls (EMR-G) was invariable throughout the ages of six and nine. The percentage of mentally retarded boys and girls equal to or above normal median points of performance was relatively small (ranges from 6.3% to 11.3%).

Howe (1959) found that the grip strength of normal boys significantly exceeded that of retarded boys and that the grip strength of normal girls was not significantly different from retarded girls. Results reported by Rarick, Dobbins, and Broadhead (1976) and those reported by Francis and Rarick (1959) reveal improvement in performance with age.

Rarick and McQuillan (1977) measured grip strength of trainable mentally retarded (TMR) subjects and compared their performance with that of EMR subjects measured in an earlier study by Rarick, Dobbins, and Broadhead (1976). They reported that grip strength performance of EMR subjects exceeds that of TMR subjects of the same sex and age (ages considered were six to 13). They further reported that the performance of TMR boys exceeds that of TMR girls on measures of static strength and that TMR boys show continued improvement between the ages of six and 21. TMR girls showed a decline in some measures of strength after the 14 to 17.9 age range but showed improvement in right grip strength after the 14 to 17.9 age level.

The flexed arm hang has also been utilized as a measure of static strength of intellectually normal girls and retarded boys and girls. Data comparing performance by normal girls (AAHPER, 1975) with that of mildly retarded boys and girls (AAHPER, 1976) indicates that the performance of mildly retarded boys exceeds that of intellectually normal and mildly retarded girls. Little difference exists between the performance of mildly retarded and normal girls through the ages of 10 and 17. Throughout these ages mildly retarded boys show consistent improvements while normal and retarded girls show little change.

Sit-ups

Number of sit-ups performed in one minute has been frequently used in comparing the physical proficiency of intellectually retarded and normal pupils. In comparing norms of mildly retarded youngsters (AAHPER, 1976) with those of normal boys and girls (AAHPER, 1975), it is clear that the performance of normal boys and girls exceed that of both mildly retarded boys and girls. This same data indicates a superiority of sit-up performance of boys over girls between the ages of 10 and 17 with a greater gap with increase in age. Rarick, Dobbins, and Broadhead (1976) reported that between the ages of six and eight, the gap in performance between normal boys and girls is negligible. These authors also found that the percentage of mildly retarded youngsters equal to or above normal median points for their sex was found to be 19.7% for boys and 17.2% for girls. Data provided by Rarick, Dobbins, and Broadhead (1976) and Rarick, Widdop, and Broadhead (1970) indicates that retarded boys exceed the performance of retarded girls, that the gap between the two is substantial, and the gap increases with age. It is also evident that the performance of normal boys consistently increases to age 17 whereas little improvement is noted in the scores of retarded boys after age 15, retarded girls after age 14, and normal girls after age 14. Results of a 30-second sit-up test administered to moderately retarded subjects by Johnson and Londeree (1976) suggest that this group would perform significantly below the mildly retarded if tests were of the same length.

Rarick and McQuillan (1977) administered four tests of muscular strength/endurance to TMR subjects: sit-ups, leg raises for time, trunk raise for time, and a bicycle ergometer with resistance test. These investigators subsequently compared the results with those of normal and EMR boys and girls and reported that the performance of normal and EMR subjects exceeded that of TMR boys and girls of the same sex and age.

Running Speed

In one of the earliest studies in which the speed of retarded youngsters was compared to that of normal youngsters, Francis and Rarick (1959) reported that the superiority of the normal child is so great that at no age level (ages eight to 14 considered) did the means of the mentally retarded approximate the mean performance of the normal children of the same sex. Howe (1959) also found that the mean 50-yard dash performance of retarded boys and girls was significantly better than that of retarded boys and girls, respectively. Sengstock (1966) found that normal boys significantly exceeded 50-yard dash scores of EMR boys.

Data presented by Rarick, Widdop, and Broadhead (1970) leads to several interesting observations in regard to performance on the 50-yard dash. Of the groups considered, normal boys perform the best

and continue to improve from age 10 to 17. Normal girls perform more slowly than normal boys but exceed the performance of retarded boys up to age 13. After that age, the performance of mildly retarded boys exceeds that of normal girls. Mildly retarded boys improve in their ability from ages eight to 17 and invariably surpass the performance of mildly retarded girls. Mildly retarded girls and moderately retarded boys and girls are slowest in their performance. The groups show improvement up to about age 15. From age 15 upward, performance either decreases or remains stable. Data reported indicates that the gap between normal and retarded youngsters tends to decrease more with age in the case of girls but remains stable in the case of boys.

In their study, Rarick, Dobbins, and Broadhead (1976) measure performance on the 5 to 35 yard dash--which they consider as a measure of explosive muscular strength. In this event, the subject's score is the time required to negotiate a 5 to 35 yard distance. These investigators found that the performance of normal children was superior to that of retarded children with the degree of difference increasing with age even though all groups improved between the ages considered. The fact that the performance of retarded boys was closer to that of normal boys than the performance of retarded girls was to normal girls is supported by the finding that 25.0% of the retarded boys but only 15.6% of the retarded girls were equal to or above the norm median for their sex group.

Rarick and McQuillan (1977) also investigated the performance of TMR boys and girls on the 35-yard dash and compared results to those of EMR subjects. They found that the performance of TMR boys generally exceeded that of TMR girls throughout the ages of six and 21. On the average, both groups improved in performance between the ages of six and 17 but either showed no improvement or a decline within the 18 to 21 age group. Rarick and McQuillan (1977) reported that at no age level was the performance of TMR's as good as that of six to nine year old EMR's.

Flexibility

Although it has been often asserted that the mentally retarded are quite flexible, relatively little research has been conducted on their flexibility. Rarick, Dobbins, and Broadhead (1976) compared the toe touching, spinal rotation, spinal extension, and lateral spinal extension performance of EMR and normal youngsters between the ages of six and nine and found that normal children were significantly superior to retarded youngsters on all four measures of flexibility and that EMR boys were superior to EMR girls on each of the four tests. Except for spinal rotation, normal girls exceeded performance of normal boys on the four tests of flexibility. However, EMR boys exceed EMR girls on all four measures of flexibility. Interestingly, 33.8% of retarded boys and 7.8% of retarded girls are equal to or exceed normal median points in toe touching performance.

Rarick and McQuillan (1977) administered tests of toe touching, spinal extension, and lateral spinal extension to TMR boys and girls between the ages of six and 21. These investigators found mixed results for differences between sexes and that the scores of TMR subjects on flexibility measures declined with age. However, when age comparisons were made with scores of EMR subjects (ages six to 13 considered) it was noted that TMR subjects showed greater flexibility than EMR subjects.

Cardiorespiratory Endurance

A very commonly used measure of cardiovascular endurance which has been employed with normal youngsters has been the 600-yard run-walk. Sengstock (1966) found that normal boys significantly exceeded the performance on EMR boys of the 600-yard run-walk. Since this distance has generally been found to be too long for retarded youngsters, the 300-yard run-walk has been employed to measure their cardiovascular endurance. Studies (AAHPER, 1976; Johnson and Londeree, 1976) show that mildly retarded youngsters exceed the 300-yard run-walk performance of moderately retarded youngsters and that boys of the same intellectual level exceed performance of girls of the same intellectual level. Mildly retarded boys show improvement between the ages of eight and 18 whereas mildly retarded girls appear to level off at age 15. Moderately retarded youngsters improve from age seven to age 10 or 11 but appear to fluctuate beyond that point.

Rarick, Dobbins, and Broadhead (1976) compared the performance of retarded and normal children on a physical work capacity test and a 150-yard dash. Results relative to physical work capacity are somewhat different than those found with other tests of physical proficiency. The results indicate that retarded boys are superior to normal girls between the ages of six and nine and at age eight retarded girls perform slightly better than normal girls. On the 150-yard dash, significant differences in favor of normal subjects were found between the ages of six and nine. Although the performance of all subjects increased with age, the extent of retardation increased with age. Normal boys exceeded the performance of normal girls, normal girls exceeded the performance of retarded boys and retarded boys exceeded the performance of retarded girls. Retarded girls performed very poorly on this test.

Rarick and McQuillan (1977) studied the 150-yard dash performance of TMR boys and girls between the ages of six and 21. They reported that the performance of TMR boys exceeded that of TMR girls and that the gap between the two groups increased with age. The scores of both TMR boys and girls increased between the ages of six and 17. However, the performance of both groups declined in the 18 to 21 age grouping. In comparing results with EMR subjects between the ages of six and 13, Rarick and McQuillan found that the performance of EMR's exceeded that

of TMR's of the same sex and age.

Although the review presented here is limited to field-based measures, it is interesting to note that descriptive laboratory studies consistently show that mentally retarded children and adolescents exhibit lower cardiorespiratory endurance than their nonhandicapped peers (Fernhall, Tymeson, and Webster, 1988).

Body Composition

Rarick, Dobbins, and Broadhead (1976) found that the weight of normal and EMR boys and girls are quite similar at each age level from six to nine years. No significant sex differences in weight were found. Rarick and McQuillan (1977) measured the weight of TMR boys and girls, aged six to 21, and found TMR boys to be heavier than TMR girls. They reported that increases in weight with advancing age are greater on the average in the male TMR than in females with a significant difference found at the 18 to 21 age level. In comparing the weight of TMR subjects with the EMR subjects measured by Rarick, Dobbins, and Broadhead (1976), it was found that the latter are heavier at both the six to nine, and 10 to 13.9 year age categories.

Rarick, Dobbins, and Broadhead (1976) administered skinfold measurements at three sites (abdominal, subscapular, triceps) in comparing skinfolds of normal and EMR youngsters between the ages of six and nine and further comparing retarded subjects to age 13. They found significantly greater skinfolds for the retarded subjects at all three sites and that skinfold measurements were consistently greater for girls than for boys in both the retarded and normal samples. These investigators also indicate that abdominal skinfolds of EMR boys exceeded that of EMR girls at ages 12 and 13 and subscapular skinfolds to be nearly equal at ages 11, 12, and 13. The triceps fold of EMR boys was less than that for EMR girls throughout the ages of seven through 13. Further results generally show that EMR children possess a greater percentage of body fat than normal children of the same age and sex.

Rarick and McQuillan (1977) measured the triceps, subscapular, and abdominal skinfolds of TMR boys and girls and compared results with those of EMR subjects tested by Rarick, Dobbins, and Broadhead (1976). Results indicated that the skinfolds of TMR girls not only exceeded that of TMR boys throughout the ages of six and 21 but that the gap between the two sexes increased with age. In comparing TMR and EMR subjects, Rarick and McQuillan (1977) noted that the skinfolds of the TMR sample exceeded that of EMR sample of the same sex and age.

On the basis of the research presented above, it is clear that retarded youngsters possesses a greater percentage of body fat than normal subjects of the same age. Since little or no difference exists in the weight of normal and retarded subjects, it is obvious that the

retarded are too heavy for their height. The greater weight of the retarded may be accounted for by greater percentages in body fat.

The Physical Fitness of Adolescents with Cerebral Palsy

The physical fitness performance of adolescents with cerebral palsy using quantitative field-based measures of physical fitness has not been studied to a great extent. In one of the few studies, Short and Winnick (1986) examined the effects of gender and age on the fitness of cerebral palsied adolescents, and where appropriate, compared fitness performance with that of able-bodied (AB) youngsters of the same gender and age.

No significant differences were found between able-bodied (AB) and cerebral palsied (CP) subjects on the three skinfold measures (triceps, abdominal, and subscapular) employed in the study. With only one exception, the scores of AB subjects were significantly higher than those of CP subjects on nine performance items included in the study where such comparisons were made. The performance items included sit-ups, leg raise, trunk raise, right grip, left grip, arm hang, pull-ups, broad jump, and sit and reach. Significant differences between CP and AB subjects were found at virtually every age for eight of the nine performance items analyzed. In the pull-up test, the one exception, a significant difference favoring able-bodied males was found but the difference between able-bodied and cerebral palsied females was not statistically significant.

In studying the influence of gender on performance Short and Winnick (1986) reported that cerebral palsied females have significantly larger triceps and abdominal skinfolds than cerebral palsied males. Gender was not a significant factor for cerebral palsied subjects on subscapular skinfold. When comparing males and females on selected performance items, the investigations found lesser number gender differences between male and female cerebral palsied subjects than male and female abled-bodied subjects. However, where differences existed, the performance of cerebral palsied males exceeded that of their female counterparts.

In studying the influence of age on physical fitness performance, Short and Winnick (1986) reported that, where differences were significant, older subjects had significantly larger skinfolds than younger subjects at the abdominal and subscapular sites. Age was also a significant factor on the tricep skinfold although it did not have the same influence on males and females. Where differences were significant, older females had larger measures and older males had smaller measures than their younger counterparts. Age was also found to have differential effects on the performance items studied. Age was found to be a significant factor for cerebral palsied subjects on the grip strength tests. Where differences were significant, older subjects had significantly higher grip strength scores than the younger

subjects. Cerebral palsied males also showed a significant improvement on pull-ups with age. Age was not a significant factor on the timed trunk raise or the flexed arm hang. On the sit-ups, timed leg raise, sit and reach, and standing broad jump, age was found to be a significant factor for able-bodied subjects (older subjects generally make higher scores than younger subjects). However, it was not a significent factor on these items for cerebral palsied subjects. After reviewing results, it was clear that age was not as significant a factor for cerebral palsied subjects as it was in the case of abled-bodied subjects.

Short and Winnick (1986) made several observations in regard to their study. First, the fact that the skinfold measurements between cerebral palsied and able-bodied subjects were not significantly different is in contrast to previous research which has established that handicapped subjects generally have larger skinfolds than nonhandicapped subjects. Another important finding was that the developmental profile for cerebral palsied subjects was not the same as typically reported. They found fewer differences between male and female cerebral palsied subjects than between male and female nonhandicapped subjects. Finally, the authors found that the performance of subjects with cerebral palsy generally did not improve with age. Of the 14 performance items studied for this analysis, (softball throw, dash, shuttle run, mat creep, and long distance run were the five additional items studied), age was a significant factor on only three: right hand grip strength, left hand grip strength, and pull-ups (males only). The authors suggest that failure of the older cerebral palsied subjects to surpass the performance of the younger cerebral palsied subjects may be due to educational and/or therapeutic approaches that do not emphasize the development of physical fitness.

Factor Structure of Physical Fitness

Although many factor analytic studies have been conducted using mature subjects, few have involved retarded youngsters or youngsters with cerebral palsy. The most comprehensive studies pertaining to retarded youngsters have been conducted by G. Lawrence Rarick and his associates.

On the basis of their research with EMR youngsters (age 6 to 13) and normal youngsters (ages 6 to 9), Rarick, Dobbins, and Broadhead (1976) attempted to determine the factor structure of motor abilities of these groups and draw implications therefrom for curricular development. The results, according to the authors, identified a factor structure remarkedly similar for both sexes, and all age levels for both normal and retarded groups. The six factors which accounted for the major proportion of variance were the factors of strength-power-body size, body fat, fine visual-motor coordination, gross limb-eye coordination, balance and leg power and coordination.

Since no definitive attempt had previously been made to determine the factor structure of motor abilities of TMR youngsters, Rarick and McQuillan (1977) investigated the factor structure of motor abilities of TMR youngsters and compared results with these obtained by Rarick, Dobbins, and Broadhead (1976). Although the performance of TMR subjects was generally below that of EMR and normal subjects, the factor structure of abilities was similar. They found that the factor structure of motor abilities of the TMR subjects was much the same regardless of sex or age level. The comparable common factors most consistently extracted included body fat, fine-visual-motor coordination, balance, upper limb-eye coordination, arm strength, spinal flexibility, and leg-power-coordination.

The factor structure of physical fitness of adolescents with cerebral palsy was studied by Winnick and Short (1982, 1984) as a part of Project UNIQUE I. A total of 14 physical fitness test items were analyzed to determine the physical fitness factor structure of males and females.

The factor structure obtained from the residual intercorrelation matrix for the cerebral palsied boys consisted of three comparable common factors and one comparable specific factor. Three skinfold measures comprised Factor 1. Thus, this factor appeared to be a body composition factor. Factor 2 was defined by variables which were dependent upon time and/or explosive coordinated movement for their successful completion. In view of raw scores, Factor 2 appeared to be a power-endurance factor. Factor 3 consisted of items which involve the musculature of the hands and arms. Consequently, an upper limb strength/power-strength label seemed appropriate. Factor 4 was represented solely by the timed leg raise test item; no attempt was made to name this factor. The three comparable common and one comparable specific factor that defined the factor structure derived from the residual intercorrelation matrix for cerebral palsied boys accounted for 70.1 percent of the total variance of the 14 test items.

The residual intercorrelation matrix yielded three comparable common factors and one comparable specific factor for the cerebral palsied girls. Factor 1 was comprised of the three skinfold measures, mat creep, and shuttle run test items. Factor 1 appeared to be a body composition factor which had a negative effect on certain speed items of cerebral palsied girls. Factor 2 was comprised of items which were labeled as power-endurance. Factor 3 was a comparable specific factor comprised of the two grip strength measures. It was tentatively labeled a strength factor. Factor 4 contained three variables which all involved the musculature of the arms and shoulders. Factor 4 appeared to be an arm/shoulder power-strength factor. The factors extracted from the residual intercorrelation matrix of the cerebral palsied girls accounted for 70.6 percent of the total variance of the 14 test items.

Project Objective

Literature related to the separate and independent influence of cerebral palsy or mental retardation on physical fitness test performance indicates that these conditions do, in fact, influence performance. Evidence also exists to substantiate the belief that this influence increases with the severity of each of these conditions. What the past research does not appear to answer is the effect of these conditions on physical fitness when they are present simultaneously. This is unfortunate since mental retardation accompanies cerebral palsy in a relativly high percentage of cases and because of the potential implications for educators. This project is designed to study the effects of mild retardation on the physical fitness performance of adolescents with cerebral palsy. This objective will be met by determining if the influence of mental retardation, gender, and age impact significantly on physical fitness performance and comparing the factor structure of physical fitness of nonretarded and retarded boys and girls with cerebral palsy.

CHAPTER 2

METHODS AND PROCEDURES

Overview

In order to attain the objectives of the project it was necessary to establish and carry out systematic methods and procedures for the conduct of the study. This section of the chapter provides an overview of the methods and procedures which were employed in this study. Following this overview, the methods and procedures are discussed in detail in the remaining portions of the chapter.

An important step in conducting the study was to define, identify, classify, sample, and select subjects in a way which would be relevant to the objectives of the study. This involved the selecting of geographical areas for subject selection, developing criteria for the selection of test sites, and formulating procedures for attaining consent for subject testing.

Another important step was to define physical fitness, select factors which represent it, and to select test itmes to measure the factors in consideration of subject classifications and subclassifications. This required that each item be analyzed to determine whether or not it could be administered to a particular subgroup. This step involved development of general guidelines for test administration and the development of specific and standardized procedures for the administration of test items.

A third step was the establishment of a testing network which could be used for the testing of subjects throughout the United States. This required the selection as well as the preparation of field testers. In regard to field tester preparation, methods and procedures were carefully formulated to develop a preparation program and to document the attainment of competency.

A fourth step was to identify and develop methods and procedures pertaining to the recording, review, and checking of data collected and providing necessary and accurate supplies and equipment for the study. This involved the development of methods and procedures for checking equipment before and after using it, procedures to follow in case of suspected equipment malfunctioning, and instructions for the use of equipment.

Finally, methods and procedures were established for the review and checking of data for entry into the computer for analysis.

The time duration of this project was from June 1, 1986 to August 31, 1988. The actual collection of data extended from approximately January, 1987 to January, 1988.

Subject Selection and Sampling

Definitions and Classifications

For the purposes of this study, two major categories of subjects were employed: cerebral palsy (nonretarded), and cerebral palsy (mildly retarded). Cerebral palsy is a group of neuromuscular conditions caused by damage to the motor areas of the brain. The term mildly retarded was defined in accord with the American Association on Mental Deficiency (AAMD) definition. An intelligence quotient (IQ) of 50-68 on the Stanford-Binet, 55-69 on the Wechler Intelligence Scale for Children (WISC), or equivalent was the range encompassing mild retardation. A slow learner was considered to have an IQ falling between mild retardation and 90, or an equivalent standard.

In selecting subjects for this study, it is important to note that subjects with multiple handicapping conditions other than retardation and cerebral palsy were not selected unless it was decided that any additional handicapping condition would not significantly affect physical fitness test performance. For example, it was permissible to include an individual with a minor learning disability. However, if it was felt that the learning disability would seriously affect performance on test items, the individual was not included.

For this study, subjects were further classified and subclassified into two groups. First, the subjects were classified and subclassified as required by the UNIQUE Physical Fitness Test. The UNIQUE test classifies subjects for stationary and locomotor test items. For stationary test items, four classes are used: A, B, C, and D. For locomotor test items, subjects are also classified into four categories (I through IV) based upon method of ambulation. The classification and subclassification systems associated with the Project UNIQUE Test of Physical Fitness are presented in Table 2.1.

In addition to the classification system employed by Project UNIQUE, each subject was further subclassified on the basis of the sport ability classifications used by the Cerebral Palsy-International Sports and Recreation Association (CP-ISRA) and the National Association of Sports for Cerebral Palsy (NASCP). These were modified slightly by the principal investigator following consultation with the project's advisory board. The CP-ISRA and NASCP classifications includes 8 groups (Sherrill, Adams-Mushett, and Jones, 1986; Sherrill, 1986). The subclassification system modified in this study, referred to as the sport ability classification, used seven of these categories because motorized wheelchairs were not used in the present investigation. The sport ability subclassifications used in UNIQUE II appear in Table 2.2.

TABLE 2.1. UNIQUE PHYSICAL FITNESS TEST CLASSIFICATIONS FOR PERSONS WITH CEREBRAL PALSY.

CLASSIFICATION SYSTEM

Participants with cerebral palsy are classified according to the two systems presented below. The first system is to be used for stationary test items (skinfolds, grip strength, sit and reach, softball throw and flexed arm hang) and requires the tester to place the participant in the most appropriate of four possible classes (A through D) based upon the descriptions associated with each. The second system is to be used for locomotor test items (dash and long distance run) and requires the tester to place the participant in the most appropriate of four categories (I through IV) based upon method of ambulation. When in doubt, the least restrictive classification should be used. Thus, for example, a person able to participate without an assistive device or wheelchair should do so.

Stationary Test Items

Class A

The Class A participant ambulates without assistive device for regular daily activities. Class A is generally appropriate for the less severely involved participant with cerebral palsy. Class A participants may have quadriparetic athetosis with minimal to moderate control problems or may have hemiplegic or monoplegic involvement.

Class B

Class B participants may exhibit one of two primary profiles. They may have quadriplegic athetosis (or similar involvement) with moderate to severe control problems in the extremeties or torso, but are able to ambulate without assistive device for regular daily activities; or Class B participants may have paraplegic involvement with good functional strength and minimal control problems in the upper extremities or torso, but use an assistive device or wheelchair for regular daily activities.

Class C

Generally, the Class C participant uses a wheelchair for regular daily activities. Class C participants have either quadriplegic or triplegic involvement with moderate to severe control problems.

They have poor to fair functional strength in the upper extremeties and torso.

Class D

Class D participants are limited to the use of an electric wheelchair or need personal assistance in moving the wheelchair during regular daily activities. They have poor functional strength and cannot independently propel a wheelchair. Class D participants have either quadriplegic or triplegic involvement (usually spasticity prevalent) with severe control problems.

Locomotor Test Items

Class I

Class I participants run completely unassisted. They do not require an assistive device of any kind or the personal assistance of a teacher or aide.

Class II

Class II participants run with the aid of an assistive device of some kind. Canes, crutches and walkers are considered to be assistive devices for the purpose of this test. Outside support from a teacher, aide or other student is not allowed.

Class III

Class III participants perform the locomotor items from a wheelchair. Class III participants must be able to independently propel their wheelchair with either their arms or legs.

Class IV

Class IV participants must use electric wheelchairs or need personal assistance in locomotion. (Class IV participants do not take the locomotor test items because they are capable only of using an electric wheelchair.)

TABLE 2.2 SPORT ABILITY SUBCLASSIFICATIONS

1.	Uses motorized wheelchair.
2.	In track, primarily propels wheelchair using feet.
3.	In track, uses and primarily propels chair with arms (slowly and/or choppy).
4.	In track, uses and propels wheelchair with arms using forceful and continuous arm pushes.
5.	Ambulates in track with assistive device.
6.	Ambulates unassisted but has obvious balance and coordination difficulties.
7.	Ambulates with a slight limp in track.
8.	Runs and jumps freely and unassisted.

In addition to being classified and subclassified, subjects were given a condition code which represented their medical condition. Six major groupings were used: spastic, athetoid, tremor, rigidity, ataxic, mixed. Each subject was specifically classified within one of these groups according to the nature of their involvement. Subjects were assigned a three-digit number which best corresponded to their handicapping condition. The numbers and the conditions they represent are identified as condition codes and are presented as appendix D in Appendix A.

Geographical Areas

Subjects in the study were selected from segregated or institutionalized and integrated or noninstitutionalized settings located throughout five geographical areas of the United States. These included the northeast, southeast, central, northwest, and southwest regions of the country. The target percentages and the target and actual number of subjects for each region is depicted in Table 2.3. The projected or targeted percentages are based upon the population distribution in the United States in 1984 according to the U.S. Department of Commerce, Bureau of the Census.

The states encompassed within regions are presented below:

Northeast: New York, New Jersey, Maine, New Hampshire, Connecticut, Massachusetts, Delaware, Pennsylvania, Ohio, Michigan, Vermont, Rhode Island.

Southeast: Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Kentucky, and Tennessee.

Central: Wisconsin, Minnesota, Texas, Illinois, Missouri, Arkansas, Kansas, Mississippi, Louisiana, Iowa, Nebraska, Indiana, Oklahoma.

Northwest: Washington, Oregon, Idaho, Montana, North Dakota, South Dakota, Wyoming, Alaska.

Southwest: California, Arizona, New Mexico, Utah, Colorado, Nevada, and Hawaii.

TABLE 2.3 TARGET AND ACTUAL PERCENTAGES OF SUBJECTS IN THE UNIQUE SAMPLE.

	Total	NE	SE	Central	NW	SW
Target percentage	100.0	29.5	22	27	6	15.5
Actual percentage	99.9	37.4	17.2	30.5	5.4	9.4
Actual number	203	76	35	62	11	19

TABLE 2.4 NUMBER OF SUBJECTS CATEGORIZED BY CONDITION, GENDER, AND AGE.

Age	Nonretarded		Retarded	
	Males	Females	Males	Females
10	15	7	5	6
11	11	11	2	7
12	11	8	6	3
13	6	10	4	4
14	10	5	4	5
15	4	3	8	6
16	6	3	4	6
17	7	5	9	2
Total	70	52	42	39

Selection of Testing Sites and Subjects

The subjects for this study came from states representing the five regions of the Unites States previously identified. Subjects were selected from two major categories: mildly retarded-cerebral palsied and nonretarded-cerebral palsy. All subjects were between the ages of 10 through 17 and were otherwise free of multiple handicapping conditions. Age was determined by the individual's age at the time the first test item was administered.

The subjects in the study were selected from testing sites which agreed to participate in the study. Since the availability of subjects at sites never exceeded the sample sizes needed, every eligible subject that could be tested was tested, and random sampling was not applicable. Also, since the number of sites involved in testing never exceeded the total required, there was no need to apply random sampling procedures to the sites selected.

Only groups/classes of subjects which were representative of cerebral palsied adolescents attending school were included in the study. The sample includes cerebral plasied persons who are non-athletes as well as athletes, individuals in adapted physical education as well as those in mainstreamed settings, persons severely as well as mildly affected, males and females, and persons in integrated as well as segregated schools or agencies. For the purposes of this study, an educational setting was considered integrated if it included both handicapped and nonhandicapped pupils. It was considered as segregated if only students with handicapping conditions were enrolled in the school or agency. Individuals were classified as residents if they lived at the educational center during the school week and as nonresidents if they commuted from home to school on a daily basis.

To enhance representation from five regions of the United States and a sample representative of cerebral palsied adolescents attending school throughout the United States certain procedures were followed to the extent possible. First, the investigators identified major population areas in each of the regions. Next, schools or agencies which included relatively large concentrations of cerebral palsied pupils were contacted. Also, several leaders in adapted physical education at colleges and universities and certified testors associated with Project UNIQUE I in regions were contacted. The latter were contacted to determine if they were knowledgeable about or had access to pupils who would be eligible to serve as subjects for the study. As a result of these efforts, possible sites for testing and a potential list of field testers was developed. The following criteria were utilized to select testing sites:

1. A school was selected if the authorized administrator

agreed to participate with the project.

2. Preference was given to those schools and institutions in which physical education teachers or other professionals in the school could and would be prepared and qualified to administer the test.

3. In selecting schools, preference was given to those schools, agencies, or institutions which best reflected the characteristics sought in the study.

4. Preference for the selection of testing sites was given to those schools and agencies geographicallv accessible to field testers.

5. Preference in the selection of testing sites was given to those sites which met targeted geographi al subject numbers.

In addition to the above criteria for the selection of testing sites, it was necessary for consent to be obtained for testing purposes. Of course, only subjects for whom permission was given were tested in this study. A copy of the consent form employed in the study appears as appendix A in Appendix A.

The next step was to prepare field testers in project procedures and prepare them for test administration and data collection. This was accomplished in a Project UNIQUE training session. Once the training was completed, field testers could identify, classiiy, and test subjects. In summary, the sample was opportunistic with efforts made to assure representation of cerebral palsied persons attending schools in five regions of the United States.

As a result of these efforts, field testers presented test results on 220 adolescents between the ages of 10 and 17. After reviewing and checking the data for accuracy, it was necessary to eliminate the scores of 17 subjects and reduce the study to 203 subjects.

Hypothesized Structure and Measurement of Physical Fitness

The hypothesized structure of physical fitness employed in this study emerges from a particular conception of physical fitness. For the purposes of this study, physical fitness is conceived as a part of the total fitness of the individual. Total fitness includes mental development, emotional development, social development, motor development, and physical development are appropriate to the individual. It is assumed that physical fitness implies freedom from disease, the ability to meet the physical requirements of daily tasks without undue fatigue, and the ability to withstand ordinary stresses

of life without harmful strain. This concept of physical fitness enables the individual to carry out the requirements of daily living, to enjoy leisure time pursuits, and to meet unforeseen emergencies.

This study recognizes physical fitness as a multidimensional construct. This means that physical fitness is considered not as a generic concept, but as an umbrella term for a series of specific components. Physical fitness is conceived as being incapable of being represented by a single measure, but consists of a series of specific abilities which, although related to some extent, are discrete enough to warrant separate measurement.

The concept of physical fitness adopted for this study assumes that it consists of health related and physical performance components. In this regard, it recognizes the importance of physical fitness for the optimal health of the individual and for optimal performance of tasks of daily living and physical or sport activities. In essence, the theoretical frame of reference for this study is based on the belief that there are certain relatively well-defined components of physical fitness which are needed for the purposes of developing optimal health and enhancing performance of daily activities, occupational activities, and sport performance. It is hypothesized that the basic factors underlying health and performance related physical fitness include muscular strength/endurance, cardiorespiratory endurance, a desirable level of body composition, and flexibility.

The test selected to represent the hypothesized structure of physical fitness adopted for this study was the UNIQUE Physical Fitness Test. The criteria and supporting technical information pertaining to the selection of test items in the UNIQUE test have been published in detail (Winnick & Short, 1984). In Table 2.5, the test items in the UNIQUE test which are used to measure the four factors of physical fitness are presented. Table 2.5 also presents a matching of test items with the stationary and locomotor classifications of subjects in the UNIQUE test.

TABLE 2.5 UNIQUE PHYSICAL FITNESS TEST FACTORS AND TEST ITEMS.

UNIQUE Test Factors and Test Items	Classification							
	Stationary				Locomotor			
	A	B	C	D	I	II	III	IV
Body Composition								
Triceps Skin.	x	x	x	x				
Subscapular Skin.	x	x	x	x				
Muscular Strength/Endurance								
Right Grip	x	x	x					
Left Grip	x	x	x					
50-yard Dash					x	x	x	
Softball Throw (Females)	x	x	x					
Arm Hang (Males)	x	x						
Flexibility								
Sit and Reach	x	x						
Cardiorespiratory Endurance								
Long Distance Run					x	x	x	

Test Administration

Selecting Test Items for Individuals

The tester's first responsibility prior to administering the UNIQUE Physical Fitness Test was to accurately classify and/or subclassify persons to be tested. Subjects were classified and subclassified as presented in Table 2.1.

Once a student was classified and subclassified, the tester was able to select appropriate test items to be administered to each individual by consulting the Test Item Selection Guide in Table 2.5. In Table 2.5, recommended items are checked (X) for each classification/subclassification.

General Testing Guidelines

Because this study required the administration of several test items to many subjects by different field testers, guidelines for administering the test were established and were communicated to testers. These guidelines are listed below:

1. Practice administering the test prior to taking measurements. Since this is especially important for the skinfold items, compare your practice results with another tester before formally administering the test.

2. Organize the necessary test forms and testing stations prior to testing.

3. Explain the test and its purpose prior to testing.

4. Have youngsters dress appropriately. Gym suits and sneakers (where appropriate) are recommended.

5. Allow sufficient time for warming-up. This is especially true for the sit and reach test (have students stretch the lower back and hamstrings) and the softball throw.

6. Provide cool-down activities (i.e., walking, stretching) after testing (especially after the long distance run).

7. Use a "Ready-Go" signal when starting timed activities.

8. Use a positive approach when testing. Encourage all children to try their best and give them positive reinforcement after each trial.

9. Administer the skinfolds, flexed arm hang, grip strength, softball throw and sit and reach individually.

10. Administer the 50-yard dash to two subjects at a time if possible.

11. Administer the long distance run to small groups of subjects.

12. Administer no more than one-half of the test items on one particular day. In cases where fatigue appears to be influencing performance, provide longer intervals of rest between test items.

13. Administer the long distance run last. Instruct participants to pace themselves. Best results will probably be obtained when the runner maintains a steady pace and closes with a strong finish.

14. Administer the running items on flat, hard, and resilient surfaces.

15. Provide a careful demonstration of test items to participants.

16. Allow participants to "walk through" an activity or become familiar with a test item prior to testing.

17. Administer all test items within a five-month time period.

In addition to the above guidelines, testers were instructed not to test subjects on the long distance item in environments when the temperature was above 90 degrees or below 50 degrees and if the temperature plus the humidity exceeded 175.

Height and Weight Measures

To the extent possible the height and weight of each subject was measured. Subjects were instructed to remove their shoes and be clothed in light weight athletic attire when tested. The height measure was taken to the nearest half inch. When possible, weight was taken by having the subject stand on a calibrated scale and recording weight to the nearest pound.

In cases where individuals used prosthetic devices or braces, height was taken while the subject wore these devices. In cases where subjects possessed exaggerated flexor tone, testers were instructed to determine functional standing height and not to attempt straightening affected parts of the body prior to measurement.

When determining weight of individuals who used prosthetic devices or braces, weight was taken with the braces and prosthetic devices

removed, or by subtracting the weight of such prosthetic devices or braces.

Description of Tests and Test Procedures

A description of the test items and procedures employed for administering them in this study are presented on pages 12-24 in Appendix A. A particularly important part of this section deals with how test items are modified in various subject classifications and subclassifications.

Field Testers and Their Preparation

The physical fitness test items selected for this study were administered by field testers prepared and certified for this function by the project director and project coordinator (central project staff) or persons they prepared and who were certified by them. Thus, all testers involved in data collection were either central project staff or individuals certified by the central project staff. Except where these functions were performed by central project staff, field testers identified and selected subjects, attained permission to test, administered tests, recorded data, and forwarded data to the central project staff at Brockport for checking, computer preparation, and analysis.

Data for this study were collected by 53 field testers. With few, if any exceptions, testers were physical education teachers. Several of the testers were graduate students pursuing masters or doctoral degrees.

Purposes and Competencies

All Project UNIQUE testers were required to participate in the competency-based UNIQUE II Training Program designed to develop the skills and knowledge necessary to effectively implement the testing protocols of the study. The training program, which required approximately two hours, presented the overview and scope of the study, project organization and personnel , definitions and classifications of subjects, a description of test items and how they are administered, test modifications, sampling procedures, explanation of unique testing equipment and supplies, and methods of data recording. Field testers were provided with a 37-page manual (see Appendix A) which they could take with them and use as a reference as they performed their duties as field testers. Each training session was conducted by either a project staff member or a certified tester who had previously attended a training session, demonstrated the required competencies, and was considered qualified to prepare others in the procedures of the study.

The purpose the training program was to provide testers with the following competencies:

1. Understand the purposes and general procedures of Project UNIQUE.

2. Understand the purpose of each test item.

3. Be able to understand and implement the classification and testing procedures.

4. Understand and implement the specific test modifications.

5. Be able to utilize the testing equipment.

6. Be able to record data accurately on the data recording sheet.

7. Be able to employ the sampling procedures used in the study.

Organization and Content of the Training Program

In this study a great deal of attention was given to the establishment of a valid and standardized training program. In this section the organization and content of the training program will be briefly described. The format to be used in this description will be to present information in the sequence used in a typical training session beginning with the reception of trainees to the checking of competencies.

Reception

In conducting each of the training sessions, the staff began by introducing themselves to trainees as they entered the classroom. Training session participants then would be asked to be seated and to informally review materials passed out to them. Materials for each workshop included a data recording sheet, an instructional manual (Appendix A), a written test, (Appendix B), a flyer describing UNIQUE II (Appendix C), and support letters (Appendix D). Letters of support were received from the National Consortium on Physical Education and Recreation for the Handicapped, the New York State Association for Health, Physical Education, Recreation and Dance, Inc., the United States Olympic Committee (Chair, Research Subcommittee), and the

American Alliance for Health, Physical Education, Recreation, and Dance.

Introduction

Once the training session participants arrived, the next step was to introduce them to each other. Following this introduction, training session participants were asked to give their name, address, and telephone numbers. In the final part of the introduction, training session participants were informed of the purpose of the training session, the relationship between Project UNIQUE I and II, and the targeted subject numbers for testing. Finally, the agenda for the training session was briefly outlined.

Training Videotape

In the next phase of the training session, a videotape was played. The videotape lasted for a duration of 41 minutes and served a very important role in the training session. As the videotape was played, trainess completed the data recording form and referred to the instructional manual. The topics covered in the videotape appear below:

Introduction:

Values of physical fitness, purposes and benefits of this relationship of this study to UNIQUE I.

Subjects:

Definitions, selection procedures, consent to test.

Classification and Subclassification system:

Stationary classification, locomotor classification, subclassification, the data recording form, condition codes, measuring height/weight.

Test Procedures

Subject Sampling

Supplies and Equipment

Closing Remarks

Questions

Following the playing of the videotape, approximately five minutes was given to answer any questions.

Subject Selection

Although the selection of subjects was covered in the videotape and was also covered in the instructional manual, additional time was given to the topic of subject selection bias. It was explained that three ways to bias the sample were: (1) testing only cerebral palsied subjects who were athletes, (2) testing only the best performing pupils in a school, or (3) testing only pupils who were in adapted physical education.

Consent

Training session participants were reminded to obtain parental consent prior to testing unless waived by a local administration having jurisdiction.

Review of Modifications in Test Items

Since the modifications of test items were described in detail in the test manual, they were not covered in detail in the training videotape. However, for emphasis, the modifications appearing on pages 13-24 in the test manual (see Appendix A) were reviewed. Typically, this portion of the program was conducted for a duration of ten minutes.

Practice

In this part of the training session, participants were invited to practice administering the skinfold, sit-and-reach, and grip strength test items.

Demonstration of Competencies

In this part of the training session, a qualified individual or individuals checked the competencies of the trainees. Trainees were asked to demonstrate their ability to administer the sit-and-reach, grip-strength, and skinfold test items. In this part of the training session, trainees often completed the written test, and their recording forms were reviewed.

In terms of time allotment, the period from introduction to review

of modifications typically took 70 minutes. Following this period of time, trainees practiced administering test items, worked at completing their written test, and waited to have competencies checked. The training session could be completed in approximately two hours if the number of trainees consisted of no more than 15 people. If a workshop was heavily enrolled, more time was necessary to check competencies.

UNIQUE I Testers

In certain instances the field testers for this study conisted of individuals who were certified as testers in connection with Project UNIQUE I. If an individual had been previously certified as a UNIQUE I tester, attendance at a training session and demonstration of procedures for the administering of the three test items were waived. However, all other training activities associated with UNIQUE II were followed, including viewing the training videotape.

Checking Competency

Three checks were employed to determine if trainees attained desired competencies. The first check involved completing properly the UNIQUE data recording form (presented as appendix C in Appendix A). During the videotape presentation at the training session, subjects were tested and scores were announced. Trainees were instructed to properly place the announced score in the appropriate spaces on the score sheet. Particular attention was given to decimals, rounding, and using proper units of measure.

The second check required trainees to complete a written examination. The examination consisted of 20 multiple-choice questions related to the purposes of the project, test procedures, modifications of test items and sampling procedures. Trainees were permitted to submit their completed test some time after completion of the training session and before their scheduled date to begin testing. Test papers were scored and trainees were advised of any incorrect answers. Trainees were permitted to use their test manuals in answering questions.

The third check was a demonstration of the ability to administer the skinfold, sit and reach, and grip strength tests. Each trainee was observed by the project director, the project coordinator or a person already certified in administering the test. A checklist was used to help examiners focus on critical concerns for test administration. In checking competency in regard to these items, particular attention was given to the following procedures:

Skinfolds

1. Proper application and release of calipers.

2. Proper identification of the triceps area.
3. Proper identification of the subscapular area.
4. Appropriate separation of skinfold from muscle tissue.
5. Proper order of operations.
6. Reliability of measures (less than 2 mm difference between two trials).
7. Objectivity of measure (less than 2 mm difference between two testers at triceps skinfold and subscapular fold).

Sit and Reach

1. Subject's shoes removed, knees held down, feet flush against box.
2. Subject advised not to bob before reaching.
3. Proper reach.
4. Reach held for one second.
5. Score recorded accurately to nearest centimeter.
6. Knowledge of classes to be tested.

Grip Strength

1. Knowledge of modifications for impaired subjects.
2. Hand dynamometer adjustment.
3. Subject seated properly.
4. Hands alternated during test trials.
5. Score read and recorded accurately (trials and mean).

When trainees demonstrated the ability to successfully complete the scoresheet, administer the three test items, and complete the written test procedures, they fulfilled their competency requirements.

Data Recording and Review

Project UNIQUE testers were provided with data recording forms (presented as appendix A in Appendix A) for the purpose of recording data. On the data recording forms, testers were able to provide demographic and performance information. Specifically, in the first part of the recording forms, space was provided to record classifications and subclassifications. On the second and third parts, space was provided to record data for stationary (nonlocomotor) and locomotor test items, respectively. On the form, the units of measure (feet, seconds, etc.) for each test item were specified. Also, to assist testers, the classifications appropriate for each test item were indicated.

After the recording forms were completed by testers they were submitted to the central project staff at Brockport. When received, data were given a cursory examination by the project staff to determine

if gross deficiencies existed. If the data appeared to be generally acceptable, several specific procedures were followed to prepare data for analysis and for the examination for reliability and validity.

The preparation of data for computer analysis by central project staff included several procedures. First, forms were reviewed to determine whether all necessary information was provided. Secondly, average scores were computed for multi-trial test items. Third, subjects were given numbers and were grouped in files according to test sites. For each test site, a file was established. The fourth step involved entering each data file into the computer, proofing printouts, and merging each testing site data file with the project's master data file.

The checking of data for reliability and validity was open-ended and heavily dependent upon the professional background of the project director and coordinator. The data were reviewed and analyzed from many perspectives and no one checklist for data checking was established. However, attention was routinely given to the following questions:

1. Is there a logical association between and within classifications and subclassifications for each subject?

2. Were the correct test items administered for each classification or subclassification?

3. Were data presented using appropriate measurement units.

4. Was the long distance run performed for the correct distance and time for each age group and were the results entered properly on data sheets?

5. Was there reasonable consistency within test trials?

6. Were all relevant entries on the data recording form completed?

7. Was there a logical relationship between subject height/weight and skinfold measures?

8. Were correct entries made for missing data and zero scores on test items?

Following cursory examination, 220 tested subjects were placed in 26 site files. Subsequent to further checks, site files were reduced to 25 and these consisted of 203 subjects. Thus, the checking procedure resulted in the elimination of 17 cases or 7.7 percent of the original total number of subjects considered.

Equipment

Specific equipment needed to administer a particular test item is identified in an earlier section of this chapter. With the possible exception of a hand dynamometer, skinfold caliper, and a sit and reach box, the equipment employed in this study is typically found in physical education programs. Hand dynamometers, skinfold calipers, and sit and reach pieces of equipment were provided by the project.

To help assure proper functioning of testing instruments, field testers were asked, upon receiving test equipment, to check it for damage, obvious malfunction, and performance according to standards identified for the project. If equipment was damaged and standards were not met, field testers were asked to return the equipment to Brockport.

The hand dynamometer selected for this study was the Smedley-type distributed by the J.A. Preston Corporation. The dynamometer consisted of a metal frame with an adjustable stirrup on the handgrip. All dynamometers were ordered and received by the central staff at Brockport. Upon receipt from the distributors, each dynamometer was checked for accuracy. The procedures for checking involved the lifting of barbells weighing 9.2 kg. and 18.2 kg. by the dynamometer at moderate speed and comparing the poundage of the weight lifted with the score registered by the dynamometer. Readings accepted for using the instrument for testing ranged from 8 to 10 kg. for the 9.1 kg. reference and from 18 kg. to 20 kg. for the 18.2 reference. If the dynamometer functioned within acceptable limits, it was given to testers. Generally this involved mailing the dynamometer. Upon receiving the hand dynamometer, testers were asked to check it. Specifically, testers were instructed to examine the instrument for breakage, assure that the two pointers registered at zero when no pressure was applied, assure that the bottom pointer moved back to zero after pressure was released and to follow specific procedures described in the instructional videotape.

The Lange skinfold caliper was selected as the fat caliper to be used in the study. This caliper meets the 10 grams per square millimeter standard generally subscribed to in research investigations. Upon receipt from the distributor (Cambridge Scientific Industries), the Lange skinfold calipers were checked by Project UNIQUE staff for accuracy. Calipers were considered acceptable if they were within + or - 1 mm. when measuring known widths between 34 and 36 mm. All Lange skinfold calipers were well within this standard.

Field testers were also encouraged to check their caliper carefully if they received it through the mail. Testers were encouraged to check it for damage upon receiving it. They were instructed to be sure that the glass was not broken and that the dial

read zero mm. when unopened. Subsequently they were instructed to apply the caliper to the outside of the carrying case of the caliper at the Cambridge Scientific logo and record the measurement. This reading was compared with the reading obtained at Brockport before mailing. If the two readings differed by more than 1 mm., testers were encouraged to return the caliper to the central project staff at Brockport and a different caliper would be provided.

The sit and reach box was constructed locally using plywood (See Appendix A). The top panel was marked with one centimeter gradations with the 23 centimeter line exactly in line with the vertical panel against which the subjects' feet were placed. Each sit and reach box was checked to determine whether specifications were met and were subsequently mailed to testers.

Reliability and Validity

Information in regard to the reliability and validity of the UNIQUE Physical Fitness test has been published by Winnick and Short (1984).

CHAPTER 3

RESULTS

The results of data analysis are presented in this chapter. The results pertain to the primary research questions:

1. Is the physical fitness performance of adolescents with cerebral palsy significantly influenced by mental retardation?

2. To what extent, if any, do the factor structures of mildly retarded and nonretarded youngsters with cerebral palsy vary?

3. Although not an original objective of the study, a third question, to what extent do various classification systems account for differences in the physical fitness test performance of youngsters with cerebral palsy?

Each research question is addressed in a separate section of this chapter.

Physical Fitness Test Performance as a Function of Mild Mental Retardation

In this section of the report, the effect of intellectual classification (mildly mentally retarded vs. nonretarded) on physical fitness test performance is examined. Items used in this analysis (as well as in most subsequent analyses) are items from the UNIQUE Physical Fitness Test for youngsters with cerebral palsy. Consequently, the items included in the analysis are 1) the sum of the tricep and subscapular skinfolds, 2) sum of right and left hand grip strength, 3) sit and reach, 4) 50-yard dash, 5) distance run, 6) softball throw (girls only), and 7) flexed arm hang (boys only).

In addition to these seven items, a second grip strength item, dominant grip, was included as a matter of interest. Conceptually, dominant grip would appear to have certain advantages over sum of the grips as a measure of grip strength for youngsters with cerebral palsy. For instance, in cases where individuals have hemiplegia, the sum of grips, in essence, would represent the "average" strength of an affected limb and a nonaffected limb. This averaging effect tends to make the interpretation of the score more difficult. With dominant grip the tester knows that the test score represents the "best" grip the youngster has to offer.

The fact that the effects of intellectual classification, along with age and gender, would be studied across eight dependent variables would ordinarily dictate a multivariate approach to data analysis. In this case, however, a multivariate approach was obviated due to the test item selection process necessitated by the classification system. Simply put, not all subjects took all test items due to difference in functional ability. Consequently a univariate approach was adopted utilzing the .01 level of significance in an effort to reduce overall experimental error.

Since the primary research question deals with the effects of mild mental retardation and its possible interaction with age and gender, a series of three-way univariate analyses were performed utilizing intellectual classification, age, and gender as independent variables. A relatively low number of subjects in each of the eight age categories necessitated collapsing ages into two groups. For the distance run, ages were combined into groups comprised of 10-12 and 13-17 year-olds. This breakdown was consistent with the time/distance requirements of the distance run procedures. For all other items, age was combined into two groups each with a four year age span, 10-13 and 14-17. This is the same approach utilized in Physical Fitness Testing of the Disabled (Winnick & Short, 1985).

Finally, to account for possible performance differences that might be attributable to differences in physical functioning level rather than differences in intellectual classification, CP classification was covaried. The covariate for the stationary test items (skinfolds, grip, sit and reach, softball throw, flexed arm hang) was the stationary classification system (A through D). The covariate for the locomotor test items (50-yard dash, distance run) was the locomotor classification system (I through III). Readers should note that where data are presented graphically (i.e. in the figures), the plotted values are the adjusted means rather than the observed means.

The results of the univariate ANCOVAs are presented in Table 3.1. For each item F ratios are given. Since softball throw and flexed arm hang were "one gender" items, they were analyzed in a two-way format; all other items were subjected to a three-way analysis. Each item is discussed separately following the presentation of the table.

TABLE 3.1 UNIVARIATE F VALUES FOR SUBJECTS WITH CEREBRAL PALSY BY INTELLECTUAL CLASSIFICATION (IC), AGE, AND GENDER WITH FUNCTIONAL CLASSIFICATION COVARIED.

Test Item	Cov.	IC	Age	Gend.	IC x Age	IC x Gend.	Age x Gend.	IC x Age x Gend.
Sum of Skin.	8.40*	.16	3.95	7.48*	6.11*	.23	1.90	.11
Sum of Grips	4.01	5.00	39.92*	.57	.41	1.87	.00	1.09
Dominant Grip	3.96	2.17	36.72*	.32	.52	2.55	.04	1.11
Sit and Reach	3.07	.05	.14	5.57	.00	1.08	5.38	.50
50-yard Dash	103.77*	.81	.21	1.14	2.65	.00	2.40	.74
Distance Run	32.60*	.63	.16	.01	1.74	1.65	.23	.27
Soft. Throw	21.67*	4.44	8.85*		1.47			
Arm Hang	.42	4.25	8.18*		.25			

*Significant at the .01 level.

Skinfolds

The only significant main effect for the sum of the tricep and subscapular skinfolds was gender. Females had significantly larger skinfolds than males. Neither intellectual classification or age (p = .05) was significant at the .01 level. The significant intellectual classification x age interaction term is apparently due to the fact that intellectual classification approached significance (p = .03) for the 14-17 year old group while it was nonsignificant for the 10-13 age group. Figure 3.1a shows that while skinfold thickness declined with age among nonretarded males, it increased with age among mildly retarded males and females of both intellectual classifications.

Grip Strength

For both sum of the grips and dominant grip only the main effect of age was significant. In each case older subjects (14-17) had significantly higher scores than younger subjects (10-13). Neither intellectual classification or gender was significant at the .01 level. (For sum of the grips, intellectual classification was significant at .03). Figure 3.1b demonstrates that regardless of intellectual classification or gender, dominant grip strength performance improved with age.

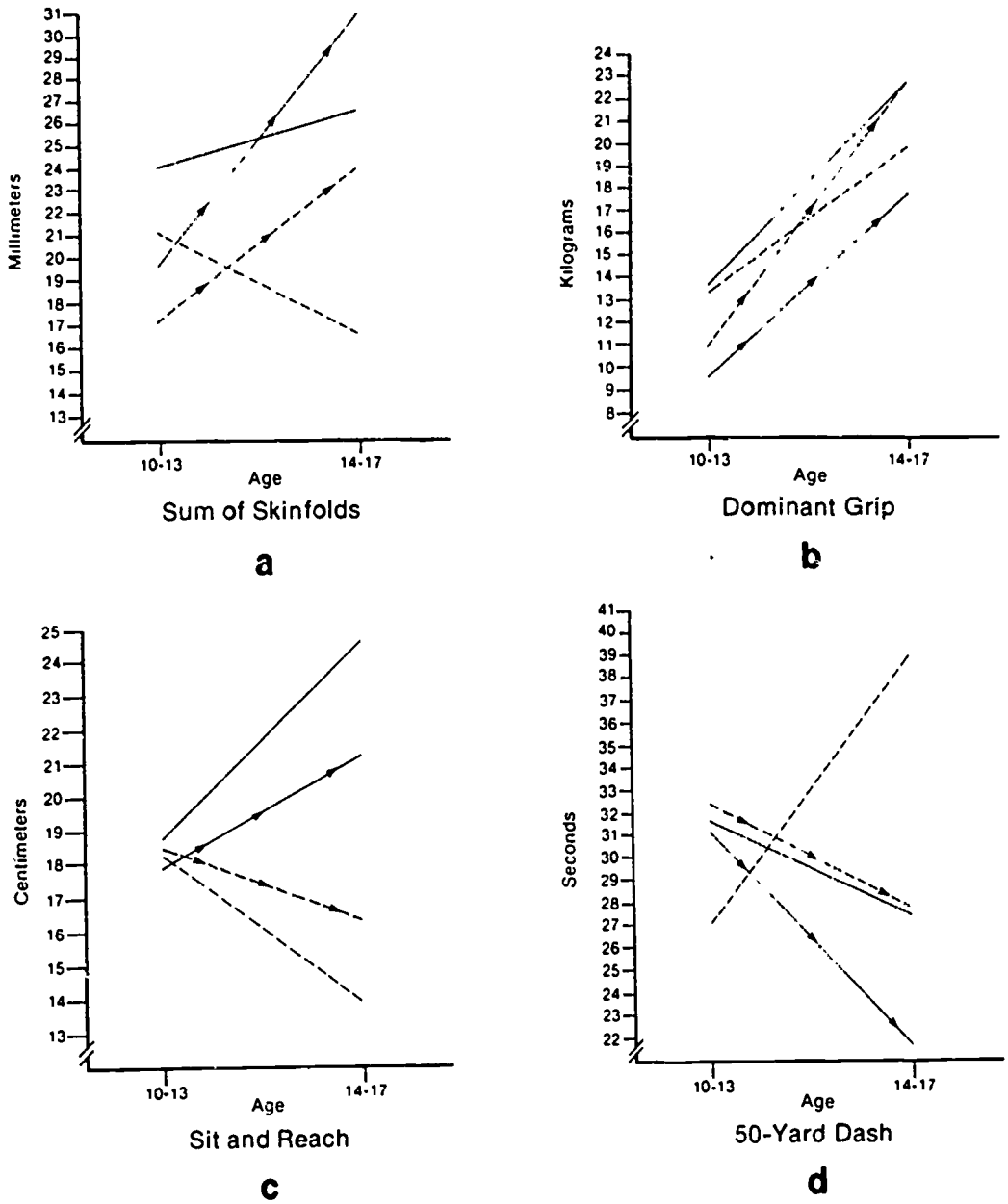
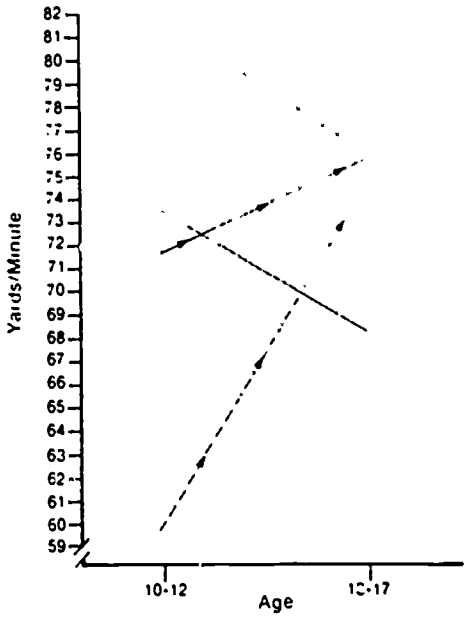
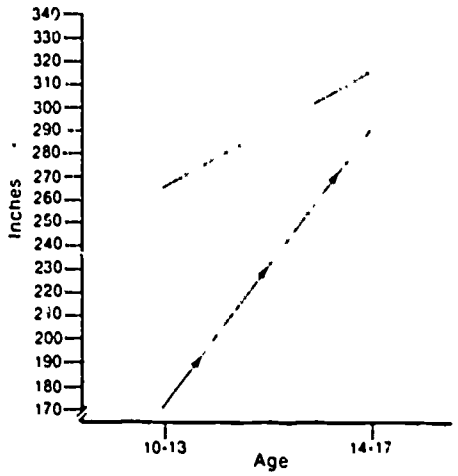


Figure 3.1 Nonretarded and Retarded Males and Females with Cerebral Palsy Compared on Measures of Physical Fitness (Adjusted Means).



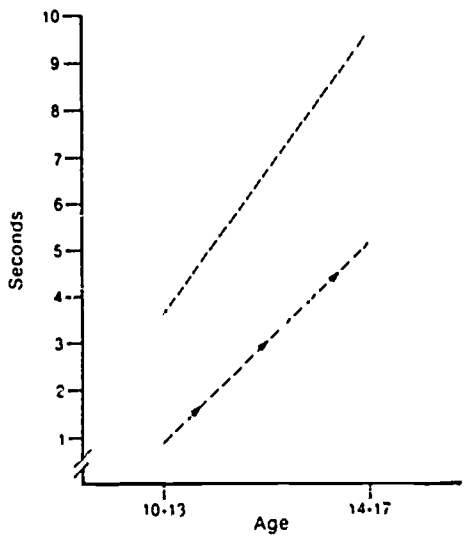
Distance Run

e



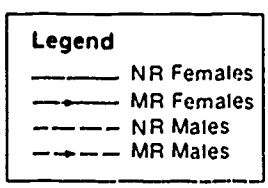
Softball Throw

f



Arm Hang

g



Sit and Reach

No significant differences at .01 were found for the sit and reach analysis, although gender and the age x gender interaction terms achieved the .05 level of significance. Figure 3.1c suggests a trend whereby female performance improves with age while male performance declines with age.

50-yard Dash

No significant differences were found for the analysis of the 50-yard dash. Performance is graphically depicted in Figure 3.1d.

Distance Run

As with the sit and reach and 50-yard dash, no significant differences were identified for the distance run. Adjusted means are presented in Figure 3.1e.

Softball Throw

Age was a significant factor on the softball throw. As demonstrated in Figure 3.1f, older females from both the retarded and nonretarded groups threw the ball farther than those subjects in the younger groups. Intellectual classification ($p = .04$) was not significant at the .01 level.

Flexed Arm Hang

Although intellectual classification ($p = .04$) did not achieve significance at the .1 level for the flexed arm hang, age did. As shown in Figure 3.1g, older subjects had better arm hang scores than younger subjects regardless of intellectual classification.

Summary and Discussion

The results of the univariate ANCOVAs indicate that the intellectual classification (nonretarded vs. mildly retarded) of adolescents with cerebral palsy was not a significant factor on Project UNIQUE test performance. Intellectual classification did not achieve the .01 level of significance on any of the eight items analyzed. (In three cases, sum of the grips, softball throw, and flexed arm hang, the .05 level of significance was obtained, favoring the nonretarded in each case.) Age was significant on four items: sum of the grips,

dominant grip, softball throw, and flexed arm hang. In each case, the 14-17 year-old age group outperformed the 10-13 year-old age group. (Age was significant for skinfolds at .05; older subjects had larger skinfolds.) Females were found to have larger skinfolds than males in the present study. This was the only item where gender was significant at .01. (Gender was significant at .05 for sit and reach, favoring females.)

The fact that intellectual classification was not a significant factor on the physical fitness test performance of subjects with cerebral palsy is an interesting finding. The literature is quite clear that when physical performance data of educable or mildly retarded subjects is contrasted with that of subjects with normal intelligence, the differences almost always favor the nonretarded group. Research by Francis and Rarick (1959) and Rarick, Widdop and Broadhead (1970) suggest that the performance differences between these two groups generally range from two to four years in terms of chronological age.

With specific regard to the items in this study, significant differences favoring nonretarded subjects over educable mentally retarded subjects have been reported for grip strength (Francis and Rarick, 1959; Howe, 1959; Rarick, Dobbins, & Broadhead, 1976), 50-yard dash (Francis & Rarick, 1959; Howe, 1959; Sengstock, 1966) and sit and reach (Pizarro, 1982). Although test items were not identical, these performance differences have also been reported for certain distance runs (Sengstock, 1966; Pizarro, 1982). In addition it has been reported that retarded subjects tend to have larger skinfolds than nonretarded subjects (Rarick, Dobbins & Broadhead, 1976).

The main difference, of course, in contrasting the present study with previous research on this topic is that the present study includes subjects with cerebral palsy as well as retardation. Apparently the condition of cerebral palsy is a more powerful determinant of physical fitness proficiency than intellectual classification. Perhaps any detriment to performance that may have been attributable to mental retardation is already accounted for by cerebral palsy.

To better understand the relative contribution of cerebral palsy and mental retardation to physical fitness test performance among the subjects in this study, a series of multiple regression analyses were performed. Four independent variables including cerebral palsy classification (the sport ability classification system), intellectual classification (mild retardation vs. normal intellect), age, and gender were used to predict performance on each of the test items (gender was not used as a predictor for arm hang or softball throw since these were "one gender" items). Stepwise solution and backward elimination multiple regression techniques were used to determine which of the four independent variables made the greatest contribution to fitness test performance. These findings are presented in Table 3.2.

TABLE 3.2 MULTIPLE REGRESSION: THE RELATIVE CONTRIBUTION OF FOUR CLASSIFICATION VARIABLES TO FITNESS TEST PERFORMANCE.

Test Item	Class. Step Ent.	R^2 Chg.	Intell. Class. Step Ent.	R^2 Chg.	Gender Step Ent.	R^2 Chg.	Age Step Ent.	R^2 Chg.
Sum of Skin.	4	.00	3	.00	1	.03	2	.01
Sum of Grips	3	.01	2	.03	4	.01	1	.23
Dominant Grip	2	.02	3	.01	4	.00	1	.22
Sit and Reach	3	.00	4	.00	1	.00	2	.00
50-yard Dash	1	.52	4	.00	3	.00	2	.01
Distance Run	1	.28	4	.00	3	.00	2	.01
Arm Hang	3	.00	2	.06	-	-	1	.10
Soft. Throw	1	.29	3	.04	-	-	2	.10

As indicated in Table 3.2, neither sport ability classification or intellectual classification made any appreciable contribution to predicting skinfold or sit and reach scores. For both of these items, gender (as indicated by "Step Entered") was selected as the single best predictor, but its contribution to the total variation in the test scores of these two items (as indicated by the "R^2 Change") was certainly modest. Both sport ability and intellectual classification accounted for a small percentage of the variance on the two grip strength items. It is interesting that intellectual classification enters before sport ability classification on sum of the grips, but that the reverse is true for dominant grip. Consequently it appears that when grip strength scores are compared among retarded and nonretarded youngsters with cerebral palsy, dominant grip would be a better measure than sum of the grips because it is slightly less affected by intellectual classification. Regardless of the measure of grip selected, age was the single best predictor accounting for 22-23% of the variance. Age was also the single best predictor for flexed arm hang although it accounted for only 10% of the variance in this case. Intellectual classification accounted for 6% of the variance on the arm hang indicating that it was a more significant determinant of performance than degree of cerebral palsy possessed (sport ability classification). On the remaining three items (50-yard dash, distance run, softball throw), however, sport ability classification was the single best predictor of performance and accounted for a considerable percentage of the variance, ranging from 28-52%. On the same items, intellectual classification was the last variable entered and accounted for only between 0-4% of the variance. Generally speaking, therefore, it appears that intellectual classification made only modest contributions to overall fitness test performance. While the same is true of sport ability classification for at least five items, it is also clear that a more considerable contribution is made to performance on 50-yard dash, distance run, and softball throw. So, among youngsters with cerebral palsy, the degree of cerebral palsy, as represented by sport ability classification, is a more significant determinant of fitness in a general sense than mental retardation. This would seem to be particularly true on locomotor-type test items.

The Factor Structures of Physical Fitness

Procedures

To determine whether the factor structures of the two major groups of subjects, mildly retarded and nonretarded, were similar, a number of factor analytic solutions were derived. (A distribution of the subjects is given below in Table 3.3). The first step in the procedure was to decide which items to include in the analysis. Softball throw and flexed arm hang were eliminated because as "one gender" items they were not taken by all subjects in the study. Two items in the battery, sum of skinfolds and dominant grip (sum of the grips) were considered

to be "computed" variables, that is, a single item which reflected two test scores. For instance, sum of skinfolds was generated by adding the tricep and subscapular skinfolds and dominant grip was generated by comparing right hand grip strength to left hand grip strength and selecting the best score. For the factor analysis it was decided to use the original variables (e.g., tricep skinfold, subscapular skinfold, right hand grip, left hand grip) rather than the computed variables. It was felt that the inclusion of the original variables might yield a more resolute factor structure than would the computed variables. The remaining items in the Project UNIQUE battery, sit and reach, 50-yard dash, and distance run, were also included in the factor analysis. The intercorrelations of these seven variables are given in Tables 3.4 and 3.5.

The second step in the factor analytic procedure was to decide exactly which subjects were to be included in the analysis. Inasmuch as the test procedures for the locomotor items were considered to be significantly different for subjects in wheelchairs and whereas subjects in wheelchairs were not "scheduled" to take all the items in the battery, it was decided to use only ambulatory subjects in the factor analysis. Subjects in the factor analysis could ambulate either with or without an assistive device. The decision to include only ambulatory subjects was consistent with previous factor analytic work on subjects with cerebral palsy by Winnick and Short (1984).

The decision to limit the analysis to ambulatory subjects coupled with the necessity to include only those subjects who had taken all seven items, reduced the total number of available subjects to 79. For this reason, it was necessary to combine male and female subjects in the factor analyses.

TABLE 3.3 SUBJECT DISTRIBUTION UTILIZED IN THE FACTOR ANALYSIS.

Subject Class	Number	Age Mean	SD
Nonretarded	49	12.59	2.29
Females	23	13.09	2.31
Males	26	12.15	2.22
Mildly Retarded	30	13.23	2.57
Females	14	12.86	2.32
Males	16	13.56	2.80

TABLE 3.4 INTERCORRELATIONS AMONG THE SEVEN ITEMS IN THE FACTOR ANALYSIS FOR SUBJECTS WHO WERE NONRETARDED.

Test Item	Tricep Skin.	Subscap. Skin.	Right Grip	Left Grip	50-yd. Dash	Sit & Reach	Dist. Run
Tricep Skin.	1.00						
Subscap. Skin.	.71	1.00					
Right Grip	.20	.50	1.00				
Left Grip	-.02	.17	.76	1.00			
50-yd. Dash	-.18	-.14	-.35	-.35	1.00		
Sit & Reach	.10	.10	.21	.11	.08	1.00	
Distance Run	-.15	-.18	.15	.14	-.58	-.06	1.00

TABLE 3.5. INTERCORRELATIONS AMONG THE SEVEN ITEMS IN THE FACTOR ANALYSIS FOR MILDLY RETARDED SUBJECTS.

	Tricep Skin.	Subscap. Skin.	Right Grip	Left Grip	50-yd. Dash	Sit & Reach	Dist. Run
Tricep Skin.	1.00						
Subscap. Skin.	.89	1.00					
Right Grip	.08	.15	1.00				
Left Grip	-.03	.07	.54	1.00			
50-yd. Dash	-.11	-.07	-.30	-.30	1.00		
Sit & Reach	.07	.09	.14	.15	.01	1.00	
Distance Run	-.09	-.14	-.14	.21	-.36	.03	1.00

The third step was to select the method of factor analysis. It was decided to use a rather conservative approach whereby six factor solutions were derived by utilizing three types of factor analysis and two types of rotation. The three types of factor analysis selected were principal components analysis, alpha factoring and image factoring. The two types of rotation selected were varimax and oblique. In this process, a variable was considered to belong to a factor if it had a factor loading of .40 or better on four of the six derived solutions. This concept of factor analysis was originally proposed by Harris and Harris (1971) and similar approaches have been utilized by Rarick, Dobbins and Broadhead (1976) and Winnick and Short (1982).

Results

The results of the factor analyses are presented in Tables 3.6 and 3.7. In each case three factors were identified. Factor 1 is comprised of the two skinfold measures and could be considered a Body Composition factor. Factor 2 consists of the two grip strength measures and could be considered a Strength factor. The 50-yard dash and the distance run define Factor 3 which could be conceptualized as a Locomotor/Power-Endurance factor. The sit and reach test was the only one of the seven test items that did not meet the criteria for inclusion in one of the factors. For subjects who were nonretarded,

the three factors accounted for 76.8% of the total variance of the seven test items (based upon the principal components analysis). The same three factors accounted for 71.7% of the total variance of the seven test items for subjects with mild mental retardation.

TABLE 3.6. FACTOR STRUCTURE OF PROJECT UNIQUE TEST ITEMS FOR NONRETARDED SUBJECTS.

	VARIMAX			OBLIQUE		
	PC	Alpha	Image	PC	Alpha	Image
Factor 1						
Tricep Skinfold	.93	.92	.71	.92	.91	.71
Subscapular Skinfold	.90	.80	.73	.92	.80	.77
Factor 2						
Left Grip	.86	.66	.71	.88	.67	.72
Right Grip	.86	1.12	.74	.86	1.15	.80
Factor 3						
50-yard Dash	-.86	1.15	-.61	.86	1.13	.61
Distance Run	.83	-.54	.58	-.84	-.55	-.59

TABLE 3.7. FACTOR STRUCTURE OF PROJECT UNIQUE TEST ITEMS FOR MILDLY RETARDED SUBJECTS.

	VARIMAX			OBLIQUE		
	PC	Alpha	Image	PC	Alpha	Image
Factor 1						
Tricep Skinfold	.98	.97	.87	.97	.97	.88
Subscapular Skinfold	.96	.93	.87	.97	.95	.88
Factor 2						
Left Grip	.76	.77	.54	.77	.79	.57
Right Grip	.88	.77	.57	.88	.77	.52
Factor 3						
50-yard Dash	-.76	-.61	-	.77	-.61	-
Distance Run	.85	.60	.43	-.85	.60	-

Discussion of Factor Structure

The most significant finding of the factor analytic investigation is that the two factor structures are remarkably similar, in fact, they are identical with regard to the items that load on particular factors. This similarity is consistent with results from other factor analytic studies with special populations. The trend identified by this and previous research is that regardless of whether the subjects exhibited auditory impairments, visual impairments, cerebral palsy, or spinal neuromuscular conditions (Winnick and Short, 1982); educable mental retardation (Rarick, Dobbins and Broadhead, 1976) or trainable mental retardation (Rarick and McQuillan, 1977), the factor structures are not appreciably different than those of nonhandicapped subjects and, when such comparisons are made, not appreciably different from each other.

Although the primary purpose of the factor analysis was to confirm the existence of common factors of physical fitness between retarded and nonretarded groups of subjects with cerebral palsy, it also helps to justify the selection of test items to measure physical fitness in these groups.

Items were originally selected for the UNIQUE Physical Fitness

Test largely on the basis of a factor analysis study (Winnick and Short, 1982). In this previous study, males and females were analyzed separately on a larger number of items (14). Differences in procedures, therefore, would make direct comparisons between this and previous findings hazardous. Still, one might expect somewhat similar structures to emerge if, in fact, the identified components are "robust" and if the items included in the battery help to define those components.

The inclusion of skinfold and grip strength items is clearly supported by the emergence of these items on Factors 1 and 2 for both groups of subjects in the present study. Winnick and Short (1982) also identified separate factors for both body composition and strength or power-strength as defined primarily by skinfold and grip strength measures. Factor 3 contains both the distance run and 50-yard dash, possibly suggesting that only one of these items need be included in the test battery. It should be noted, however, that while the dash and the distance run have "locomotion" in common and consequently load on such a factor (particularly in the absence of other locomotor variables) they apparently still measure appreciably different abilities as evidenced by their correlation coefficients. The coefficient between the dash and the distance run for nonretarded subjects was -.58 and for mildly retarded subjects was -.36. It would appear that including both locomotor items, one as a measure of power-endurance and one as a measure of cardiorespiratory endurance (Winnick and Short, 1982), would seem to be appropriate. In the 1982 study, Winnick and Short found that the dash and the distance run both loaded on the same factor (power-endurance) for boys, but on separate factors for girls (although both of these factors were considered to be "power-endurance" related).

Although the sit and reach test failed to emerge in the factor analysis, it should be noted that no other hypothesized measures of flexibility were included in the analysis to help define such a construct. Therefore, the inclusion of the sit and reach would be justified largely on conceptual grounds and because it failed to emerge on any of the three factors. This suggests that whatever the sit and reach measures (presumably low back-hamstring flexibility) it is not considered to be a measure of either body composition, strength, or locomotor ability. (Sit and reach was not included in the 1982 study.)

Physical Fitness Test Performance as Function of the Cerebral Palsy Classification Systems

Three systems of cerebral palsy classification were used in the present study. Two of the systems, stationary classification and locomotor classification, were adopted from Physical Fitness Testing of the Disabled (Winnick & Short, 1985), and the third, referred to here as the sport ability classification system, utilizes key elements of the cerebral palsy sport classification system. (Refer to Tables 2.1 and 2.2 for classification).

To determine if significant differences existed among the various categories of each of the classification systems, a one-way analysis of variance was applied to each test item for each of the appropriate classification systems. Once again, the .01 level of significance was adopted for each ANOVA. The Scheffe' procedure was utilized for post hoc multiple comparisons. Since Scheffe' tends to be a conservative procedure, the .05 level of significance was employed for post hoc tests.

Stationary Classification

Results of the analyses using the stationary classifiation system are presented in Table 3.8. Only the so-called stationary test items (skinfolds, grip strength, sit and reach, softball throw, arm hang) were included since the stationary system pertains only to these items. Data were not collected for Class C and D subjects on some items because these items were deemed to be inappropriate for a particular type or severity of cerebral palsy.

TABLE 3.8 UNIVARIATE F VALUES AND MEANS FOR STATIONARY TEST ITEMS WITH SUBJECTS CATEGORIZED BY THE STATIONARY CLASSIFICATION SYSTEM.

Test Items	F Ratio	Means A	B	C	D
Sum of Skin.(mm.)	8.51*	26.22(1)	19.57(1,2)	26.76(1)	14.02(2)
Sum of Grips(kg.)	1.11	28.54	24.43	24.45	-
Dominant Grip(kg.)	1.71	17.41	14.25	15.61	-
Sit and Reach(cm.)	.15	18.00	18.66	-	-
Soft. Throw(in.)	9.67*	318.11(1)	205.75(2)	175.67(2)	-
Arm Hang(sec.)	2.05	3.84	6.46	-	-

*Signficant at the .01 level.
Numbers in parentheses convey Scheffe' comparisons. Means with the same numbers in parentheses did not differ significantly; means with different numbers in parentheses differed signficantly.

The results presented in Table 3.8 indicate that significant differences existed among the categories of the stationary classification system on two test items, skinfolds and softball throw. The significant difference on the skinfolds is due to the fact that Class D subjects, those with more severe control problems who generally are limited to the use of an electric wheelchair, had significantly lower skinfold scores than either Class A or C subjects. On the softball throw, Class A subjects, those with minimal control problems, threw the ball farther than either Class B or Class C subjects. No other significant classificatior differences were identified.

Locomotor Classification

Initially only the two running items in the test battery, 50-yard dash and distance run, were analyzed by the locomotor classification system. The results are presented in Table 3.9. Data were not collected on Class IV subjects since those individuals typically use an electric wheelchair for ambulation.

TABLE 3.9 UNIVARIATE F VALUES AND MEANS FOR LOCOMOTOR TEST ITEMS WITH SUBJECTS CATEGORIZED BY THE LOCOMOTOR CLASSIFICATION SYSTEM.

	F Ratio	Means I	Means II	Means III
50-yard Dash(sec.)	51.62*	16.94(1)	39.27(2)	56.60(3)
Distance Run(yds./min.)	17.68*	87.02(1)	58.64(2)	49.66(2)

*Significant at the .01 level.

Results presented in Table 3.9 indicate that locomotor classification was a significant variable on both dash and distance run performance. On the dash, significant differences existed among all three categories; Class I (unassisted) subjects were fastest, Class II (assistive device) subjects were second fastest, and Class III (wheelchair) subjects were slowest. A similar, but not identical, trend emerged for the distance run. Once again Class I subjects made the best scores and Class II subjects made the second best scores. However, despite the fact that Class III subjects were about 9 yards per minute slower than Class II subjects, these groups were not significantly different.

As a matter of interest, test performance on the stationary items was also analyzed using the locomotor system This analysis was performed to determine if the locomotor system could potentially be used as a single classification for fitness testing. It is currently recommended (Winnick and Short, 1985) that fitness test participants with cerebral palsy be classified in both the stationary and locomotor systems. The results of this analysis are presented in Table 3.10.

TABLE 3.10 UNIVARIATE F VALUES AND MEANS FOR STATIONARY TEST ITEMS WITH SUBJECTS CATEGORIZED BY THE LOCOMOTOR CLASSIFICATION SYSTEM.

	F Ratio	Means I	II	III
Sum of Skin.(mm.)	3.28	24.97	18.87	27.35
Sum of Grips(kg.)	.34	27.21	24.49	25.69
Dominant Grip(kg.)	.81	16.44	14.20	16.69
Sit and Reach(cm.)	.98	18.53	17.86	23.80
Soft. Throw(in.)	11.17*	309.16(1)	197.94(2)	145.83(2)
Arm Hang(sec.)	3.40	3.91	8.13	1.80

*Significant at the .01 level.

The results presented in Table 3.10 are fairly similar to those presented earlier in Table 3.8 in which the stationary items were analyzed by the stationary classification system. In the present analysis softball throw is the only item significant at the .01 level. Class I subjects threw the ball significantly farther than either Class II or Class III subjects. The primary difference between this analysis (using the locomotor system) and the previous one (using the stationary system) is that classification was significant for skinfolds in the previous analysis, but not in the current one.

Sport Ability Classification

Both stationary and locomotor test items were analyzed using the sport ability classification system and the results are presented in Table 3.11. This system consists of seven categories which describe levels of independent locomotion (see Procedures for a complete description). Implicitly there was an eighth category for those individuals who were incapable of independent locomotion. Subjects assigned to this eighth category (Category 1 in the table) were included in the analysis for the skinfolds only. An insufficient number of subjects in Category 2 obviated its inclusion in the analysis.

TABLE 3.11. UNIVARIATE F VALUES AND MEANS FOR ALL TEST ITEMS WITH SUBJECTS CATEGORIZED BY THE SPORT ABILITY CLASSIFICATION SYSTEM.

	F Ratio	Means for Sport Ability Classes						
		1	3	4	5	6	7	8
Sum of Skin.(mm.)	5.01*	14.02(1)	25.96(1,2)	35.71(2)	18.87(1,2)	25.34(2)	26.21(2)	22.35(1,2)
Sum of Grips(kg)	3.36*	-	19.01(2)	45.13(1)	24.49(1,2)	24.64(1,2)	28.35(1,2)	29.95(1,2)
Dominant Grip(kg.)	5.02*	-	12.19(2)	28.50(1)	14.20(2)	14.36(2)	18.29(1,2)	17.47(1,2)
Sit and Reach(cm.)	.73	-	-	-	17.86	16.95	19.30	20.00
50-yard Dash(sec.)	3.71*	-	63.22(3)	31.09(1,2)	39.27(2)	21.81(1)	13.87(1)	12.81(1)
Dist. Run(yds./min.)	13.82*	-	44.01(2)	74.70(2)	58.64(2)	67.77(2)	98.22(1)	104.26(1)
Softball Throw(in.)	7.29*	-	104.43(2)	203.80(1,2)	197.94(2)	254.95(1,2)	366.37(1)	299.67(1,2)
Arm Hang(sec.)	1.43	-	1.50	3.00	8.13	2.94	4.75	4.69

*Significant at the .01 level.

The information presented in Table 3.11 indicates that sport ability classification was a significant factor on six of the eight test items analyzed. It was not significant for the sit and reach and flexed arm hang. Although some exceptions can be noted, where significant differences existed, there was a trend for those differences to favor subjects in higher numbered categories. This was particularly true of the locomotor test items. A notable exception to this trend was the performance of Category 4 subjects on the grip strength measures and the softball throw. A subject in this category "propels wheelchair with arms using forceful and continuous arm pushes", suggesting paraplegia with good upper body strength and control. Consequently, Category 4 subjects performed well on these upper body measures, particularly grip strength. No discernible trend among categories was noted for the skinfolds.

Summary and Discussion

The condition of cerebral palsy manifests itself in many different ways or combinations. For instance, persons with cerebral plasy may be described as spastic, athetoid, or ataxic; or they may be described as hemiplegic, paraplegic, or quadriplegic; or they may be described as being minimally, moderately, or severely involved. Persons with cerebral palsy, therefore, constitute a fairly heterogeneous group. Equitable comparisons require that an appropriate classification system be used for physical activity. Just as a sport classification system must provide for equitable competition, a fitness classification system must provide a basis for sound educational and training decisions. A good classification system helps the teacher to focus on ability rather than disability.

Of the three classification systems analyzed in this study, the sport ability classification system appeared to be the most sensitive to differences in functional ability among participating subjects. Apparently the fact that the subclassification system had eight categories while the stationary and locomotor systems had only four, contributed to this sensitivity. It is suggested that the sport ability classification system may be the preferred classification for use with physical fitness testing of youngstes with cerebral palsy.

It is further proposed that any future revision of the Project UNIQUE Physical Fitness Test for youngsters with cerebral palsy incorporate the sport ability classification system. This could be done by developing an appropriate number of percentile tables for each item as dictated by the results in Table 3.11. For instance, only one percentile table (categorized by age and gender) would be necessary for the sit and reach and flexed arm hang test items since no significant subclassification differences were found for these items. Skinfolds, grip strength, softball throw, and distance run would require two percentile tables to reflect the significant differences found among the means of these items. The dash would necessitate the construction

of three percentile tables. Each percentile table for each item would then be labeled A, B, or C and a selection guide would be used to inform the user which percentile table should be used for each item for a particular "class" of person. A selection guide is provided in Table 3.12.

TABLE 3.12 SAMPLE PERCENTILE TABLE SELECTION GUIDE.

Subclass.	Skin-folds	Dominant Grip	Sit & Reach	50-yd. Dash	Distance Run	Softball Throw	Arm Hang
1	A	-	-	-	-	-	-
2	B	B	-	C	C	B	A
3	B	B	-	C	C	B	A
4	B	A	-	B	B	B	A
5	A	B	A	B	B	B	A
6	B	B	A	A	B	A	A
7	B	A	A	A	A	A	A
8	A	A	A	A	A	A	A

The sample selection table follows the results of the Scheffe' multiple comparisons (Table 3.11) very closely. There are, however, two noticeable differences. First, since there were not enough subjects in Category 2 for data analysis, the suggestion here is to adopt the profile of Category 3 for that group. The second difference is that although only two groups of means were identified for the distance run, the recommendation in Table 3.12 is to create a third group (percentile Table C) for Categories 2 and 3. The rationale is that although Category 3 did not differ significantly from Category 4, for example, the actual difference between means was about 30 yards per minute. This constitutes a 270 yard difference over 9 minutes and 360 yards over 12 minutes. These differences would seem to constitute a practical, if not statistically significant, difference and the creation of a third percentile table (i.e., Table C) would yield some consistency for the locomotor items; that is, a Table C would be required for both the dash and the distance run for subjects in Category 2 and 3.

CHAPTER 4

SUMMARY, FINDINGS, AND CONCLUSION

Summary

The positive value of physical fitness is widely accepted in the United States today. Physical fitness is important for enhancing the quality and length of life and it is important in the play and the development of children and youth. It enhances their participation in leisure time pursuits and athletic endeavors and helps them in carrying out the requirements of daily living. Although physical fitness is important for all persons, it is particularly important for children and youth with handicapping conditions. In cases where they attain high levels of physical fitness, they are more likely to participate in play and sport activities and receive the same physical and social benefits from these activities as nonhandicapped children and youth. While physical fitness is important for nonretarded and retarded persons with cerebral palsy, these handicapping conditions may be associated with variables which impact on physical fitness in such a way that it is below that of nonhandicapped persons.

Although some research has been conducted to study independently the influence of mental retardation and cerebral palsy on physical fitness, little or no research has been conducted using field-based quantitative measures, in which the influence of both retardation and cerebral palsy have been studied. Since mental retardation accompanies cerebral palsy in a relatively high percentage of cases, this is unfortunate. Information on the physical fitness performance of nonretarded and retarded youngsters with cerebral palsy has many implications for teachers, coaches, and persons in allied medical professions.

This project was designed to study the effects of mild retardation on the physical fitness performance of youngsters with cerebral palsy. This was accomplished by determining if the influence of mental retardation, gender, and age impacted significantly on the physical fitness performance of youngsters with cerebral palsy and comparing the factor structure of physical fitness of nonretarded and retarded boys and girls with cerebral palsy.

In order to attain the objectives of the project, the UNIQUE Physical Fitness Test was administered to retarded and nonretarded cerebral palsied subjects throughout the United States. The test was administered by professional persons designated as field testers following preparation in test procedures using a competency- based format. For testing, subjects were classified into two groups. First, the subjects were classified and subclassified as required by the UNIQUE Physical Fitness Test procedures. The UNIQUE test classifies subjects for stationary and locomotor test items. Secondly, each

subject was further classified on the basis of sport ability classifications used by the Cerebral Palsy International Sport and Recreation Association (CP-ISRA) and the National Association of Sports for Cerebral Palsy (NASCP). Subjects then performed test items associated with their classification.

Subjects in the study were selected from segregated or institutionalized and integrated or noninstitutionalized settings located throughout the United States. They were selected from testing sites which agreed to participate in the study. All subjects were between the ages of 10 and 17 and free from multiple handicapping conditions other than mild mental retardation and cerebral palsy.

Once testing was completed and data were recorded, field testers forwarded data to the central project staff at Brockport for checking and preparation for analysis. The data forwarded to Brockport included 220 subjects placed into 26 site files. Subsequent to central staff review and checks, site files were reduced to 25 and these consisted of 203 subjects. The checking procedure, thus, resulted in the elimination of 17 cases or 7.7% of the original total number of subjects tested.

To analyze the effects of mild retardation and its possible interaction with age and gender, a series of three-way univariate analysis of covariance were performed utilizing intellectual classification, age, and gender as independent variables and functional ability as the covariate. A rigid standard of an .01 level of significance was adopted for the determination of significance in an effort to reduce the possibility of experimental error. To better understand the relative contribution of cerebral palsy and mental retardation on physical fitness test performance among the subjects in the study, a series of multiple regression analyses were performed. To determine whether the factor structures of mildly retarded and nonretarded subjects were similar, a number of factor analytic solutions were derived. Six factor solutions were derived by utilizing three types of factor analyses and two types of rotation. The three types of factor analysis selected were principal components analysis, alpha factoring, and image factoring. The two types of rotation selected were varimax and oblique. In this process, a variable was considered to belong to a factor if it had a factor loading of .40 or greater on four of the six derived solutions.

In order to determine if significant differences existed among the various categories of each of the classification systems, a one-way analysis of variance was applied to each test item for each of the appropriate classification systems. Again, the .01 level of significance was adopted for each ANOVA. The Scheffe' procedure was used for post hoc multiple comparisons. The .05 level of significance was employed for post hoc tests.

Findings

The following are findings resulting from data analysis:

1. Mild mental retardation was not a significant factor on the physical fitness test performance of individuals with cerebral palsy.

2. The physical fitness factor structures of mildly retarded and nonretarded adolescents with cerebral palsy are virtually identical.

3. The sport ability classification system was more discriminating in regard to physical fitness performance than the stationary or locomotor classification systems associated with the UNIQUE Physical Fitness Test.

Conclusion

Within the limitations of this study, it was concluded that the physical fitness performance of adolescents with cerebral palsy is not significantly influenced by mild mental retardation.

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THE PHYSICAL FITNESS OF ADOLESCENTS WITH CEREBRAL PALSY

UNIQUE II

INSTRUCTIONAL MANUAL FOR DATA COLLECTION

SPONSORED BY:
SPECIAL EDUCATION PROGRAMS
U.S. DEPARTMENT OF EDUCATION
AND
STATE UNIVERSITY OF NEW YORK
COLLEGE AT BROCKPORT

PROJECT DIRECTOR: JOSEPH P. WINNICK
PROJECT COORDINATOR: FRANCIS X. SHORT
DEPARTMENT OF PHYSICAL EDUCATION AND SPORT
STATE UNIVERSITY OF NEW YORK
COLLEGE AT BROCKPORT
BROCKPORT, N.Y. 14420
(716) 395-2383/5336

The Project Advisory Committee includes Dr. Claudine Sherrill, Texas Woman's University; Dr. Julian Stein, George Mason University; Ms. Diane Lewandowski, Chicago Public Schools; and Dr. Geoffrey Broadhead, Louisiana State University.

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INTRODUCTION

Function of Manual

This manual is developed for the function of informing coordinators and field testers of the specific procedures and methods to be utilized in the testing of subjects participating in UNIQUE Project II. The manual is a training aid and reference source for project coordinators and field testers. This manual should provide the trainer and the tester with the content needed to insure quality control and standardization of procedures.

Background

The positive value of physical fitness is widely accepted in the United States today. Physical fitness has been found to contribute to the quality and length of life in adults and facilitate the play and development of children. While physical fitness is generally recognized as important for all persons, it is particularly important for the impaired person.

While it appears that physical fitness is extremely important for both the impaired and nonimpaired populations, significantly less attention has been given to the development of fitness related programs for impaired individuals. Often, the impaired are completely neglected in programs. This situation not only exists within instructional programs in schools, but also in intramural and athletic programs. The impaired individual should have an equal opportunity to obtain the potential benefits from activity programs. The passage of PL 94-142 and Section 504 of the Rehabilitation Act of 1973 provided an impetus for program change. However, legislation is not enough. If handicapped persons are to develop the physical fitness necessary to pursue careers, participate in intramural and athletic activities, or to enjoy the quality of life to which they are entitled, they need quality individualized education programs as outlined in PL 94-142. To effectively implement quality programs, there is a need for teachers who can assess performance, determine unique need, set objectives and goals to improve performance, implement programs to obtain these goals, and evaluate performance on a regular basis. This is the essence of individualized education programs mandated by PL 94-142.

The intention of this project is to provide baseline data to determine the unique physical fitness needs of individuals with cerebral palsy and to study the effects of mental retardation on performance.

Nature of the Study

In order to measure the physical fitness of the population, the UNIQUE test will be administered as described herein. The fitness areas and test items are listed below:

1. Anthropometric Measures

   height
   weight
   skinfold measures

2. Strength/Endurance

   grip strength
   softball throw (girls only)
   flexed arm hang (boys only)
   50-yard/meter dash

3. Flexibility

   sit and reach test

4. Cardiorespiratory Endurance

   ages 10-12: 1 mile or 9 minute run
   ages 13-17: 1 1/2 mile or 12 minute run

Scope of the Study

The populations to be assessed in this project have been delimited to mildly retarded and nonretarded adolescents with cerebral palsy, aged 10-17 years. Subjects will be selected from institutionalized and noninstitutionalized settings located throughout five geographical areas of the United States. These areas are the Northeast, Southeast, Central, Northwest and Southwest regions of the country.

PROJECT ORGANIZATION AND PERSONNEL

Coordinators

The organization of this project revolves around a central project staff, coordinaters, and field testers. Site coordinators will locate testers in their region and certify testers through a training program. Site coordinators will also recommend subjects for the study. Site coordinators may also be responsible for arranging testing schedules

and dispersing equipment. Equipment that is needed to complete the testing will be acquired from central project staff at Brockport.

Field Testers

Testers will become certified as UNIQUE field testers. Field testers will be involved in several aspects of the project; they will obtain written parental consent to test the subjects and forward these forms to Brockport. (A copy of the informed consent form is located in Appendix A.) Field testers will also administer tests to pupils in schools. All data will be forwarded to central project staff at Brockport.

DEFINITIONS OF SUBJECTS

For the purposes of this study, two major categories of subjects have been identified: cerebral palsy (nonretarded) and cerebral palsy (mildly retarded). Cerebral palsy is a group of neuromuscular conditions caused by damage to the motor areas of the brain. The term mildly retarded as used here is in accord with the American Association on Mental Deficiency (AAMD) definition of mild retardation or equivalent. An IQ of 52-68 on the Stanford-Binet, 55-69 on the Wechler Intelligence Scale for Children (WISC), or equivalent is the IQ range encompassing mild retardation. A slow learner has an IQ between mild retardation and 90 or an equivalent standard.

In selecting subjects for this study, the reality of individuals with multiple impairments becomes of tremendous concern. Subjects with multiple handicapping conditions should not be selected. The exception to this is in cases where additional handicapping conditions would not significantly effect performance on the physical fitness items included in the study. For example, it would be permissible to include an individual with cerebral palsy who, in addition, had some minor learning disability. However, if it was felt that the learning disability would seriously effect performance on the test items, the individual should not be included. In regard to mental retardation, only mildly retarded individuals should be included in the sample of subjects.

Questions concerning the eligibility of an individual to be placed in a group if not answered by the above definitions, should be directed to the project staff.

SUBJECT SELECTION AND SAMPLING DESIGN

The subjects for this study will come from states representing five regions of the United States. The target number and percentage of subjects for each regions is depicted in Table 1. All subjects for the study will be between the ages of 10 through 17. To the fullest extent possible, subjects will be selected by random and stratified random sampling procedures. The exact sampling procedures employed will be clarified in subsequent paragraphs.

Table 1

Subject Goals by Regions

	U.S.	Northeast	Southeast	Central	Northwest	Southwest
	100%	29.5%	22%	27%	6%	15.5%
Retarded CP	450	132	99	122	27	70
Nonretarded CP	300	89	66	81	18	46
TOTAL	750	221	165	203	45	116

Basic Procedures

In selecting subjects, the local coordinator must divide subjects into two groups: those that exist in noninstitutionalized or institutionalized settings.

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*Noninstitutionalized means schools which are not totally segregated or those which include both impaired and nonimpaired persons. A setting is classified as noninstitutionalized even if classes within schools are segregated, sections within the school are segregated, or the impaired are not integrated with nonimpaired persons.

Subsequently, the coordinator follows procedures identified in Tables 2 or 3. In the case of institutionalized subjects, a school/agency is selected from which to attain subjects. Once the school/agency is selected, subjects within the school/agency are selected. In selecting individuals who are in noninstitutionalized (see Table 3) settings, schools in which the needed number of individuals attend are identified. Once this is done, the subjects may be te d. Whether the setting is institutionalized or noninstitutionalized, random

Table 2

SELECTION PROCESS FOR SAMPLES OF IMPAIRED SUBJECTS IN INSTITUTIONALIZED SETTINGS

(1) Identify Institutionalized School/Agencies	(2) Select Sample Schools Based on Criteria for Testing Site Selection	(3) Identify Classes Within Schools*	(4) Randomly Select Sample Classes*	(5) Test All Qualified Subjects in Randomly Selected Classes*
School A School B School C	School A	School A Class 1 Class 2 Class 3 Class 4 Class 5	School A Class 1 Class 3 Class 4	In situations where all qualified subjects in a school will be tested, there is no need to randomly select classes.

Table 3

SELECTION PROCESS FOR SAMPLES IN NONINSTITUTIONALIZED SETTINGS

Determine schools in immediate vicinity which house subjects. → Test the subjects.

- If sufficient numbers have been tested, end testing.
- If sufficient numbers have not been tested, continue to seek subjects in other schools.

Points to Remeber

1. Attempt to diversify samples, i.e. urban, suburban, rural.
2. Be aware that all impaired groups will not be available in every school.
3. Randomly select subjects only if too many subjects exist in a particular setting.
4. If possible, use at least two noninstitutionalized settings.

selection is necessary only if an overabundant number of subjects exists. In view of the expected lack of large numbers available, it may not be necessary to select subjects randomly. This means that all subjects can be tested as identified in a region or a local setting.

Criteria for the Selection of Testing Sites

The following criteria should be followed when test sites are being selected for project participation:

1. A school will be selected if the authorized administator agrees to cooperate with the project.

2. Preference is given to those schools and institutions in which the physical education teacher or other professionals in the school are qualified to administer the test.

3. In selecting schools, preference is given to those schools, agencies, or institutions which best reflect the characteristics sought in substrata.

4. Preference in selection of testing sites will be given to those which are geographically accessible to coordinator and field testers.

5. Preference in selection of testing sites will be given to those sites which meet geographical area targets.

Consent for Testing

Prior to testing, parental consent must be attained by coordinators or field testers. A copy of the consent form appears in Appendix A.

TEST ADMINISTRATION

Selecting Test Items for Individuals

The tester's first responsibility prior to administering the Project UNIQUE Physical Fitness Test is to accurately classify and/or subclassify persons to be tested. Participants with cerebral palsy are classified and subclassified as presented in Table 4.

Once a student has been classified and subclassified, the tester is able to select appropriate test items to be administered to each individual by consulting the Test Item Selection Guide in Table 5. Recommended items are checked (X) for each classification/ subclassification. Enter the appropriate classification and subclassification for each subject on the subject's data recording sheet. Items should be administered to subjects aged 10-17.

Procedures and Test Instructions

The procedures for all UNIQUE test items are described in this section to help insure standardization of test procedures.

The following guidelines should be followed in administering the test items:

-Practice administering the test prior to taking measurements. Since this is especially important for the skinfold items, compare your practice results with another tester before formally administering the test.

-Organize the necessary test forms and testing stations prior to testing.

-Explain the test and its purpose prior to testing.

-Have youngsters dress appropriately. Gym suits and sneakers (where appropriate) are recommended.

-Allow sufficient time for warming-up. This is especially true for the sit and reach test (have students stretch the lower back and hamstrings) and the softball throw.

-Provide cool-down activities (i.e., walking, stretching) after testing (especially after the long distance run).

-Use a "Ready-Go" signal when starting timed activities.

-Use a positive approach when testing. Encourage all children to try their best and give them positive reinforcement after

Table 4

CLASSIFICATION AND SUBCLASSIFICATION SYSTEM FOR PARTICIPANTS WITH CEREBRAL PALSY

CLASSIFICATION SYSTEM

Participants with cerebral palsy are classified according to the two systems presented below. The first system is to be used for stationary test items (skinfolds, grip strength, sit and reach, softball throw and flexed arm hang) and requires the tester to place the participant in the most appropriate of four possible classes (A through D) based upon the descriptions associated with each. The second system is to be used for locomotor test items (dash and long distance run) and requires the tester to place the participant in the most appropriate of four categories (I through IV) based upon method of ambulation. When in doubt, the least restrictive classification should be used. Thus, for example, a person able to participate without an assistive device or wheelchair should do so.

Stationary Test Items

Class A

The Class A participant ambulates without assistive device for regular daily activities. Class A is generally appropriate for the less severely involved participant with cerebral palsy. Class A participants may have quadriparetic athetosis with minimal to moderate control problems or may have hemiplegic or monoplegic involvement.

Class B

Class B participants may exhibit one of two primary profiles. They may have quadriplegic athetosis (or similar involvement) with moderate to severe control problems in the extremities or torso, but are able to ambulate without assistive device for regular daily activities; or Class B participants may have paraplegic involvement with good functional strength and minimal control problems in the upper extremities or torso, but use an assistive device or wheelchair for regular daily activities.

Class C

Generally, the Class C participant uses a wheelchair for regular daily activities. Class C participants have either quadriplegic or triplegic involvement with moderate to severe control problems. They have poor to fair functional strength in the upper extremities and torso.

Class D

Class D participants are limited to the use of an electric wheelchair or need personal assistance in moving the wheelchair during regular daily activities. They have poor functional strength and cannot independently propel a wheelchair. Class D Participants have either quadriplegic or triplegic involvement (usually spasticity prevalent) with severe control problems.

Table 4 (Cont.)

Locomotor (Run Code) Test Items

Class I

Class I participants run completely unassisted. They do not require an assistive device of any kind or the personal assistance of a teacher or aide.

Class II

Class II participants run with the aid of an assistive device of some kind. Canes, crutches and walkers are considered to be assistive devices for the purpose of this test. Outside support from a teacher, aide or other student is not allowed.

Class III

Class III participants perform the locomotor items from a wheelchair. Class III participants must be able to independently propel their wheelchair with either their arms or legs.

Class IV

Class IV participants must use electric wheelchairs or need personal assistance in locomotion. (Class IV participants do not take the locomotor test items because they are capable only of using an electric wheelchair.)

SUBCLASSIFICATION SYSTEM

Each participant must be subclassified according to the statements presented below. Individuals who cannot be subclassified cannot be included in the study. Enter subclassification on the data recording sheet. It is not necessary to subclassify participants to determine the selection of test items.

_____1. runs and jumps freely and unassisted

_____2. ambulates with a slight limp in track

_____3. ambulates unassisted but has obvious balance and coordination difficulties

_____4. ambulates in track with assistive device

_____5. in track, uses and propels wheelchair with arms using forceful and continuous arm pushes

_____6. in track, uses and primarily propels chair with arms (slowly and/or choppy)

_____7. in track, primarily propels wheelchair using feet

TABLE 5 TEST ITEM SELECTION GUIDE FOR INDIVIDUALS WITH CEREBRAL PALSY

Test	Classification[a]							
	Stationary				Locomotor (Run Code)			
	A	B	C	D	I	II	III	IV
1. Body Composition Measures								
Skinfolds	X	X	X	X				
Triceps	X	X	X	X				
Subscapular	X	X	X	X				
2. Muscular Strength/Endurance								
Grip Strength*	X	X	X					
Right	X	X	X					
Left	X	X	X					
50-Yard/Meter Dash					X	X	X	
Softball Throw (Girls Only)	X	X	X					
Flexed Arm Hang (Boys Only)	X	X						
3. Flexibility								
Sit and Reach	X	X[b]						
4. Cardiorespiratory Endurance								
9-Minute/ 1 Mile Run or 12-Minute/1½Mile Run					X	X	X	

[a]All subjects must be classified in both the stationary and locomotor (run code) classification -- but only within one subgroup within each of these classifications.

[b]Is not recommended for Class B participants with spastic paraplegia.

each trial.

-Administer the skinfolds, flexed arm hang, grip strength, softball throw and sit and reach individually.

-Administer the 50-yard/meter dash to two subjects at a time, if possible.

-Administer the long distance run to small groups of subjects.

-Administer no more than one-half of the test items on one particular day. In cases where fatigue appears to be influencing performance, provide longer intervals of rest between test items.

-Administer the long distance run last. Instruct participants to pace themselves. Best results will probably be obtained when the runner maintains a steady pace and closes with a strong finish.

-Administer the running items on flat, hard, yet resilient, surfaces.

-Provide careful demonstration to participants.

-Allow participants to "walk through" an activity or become familiar with a test item prior to testing.

-Administer all test items within a five-month time period.

Height and Weight

Subjects should remove their shoes and be clothed in lightweight athletic attire when tested. The height measure should be taken to the nearest half inch. Weight should be taken by having the subject stand on a calibrated scale and recording weight to the nearest pound.

In cases where individuals wear prothetic devices or braces, height should be taken while wearing these devices. In cases where subjects possess exaggerated flexor tone, functional standing height should be recorded and no attempt should be made to relax and straighten affected parts of the body prior to measurement.

When determining weight of individuals who wear prothetic devices or braces, weight is taken with the braces and prothetic devices removed, or by subtracting the weight of such prothetic devices or braces.

Test Items

1. Skinfolds

a. Equipment

Lange skinfold fat caliper, pen.

b. Procedure

Each subject will have three skinfold measures taken alternately at the triceps and subscapular sites. A pen should be used to mark a line at the exact spot that the measures will be taken. This will increase the probablity that all three measures will be taken from the same spot. The tester should grasp the skinfold between the thumb and the index finger. The span of the grasp depends on the thickness of the skinfold. The skinfold should not include muscle. The caliper should be applied at the base of the grasp approximately 1 centimeter (less than 1/2") above or below the fingers holding the skinfold. Slowly remove thumb pressure from the caliper allowing it to exert full pressure on the fold. Open the caliper completely before removing it so as not to pinch the participant.

The skinfold at the triceps is located at the back of the dominant arm midway between the elbow and the tip of the shoulder. With the subject's arm freely hanging, the skinfold should be taken parallel to the long axis of the arm. Testers can help distinguish muscle and fat by having subjects tense and relax the triceps. The measurement should be taken with the arm "loosely hanging" and relaxed. The triceps skinfold is a vertical fold.

The subscapular skinfold should be taken one-half inch below and medial to the inferior angle of the scapula on the dominant side. The skinfold for the subscapular skinfold is an oblique fold which is in line with the natural cleavage lines of the skin. Testers may be aided in finding the line by having subjects bend their arm at the elbow and placing the arm on the back so that the back of the hand touches the spine while standing. The top of the fold should be medial to the bottom of the fold.

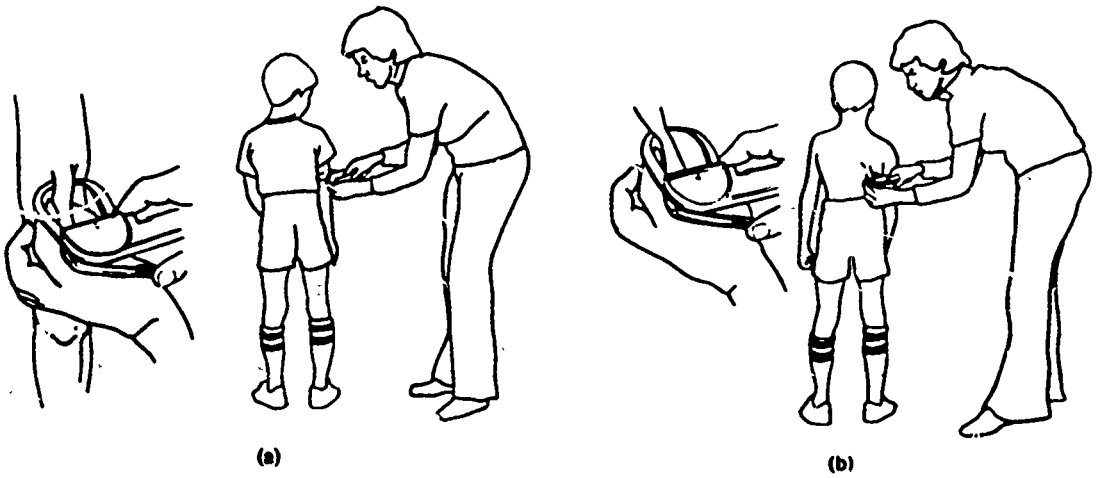


FIGURE 1 Skinfold measures.
(a) Triceps skinfold. (b) Subscapular skinfold.

In measuring the subscapular skinfold in the female, it is recommended that the individual being tested wear a loose fiting t-shirt or similar garmet. The shirt can be raised to allow access to the skinfold site. For females wearing a bra, the strap need only be pushed upward 2-3 inches to allow the measurement. If possible, female subjects should be tested by females.

Testers may be guided to some extent by observing the subject. If the subject is obviously lean, skinfold measures will be below median values. If subjects are fat, skinfolds will be higher. Figure 1 illustrates the triceps and subscapular folds. Skinfold values for able-bodied boys and girls are presented in Appendix D.

c. Scoring and Trials

Three measures are to be taken at each of the two sites and rounded to the nearest millimeter. If a skinfold reading at the same site differs from other readings 2 to 3 mm or more, take an additional measu and drop the measure which is substantially different.

d. Modifications

Procedures are not modified. However, it may be necessary to eliminate the item if an orthopedic involvement prohibits taking the skinfold measures. Administer to classes A, B, C, and D.

2. Grip Strength

a. Equipment

Grip strength hand dynamometer.

b. Procedure

Right and left grip strength are measured by the use of a hand dynamometer. The dynamometer must have an adjustable grip. Have each subject grip the device with four fingers and the palm, similar to a hand shake grip. The handle of the dynamometer should be adjusted for each subject's hand size. Adjust the handle so that the middle joint (second joint) may firmly pull on the handle and the first joint points toward the base of the handle. The heel of the hand should be placed around the base of the dynamometer with the thumb wrapped around the base also. All subjects should take the grip strength test from a seated position. A straight back chair should be utilized. The subject's hand and arm should be free from making contact with the seat or any other obstacle which may provide additional leverage or impede movement. The desired position is demonstrated in Figure 2.

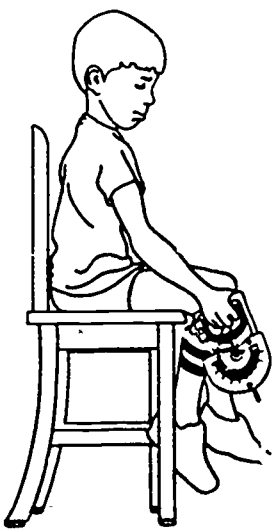


FIGURE 2 Right and left grip strength.
Adjust the hand grip dynamometer to fit the subject's grip.

Demonstrate how to use the hand dynamometer and how to be seated properly in the chair. Keep the dial facing out. At a signal to squeeze, have the subject squeeze the dynamometer as hard as possible. Subjects should be instructed that a maximum squeeze rather than a long continuous one gives best results. Testers must be sure to move the dail back to zero after each trial.

c. Scoring and Trials

Record the score for each trial to the nearest kilogram. Three trials will be given for each subject with each hand. Alternate hands when testing subjects. Trial One - Right Hand; Trial One - Left Hand; Trial Two - Right Hand; Trial Two - Left Hand; Trial Three - Right Hand; Trial Three - Left Hand.

d. Modifications

The procedures are not modified. It may be necessary to eliminate the item for certain individuals. Individuals without functional strength or those unable to grasp or release should not be administered the grip strength tests. Generally suitable for classes A, B, and C.

3. Softball Throw

a. Equipment

A regulation softball (12 inch circumference) and tape measure are necessary. The test should be conducted outdoors on a flat surface and should not be conducted under excessive wind conditions.

b. Description

Each subject should be instructed to throw a regulation softball in the air as far as possible. Participants should be instructed to throw the ball at an angle of about 40 degrees. Allow one forward step during the overhand throwing motion. Each subject should be allowed two practice or warm-up throws and three test throws. Be sure each subject has adequately warmed-up prior to throwing. The softball throw is illustrated in Figure 3.

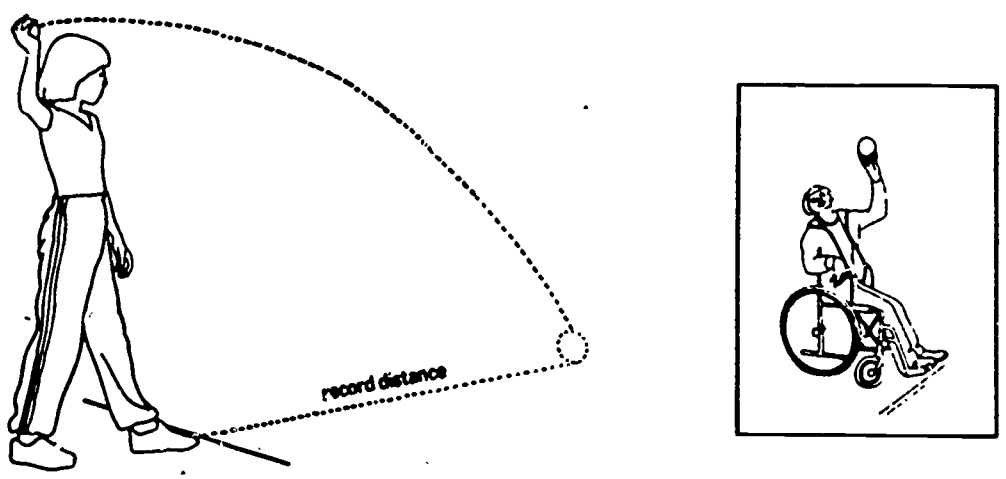


FIGURE 3 The softball throw.

c. Scoring and Trials

Three trials should be given to each participant. The distance of the throw should be recorded in feet and inches. The spot where the ball lands (no roll measured) should be marked and the distance from the point thrown should be measured.

d. Modifications

Class A cerebral palsied participants must throw the softball from a standing position, although they may utilize the back of a chair, a desk, or other objects for stabilization as necessary. Class B and Class C participants may throw from either a standing or seated position. Any participant throwing from a wheelchair should have the brakes on and the wheelchair locked. Considerable leeway may be given in recognizing an overhand throw. A backward over the shoulder throw may be used; however, if it is, it must be so indicated on the score sheet. Item is not administered to Class D subjects or to males.

4. Flexed Arm Hang

a. Equipment

A horizontal bar approximately 1.5 inches in diameter should be used for the flexed arm hang. The height of the bar should preferably be no more than 3 feet and no less than 1.5 feet above standing height. If a horizontal bar is available, a doorway gym bar is acceptable.

b. Procedures

The pupil should grasp the bar using an overhand (pronated) grip. A spotter should be used while participating in the flexed arm hang. Subjects should attempt to hold their body off the floor at a position where the chin is above the bar, the elbows are flexed, and the chest is close to the bar (see Figure 4). The subject should attempt to hold this position for as long as possible. Timing stops when the head tilts back or the chin contacts or drops below the bar. The body may not swing, the knees may not be bent, and the legs may not kick during performance of the task. Spotters may use an "arm bar" across the participants thighs to restrict their movements. There should be at least a minimum of one minute rest interval between trial one and trial two.

The time in seconds that the subject has correctly maintained the flexed arm hang position correct to the nearest second should be recorded on the data sheet. The timing of the flexed arm hang will stop as soon as the subject has allowed the chin to touch the bar or allows the chin to fall below the level of the bar.

c. Scoring and Trials

Each participant receives two trials. The time in seconds that the subject has correctly maintained the flexed arm hang position correct to the nearest second should be recorded on the data sheet. The timing of the flexed arm hang will stop as soon as the subject has allowed the chin to touch the bar or allows the chin to fall below the level of the bar.

d. Modifications

When wheelchair participants perform the test item, the feet may touch the ground providing they do not assist in performing the task. If physical inability prohibits grasping, the bearing of weight, or reasonable execution, omit this item. Suitable for boys in Class A or B.

FIGURE 4 Flexed arm hang.

5. Sit and Reach Test

a. Equipment

Sit and reach box (see Figure 5). If a sit and reach box is not available, a bench placed on its side and against an immovable object (or wall) may be used (see Figure 6). Place a measuring stick so that the 23 cm mark is at the exact level of foot contact with the bench.

If a participant's reach extends beyond the markings of the sit and reach box extend out a cm marked ruler from the final cm markings on the box. (see Figure 7).

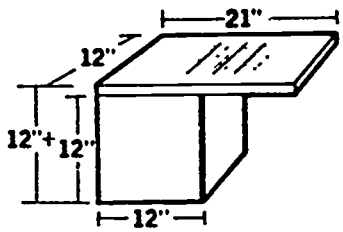


FIGURE 5 Sit and reach box.

b. Procedures

Each subject should be instructed to sit with their legs extended flat and straight out in front of them. The subject's feet (shoes removed) should be placed flush against the sit and reach box. The sit and reach box should be placed against a wall or other secure surface. A partner should hold down the subject's knees firmly so that they remain in contact with the floor. The participant should be instructed to place the hands on top of the box (palms down) and slowly reach as far down on the grid as possible four times. One hand should be placed on top of the other (overlapped). On the fourth time, the participant should achieve maximum reach and hold the position for one second. The subject should extend the arms and hands in front of the body attempting to reach past the toes and contact the measurement board with the fingertips. The subject should be cautioned not to bob with the torso but rather to gradually reach as far forward as possible. A practice trial should be given to each subject and be followed by two test trials. The desired position for this test is depicted in Figure 8.

FIGURE 6 Optional Sit and Reach Measuring Procedure

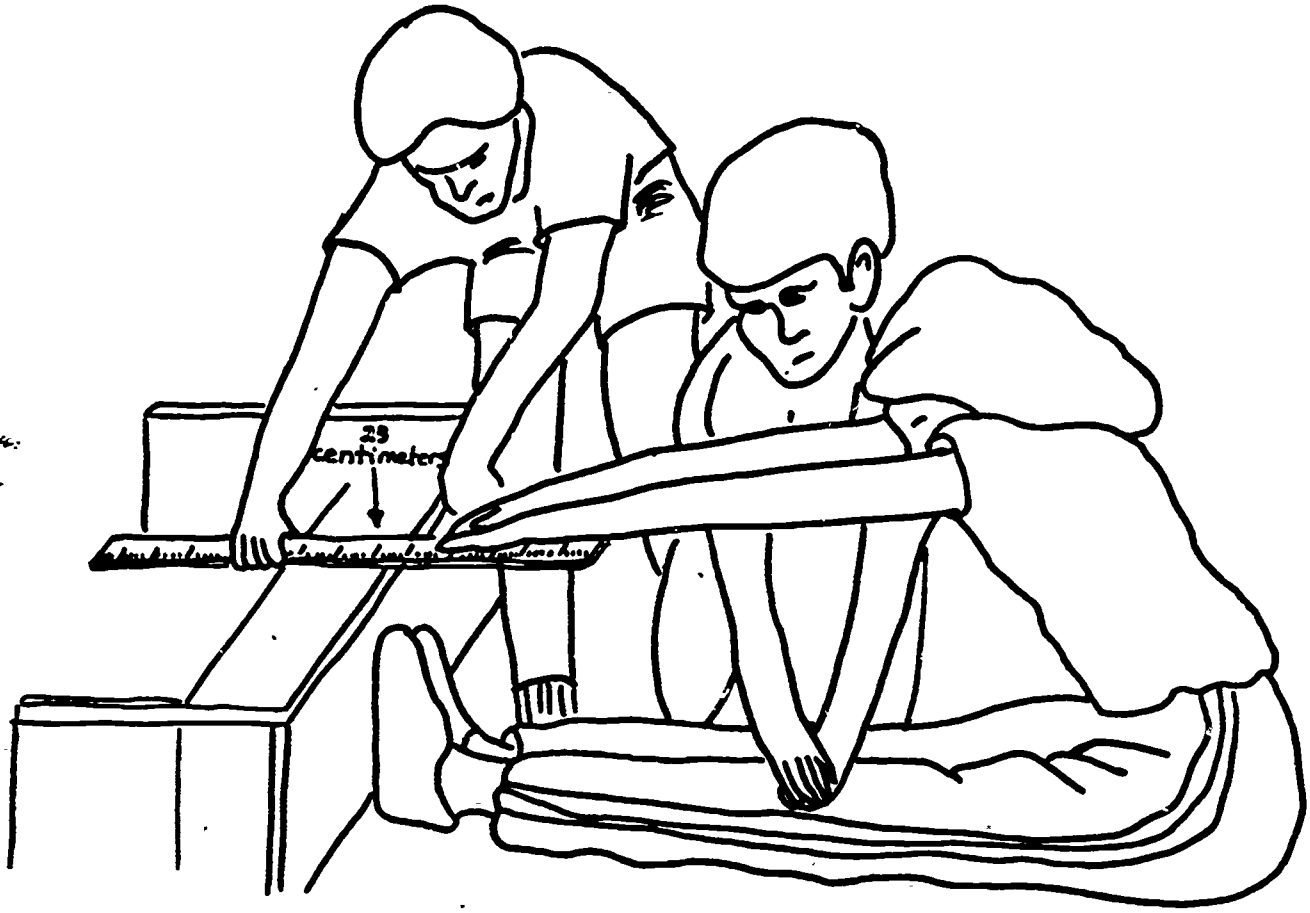
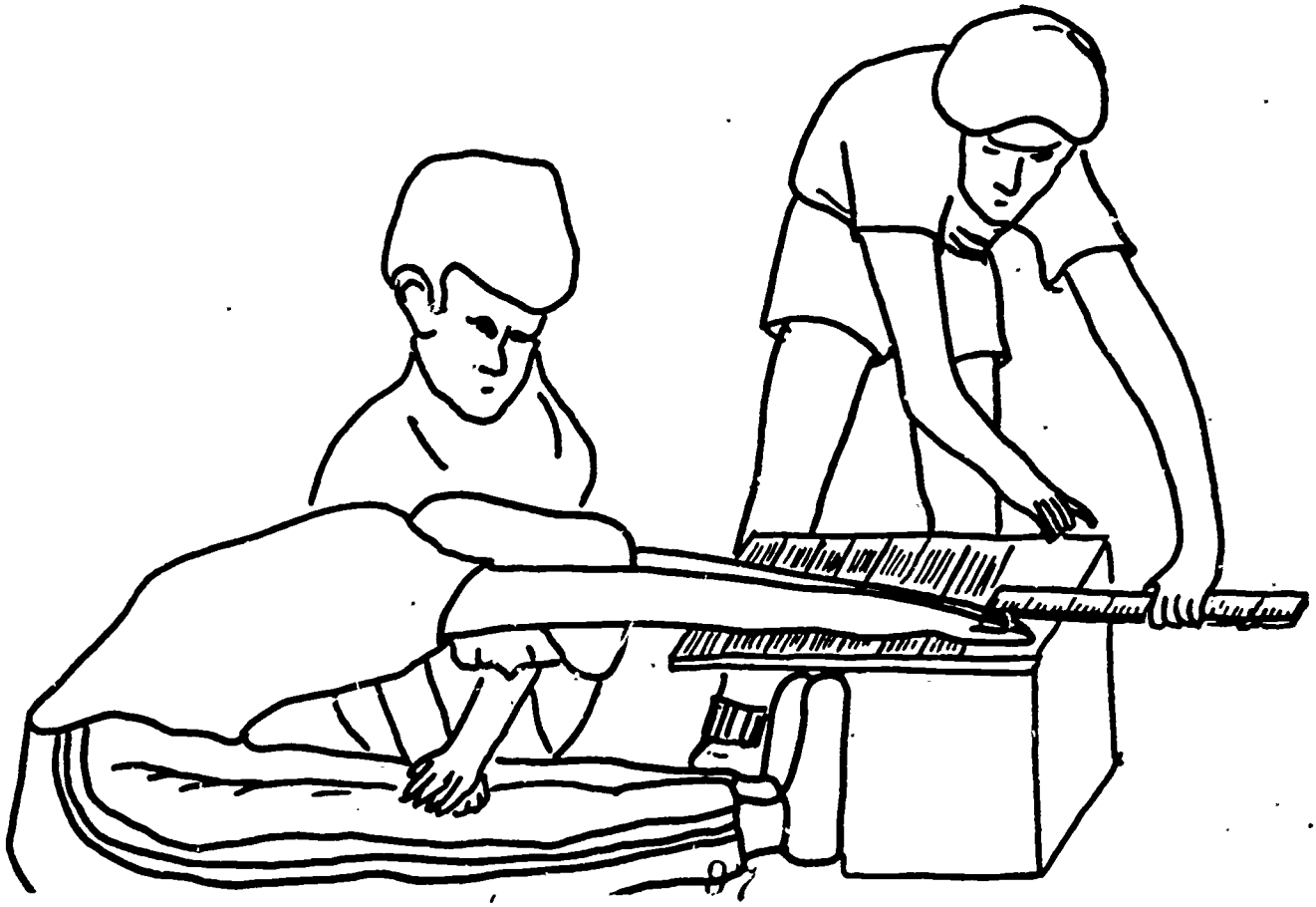


FIGURE 7 Measuring extremely flexible subjects. .



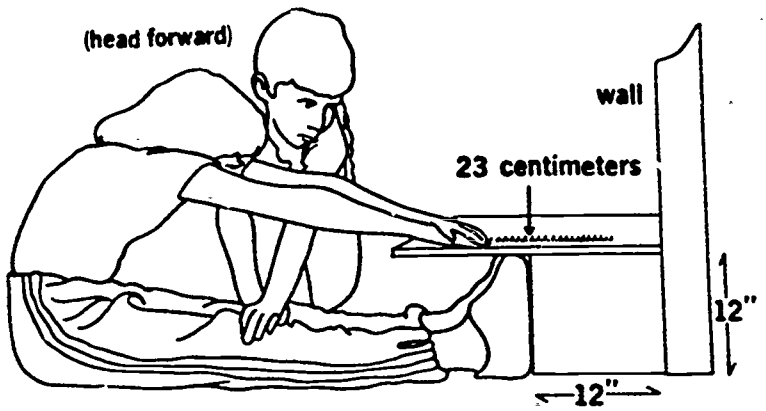


FIGURE 8 Sit and reach test.

c. Scoring and Trials

The score on the sit and reach test should be the distance in centimeters that the subject holds the reach for a one second count. Record the subject's reach to the nearest centimeter in each of two trials. Each participant should be given a warm-up trial and two test trials. The tester should round to the nearest centimeter the maximum reach of the participant (top of the middle index finger).

d. Test Modifications

The sit and reach test is not appropriate for cerebral palsied participants who have spastic paraplegia characterized by exaggerated flexor tone at the ankles, knees, and/or hips. Cerebral palsied participants with athetosis (or other nonspastic characteristics) may participate in the test without modification. Administer to Class A and B participants.

6. 50-Yard/Meter Dash

a. Facilities and Equipment

The test area should have a start/restraining line and a finish line at both 50 yards and 50 meters. A stopwatch, preferably a split timer is necessary.

b. Procedure

In the dash, the participant runs (or pushes a wheelchair) as fast as possible from the start line through the finish line 55 meters away. Time is recorded at both the 50-yard and 50-meter mark.

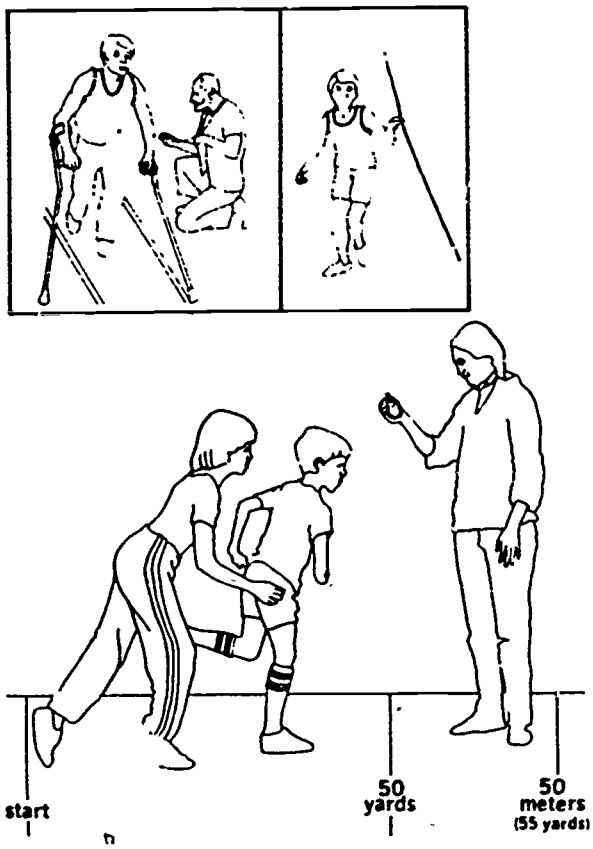


FIGURE 9 50-yard/meter dash.

The 50-yard/meter dash should begin by having the tester raise the hand above the head to signify READY. The tester should then drop the hand by the thigh and call out GO to begin the race. All subjects should be required to wear athletic sneakers, where appropriate, and should be tested on a hard flat surface. Surfaces that have any type of incline or decline are not acceptable.

It is preferable to have two subjects running at the same time for the 50-yard/meter dash. A subject running alone will not have the same competitive incentive that may be present in pairs or small groups. The subjects should be shown the starting line and the finish line. Timers should be stationed halfway between the 50-yard line and the 50 meter (55 yard) finish line. Two lines should be marked and subjects should be instructed to run to the second line. Record the time at the 50-yard mark and then again when the subject crosses the 50-meter mark. It is important that timers know their responsibilities and how to use the stopwatch. If one stopwatch is available, remember the time at the 50-yard mark and stop the watch when the subject crosses the meter mark. Immediately record both times. The timing of the test is very difficult and some practice is suggested.

c. Scoring and Trials

All subjects will have one trial. If a subject falls or has a mistrial, repeat the testing.

The score for the 50-meter/yard dash is the amount of time (seconds rounded to tenths) it takes a subject to run from the starting

line to the finish line. Record the time for the 50-yard and the 50-meter distance. Timing stops when any part of the body breaks the plane of the finish line. For wheelchair participants, timing stops when the wheels cross the finish line.

d. Modifications

The only test modifications are those which pertain to the method of ambulation. In the case of subjects with cerebral palsy, testers are cautioned to match appropriate method of ambulation with classifications and subclassifications indicated in Table 1 and to record them on the data recording sheet. Essentially, Class I participants run completely unassisted, Class II with the aid of an assistive device, and Class III in a sport or nonsport wheelchair using either the arms or legs. Class IV subjects do not take this test item. Individuals able to complete the item without an electric wheelchair should do so.

7. Long Distance Run

This test item measures endurance by timing a subject in a 1 or 1 1/2 mile run or by recording the distance a subject runs in 9 or 12 minutes. For ages 10-12, subjects must perform for 1 mile (1760 yards) or 9 minutes (whichever comes first). For ages 13 and over, subjects must perform for 1 1/2 miles (2640 yards) or 12 minutes (whichever comes first).

Table 6
Time and Distance Requirements
for Long Distance Run

AGE	DISTANCE		TIME
10-12 years old	1 Mile	OR	9 Minutes
13-17 years old	1.5 Miles	OR	12 Minutes

a. Equipment and Facilitiy

Stopwatches, tape, pylons or other suitable markers are necessary. The run may be done either indoors or out. An outside track 1/8 - 1/4 of a mile is highly recommended. Some alternatives for course construction for the one-mile distance appear below. Courses which

require more than 32 laps to complete a mile should not be used. Preference should be given to courses with long straight-aways.

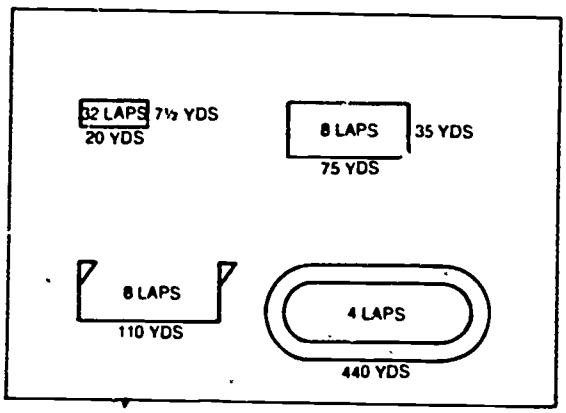


FIGURE 10 Course construction for distance run tests.

b. Procedure

Participants should be instructed to run (or push a wheelchair), jog, or walk (if necessary) the course until they cover distance or time associated with their age group. Participants may not come to a complete stop and continue. If they come to a complete stop prior to time or distance requirements, record distance covered for the applicable time period.

Prior to the running of this event, markers spread at 10 yard intervals should be placed around the running area. This marking will facilitate recording of yardage covered by subjects not completing a distance of 1 or 1 1/2 miles. Up to four subjects can run simultaneously around the track during each test (outdoor testing). Except for those using a wheelchair, subjects should use a standing start. After the run has begun, the tester should proceed to the center of the track infield so that accurate time and distances may be recorded when each subject finishes. If a subject is still running or walking at the 9 or 12 minute mark, the tester should signal to STOP.

Assistants must be used during the long distance run. Their duties include: recording times when verbally issued by the tester, recording the laps completed by each runner, and marking the yard distance when a runner stops before completing the full distance. All subjects must run in sneakers and athletic clothing.

c. Scoring and Trials

Only one trial is administered. There are two requirements in scoring the long distance run. For 10 to 12 year old participants who are able to cover the one-mile (1760 yard) distance in under nine minutes, the tester must record the time in which participants run the distance covered to the nearest second. This is also true for participants between the ages of 13 to 17 years of age who can run/push one and one-half miles (2640 yards) in less than 12 minutes. For youngsters who are unable to run/push either one mile or one and one-half miles in less than the allotted time, the tester must record the distance to the nearest yard that these participants cover during the appropriate time frame. Distance covered can be determined by keeping a tally sheet of the number of laps that each participant runs/pushes and calculating partial laps by counting the number of markers (cones, flags, etc.).

d. Modifications

The only test modifications are those which pertain to the method of ambulation. In the case of subjects with cerebral palsy, testers are cautioned to match appropriate method of ambulation with classifications and subclassifications indicated in Table 1 and to record them on data recording sheets. Persons able to complete the item without an electric wheelchair should do so. Essentially, Class I participants run completely unassisted, Class II with the aid of an assistive device, and Class III in a sport or nonsport wheelchair using the arms or legs. This item is not recommented for Class IV subjects or subjects unable to reasonably move in the desired direction.

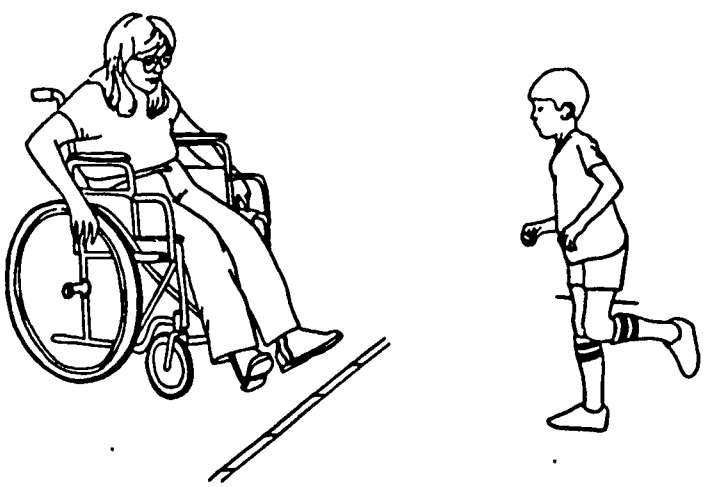


FIGURE 11 Long distance run.

PROJECT UNIQUE TRAINING PROGRAM

Purposes and Competencies

The purpose of the training program is to develop the skills and knowledge necessary to effectively implement the testing protocols of Project UNIQUE.

Individuals who participate in Project UNIQUE as site coordinators or field testers must successfully complete the training program outlined. The training program is designed to establish 7 basic competencies. Each participant should:

1. Understand the purposes and general procedures of Project UNIQUE.
2. Understand the purpose of each test item.
3. Understand classification and testing procedures.
4. Understand specific test modifications.
5. Be able to set up and utilize the testing equipment.
6. Be able to record data accurately on the data recording sheet.
7. Be able to employ the sampling procedures used in the study.

Training Activities

The training program to certify testers includes the following activities:

*1. Attend a training session.
2. View videotape.
3. Read material in a test manual.
4. Complete a written test.
5. Complete a score sheet.
*6. Demonstrate the ability to administer the skinfold, sit and reach, and grip strength test.

If an individual has been previously certified as a Project UNIQUE tester, attendance at a training session and demonstration of testing

can be waived. Prior to testing, each field tester must have received or have available a test manual, written test, consent forms, testing equipment, videotape, and a condition code directory.

Checking Competency

Several checks will be employed to determine whether competencies have been attained. First, training leaders will be asked to verify attendance of trainers at training sessions. Secondly, trainers will be required to state that they have received and viewed the training videotape, have read the materials, and have a test manual available as a reference. Third, all testers must complete successfully a score sheet and written test. The score sheet and written test will be reviewed/corrected by central project staff or their designees. Trainees must score 100% on the written test or, if scoring lower, must be notified of any incorrect answers they have given. Any incorrect entries on the score sheet will be discussed with trainees.

The final check will be a demonstration of the ability to administer the skinfold, sit and reach, and grip strength tests properly. This is on a pass/fail basis and all trainees must demonstrate proper attention to the following:

Skinfolds

1. Proper application and release of calipers.
2. Proper identification of the triceps area.
3. Proper identification of the subscapular area.
4. Appropriate separation of skinfold from muscle tissue.
5. Proper order of operations.
6. Reliability of measures (less than 2 mm difference between two trials).
7. Objectivity of measure (less than 2 mm difference between two testers at triceps skinfold and subscapular fold).

Sit and Reach

1. Subject's shoes removed, knees held down, feet flush against box.
2. Subject advised not to bob before reaching.
3. Proper reach.
4. Reach held for one second.
5. Score recorded accurately to nearest centimeter.
6. Knowledge of classes to be tested.

Grip Strength

1. Tester knows modifications for impaired subjects.
2. Hand dynamometer adjustment.
3. Subject seated properly.
4. Hands alternated during test trials.
5. Score read and recorded accurately (trials and mean).

Training Program Outline

All trainees should be preadvised to bring athletic attire and sneakers to the training session. Training sessions should be held in a setting which meets professional standards for a workshop or class. If possible, a physical education teaching station should be used for practical activities. A classroom should be used for lecture, discussion, video viewing.

Trainees arrive--informal meeting of participants.

1. Reception of trainees.

2. Introduction.
   a. Pass out materials.
      1. Flyers
      2. Test manuals
      3. Consent forms
      4. Condition code directory
      5. Score sheets
   b. Endorsements by cooperating agencies.

3. Videotape.

*4. Reading material.

5. Practice and demonstration of testing protocol.

6. Instruction in completing score sheets.

**7. Completion of score sheet.

**8. Written test.

9. Competency testing.

10. Questions and discussion.

*May be done before, during, or after training session.
**May be done during or after training session.

DATA RECORDING

Results of test administration must be recorded on data recording forms. With few exceptions, the information to be presented in the subject data and supplementary data sections is obvious. Item 9

requires that a three-digit condition code be entered for each subject. This number must correspond to the subject's condition as described in the condition code directory.

On the flip side of the score sheet dealing with classification and raw scores, the first step is to classify and subclassify subjects. Subsequently, subjects are tested and scores are recorded on the form. The form presents trials, units of measure, and classification. In some instances, additional descriptive information is requested. Any questions about the form may be answered by calling collect 716-395-2383 (project staff telephone).

Some points of emphasis in filling out the form:

-Be sure to check classifications and subclassifications.

-Record a zero if a subject attempts an item but scores zero.

-Leave blanks if the test item was not administered.

SUPPLIES AND EQUIPMENT

Supplies/Equipment

Skinfold Calipers
Pens
Hand Grip Dynamometers
Horizontal Bar
Measuring Tape
Ruler
Pencils
Pylons
Scale
Sit and Reach Box
Softballs
Stopwatches

Checking

Periodically check all equipment before using it. Since the grip dynamometer and skinfold calipers are particularly sensitive, please check them most carefully. If problems are encountered in checking the equipment, or the need to check it, call 716-395-2383 collect for help.

Hand Dynamometer

Upon receiving the hand dynamometer, check it for damage or obvious malfunctioning. Then, gently move the pointer to the left

(start) point. The pointers should both be at zero to start. Give a gentle squeeze. Both pointers should move but the bottom pointer should return to the zero point.

If malfunctioning of the dynamometer is suspected, follow these steps. First, adjust the dynamometer stirrup so that there is about a one inch space between the handle and the stirrup. (The handle is the bottom of the dynamometer around which the palm of the hand is placed for the squeeze and the stirrup is the part around which the fingers grasp during the squeeze). Then, check accuracy by measuring weights whose poundage is accurately known. For weighing, use free weights like those used in barbell weight lifting. Tie one end of a rope securely around the plate hole; place the opposite end of the rope around the adjusted hand grip and tie a secure knot below the instrument's handle (tie the knot on free standing rope). In other words, be careful not to tie together the stirrup and the handle or else the result will be inaccurate. Allow the weights to rest on the floor. Then lift them gradually from the floor (straight back lift). Return the weight to the floor and read the scale. There should not be a difference greater than plus or minus 2 pounds between the known weight and the weight recorded. It is recommended that weights of 20 and 40 pounds be checked. Thus, readings of 18-22 pounds or 38-42 pounds respectively for 20 and 40 pound checks are acceptable weights. This corresponds to a range of 8-10 kg for a 20 pound weight and a range of 17-19 kg for a 40 pound weight.

Skinfold Caliper

Upon receiving the caliper, check it for damage. Be sure that the glass is not broken and that the dial reads zero mm. Apply the caliper to the outside of the carrying case at the Cambridge Scientific logo. The resulting reading should be within 1 mm of the number written on the tape mark placed inside the case. If not, contact central project staff at Brockport.

Full Board Review — Project IRB # 84-7

OMB No. 0925-0637

DEPARTMENT OF HEALTH AND HUMAN SERVICES

PROTECTION OF HUMAN SUBJECTS ASSURANCE/CERTIFICATION/DECLARATION

☐ ORIGINAL ☐ FOLLOWUP ☐ EXEMPTION (previously undesignated)

☐ GRANT ☐ CONTRACT ☐ FELLOW ☐ OTHER

☐ New ☐ Competing continuation ☐ Noncompeting continuation ☐ Supplemental

APPLICATION IDENTIFICATION NO. *(if known)*

POLICY: A research activity involving human subjects that is not exempt from HHS regulations may not be funded unless an Institutional Review Board (IRB) has reviewed and approved the activity in accordance with Section 474 of the Public Health Service Act as implemented by Title 45, Part 46 of the Code of Federal Regulations (45 CFR 46–as revised). The applicant institution must submit certification of IRB approval to HHS unless the applicant institution has designated a specific exemption under Section 46.101(b) which applies to the proposed research activity. Institutions with an assurance of compliance on file with HHS which covers the proposed activity should submit certification of IRB review and approval with each application. (In exceptional cases, certification may be accepted up to 60 days after the receipt date for which the application is submitted.) In the case of institutions which do not have an assurance of compliance on file with HHS covering the proposed activity, certification of IRB review and approval must be submitted within 30 days of the receipt of a written request from HHS for certification.

1. TITLE OF APPLICATION OR ACTIVITY

Physical Fitness for Blind & Orthopedically Impaired Youth, Project UNIQUE 2

2. PRINCIPAL INVESTIGATOR, PROGRAM DIRECTOR, OR FELLOW

3. FOOD AND DRUG ADMINISTRATION REQUIRED INFORMATION *(see reverse side)*

4. HHS ASSURANCE STATUS

☒ This institution has an approved assurance of compliance on file with HHS which covers this activity.

M-1064 Assurance identification number 01XM IRB identification number

☐ No assurance of compliance which applies to this activity has been established with HHS, but the applicant institution will provide written assurance of compliance and certification of IRB review and approval in accordance with 45 CFR 46 upon request.

5. CERTIFICATION OF IRB REVIEW OR DECLARATION OF EXEMPTION

☒ This activity has been reviewed and approved by an IRB in accordance with the requirements of 45 CFR 46, including its relevant Subparts. This certification fulfills, when applicable, requirements for certifying FDA status for each investigational new drug or device. *(See reverse side of this form.)*

10 Dec 1984 Date of IRB review and approval. *(If approval is pending, write "pending." Followup certification is required.)*
(month/day/year)

☒ Full Board Review ☐ Expedited Review

(see "NOTES")

☐ This activity contains multiple projects, some of which have not been reviewed. The IRB has granted approval on condition that all projects covered by 45 CFR 46 will be reviewed and approved before they are initiated and that appropriate further certification *(Form HHS 596)* will be submitted.

☐ Human subjects are involved, but this activity qualifies for exemption under 46.101(b) in accordance with paragraph _____ *(insert paragraph number of exemption in 46.101(b), 1 through 5)*, but the institution did not designate that exemption on the application.

6. Each official signing below certifies that the information provided on this form is correct and that each institution assumes responsibility for assuring required future reviews, approvals, and submissions of certification.

APPLICANT INSTITUTION	COOPERATING INSTITUTION
NAME, ADDRESS, AND TELEPHONE NO. State University of New York College at Brockport Brockport, New York 14420 716-395-2488 or 716-395-2444	NAME, ADDRESS, AND TELEPHONE NO.
NAME AND TITLE OF OFFICIAL *(print or type)* Frederick J Gravetter IRB Chairman	NAME AND TITLE OF OFFICIAL *(print or type)*
SIGNATURE OF OFFICIAL LISTED ABOVE *(and date)*	SIGNATURE OF OFFICIAL LISTED ABOVE *(and date)*

HHS 596 (Rev. 1/82)

(If additional space is needed, please use reverse side under "Notes.")

1986
Project UNIQUE
Consent Form

Student's Name: _____
(Please Print)

Researchers' Names: Dr. Joseph P. Winnick
Dr. Francis X. Short
State University of New York
College at Brockport
Brockport, NY 14420

Description of the Research

The Department of Education has provided SUNY, College at Brockport a grant to study the physical fitness of school-aged pupils aged 10-17. To accomplish this, the UNIQUE Physical Fitness Test must be administered. The test is similar to the American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD) Youth Fitness and Health Related Tests which are administered on a national scale. The items in the test measure body composition (weight and skin-fold measures), strength/endurance (grip strength, dash, softball throw, or flexed arm hang), flexibility (sit and reach), and cardiorespiratory endurance (running 9 to 12 minutes). All testing will be conducted by school personnel or by specially prepared project personnel. All data will be analyzed as group data and individual results will remain anonymous. The testing is designed to provide information on school populations so that adequate physical fitness programs may be designed by schools.

Certification

This is to certify that I agree to allow my child to participate in the above testing. I understand the purpose of the research and the components of physical fitness being measured. I further understand that if I have any questions, they will be answered by school personnel or the project staff. I hereby give my consent for:

_____
student's name printed

to participate in the study. I reserve the right to withdraw my consent and discontinue participation at any time.

_____
Parent/Guardian's Name Printed

_____
Parent/Guardian's Signature

Date: _____
(month) (day) (year)

Triceps Skinfold (Millimeters): Percentile Table for Normal Boys & Girls

PERCENTILE	AGE							
	M 10-11 (n=129)	F 10-11 (n=106)	M 12-13 (n=130)	F 12-13 (n=226)	M 14-15 (n=89)	F 14-15 (n=193)	M 16-17 (n=103)	F 16-17 (n=91)
95	5	3	6	4	5	4	5	3
90	6	3	6	5	6	5	5	4
85	7	4	7	6	6	6	6	6
80	7	4	8	7	7	7	6	7
75	8	4	8	7	8	9	7	8
70	9	5	9	8	8	10	8	9
65	9	6	10	10	9	11	8	10
60	10	7	10	11	9	12	8	10
55	10	8	11	11	10	13	9	11
50	11	9	12	12	11	14	9	12
45	11	9	12	13	11	15	10	13
40	11	10	13	14	12	16	10	14
35	12	12	14	15	13	17	11	14
30	13	12	15	16	13	18	12	16
25	14	13	16	18	14	19	13	17
20	15	14	17	19	16	21	14	18
15	17	17	19	20	17	22	15	19
10	19	19	22	22	19	24	16	20
5	20	22	23	26	20	26	18	26
M	12.1	10.5	13.3	13.6	12.0	14.9	10.9	13.4
S.D.	5.0	6.3	5.8	6.8	4.7	7.3	4.7	6.7

Subscapular Skinfold (Millimeters): Percentile Table for Normal Boys & Girls

PERCENTILE	AGE							
	M 10-11 (n=129)	F 10-11 (n=106)	M 12-13 (n=129)	F 12-13 (n=214)	M 14-15 (n=89)	F 14-15 (n=193)	M 16-17 (n=103)	F 16-17 (n=91)
95	4	3	4	4	5	4	6	4
90	4	4	5	4	6	5	6	4
85	4	4	5	5	6	6	6	5
80	4	4	5	5	6	6	7	6
75	4	4	5	6	7	7	7	7
70	5	5	6	7	8	8	8	7
65	5	5	6	7	8	8	8	8
60	5	5	6	8	8	9	8	8
55	5	6	7	8	8	9	8	8
50	6	6	7	9	9	10	9	9
45	6	7	8	9	9	10	9	9
40	7	8	9	10	10	11	9	9
35	7	9	9	11	10	13	10	10
30	8	9	10	12	11	13	10	11
25	9	10	11	13	11	14	11	12
20	10	11	13	14	12	16	12	13
15	12	12	14	16	13	17	14	14
10	14	14	16	18	16	19	16	15
5	20	20	21	22	18	24	19	19
M	8.3	8.7	9.9	11	10.6	12	10.7	10.3
S.D.	4.6	4.9	5.6	6	4.6	6.1	4.2	4.7

PROJECT UNIQUE - Data Recording Form

Subject Data

Check Appropriately

Please Print or Type All Information.

1. SUBJECT'S NAME: _____

2. SUBJECT'S AGE: _____ (Record age for initial test. Round age to lesser whole year. Example: 10 years 1 month or 10 years 11 months are both recorded as 10 years.)

3. SUBJECT'S GENDER: ____ MALE ____ FEMALE

4. SUBJECT'S HEIGHT: _____
(Record in inches to the nearest 1/2 inch).

5. SUBJECT'S WEIGHT: _____
(Do not include prothetic devises, etc. as part of the body weight.)

Note:
Do not record height or weight for persons missing body parts. Write missing" in the blank.

6. SUBJECT'S RACE: (Check one)
____ WHITE ____ BLACK ____ OTHER

*7. IMPAIRED SUBSTRATA CODE:
____ NONINSTITUTIONALIZED
____ INSTITUTIONALIZED NONRESIDENT
____ INSTITUTIONALIZED RESIDENT

**8. CONDITION:
____ NONRETARDED CP
____ slow learner
____ above slow learner
____ MILDLY RETARDED CP

9. CONDITION CODE: _____ (Insert the 3-digit number number that best reflects the cerebral palsy conditions of the subject. Consult the condition code directory)

Supplementary Data

TESTER'S NAME: _____

TESTER'S SIGNATURE: _____

TESTER'S PHONE NUMBER: _____

TESTING BEGUN: _____
month day year

TESTING COMPLETED: _____ _____
month day year

NAME OF SUBJECT'S SCHOOL: _____

SCHOOL PHONE NUMBER: _____

LEAVE BLANK

SUBJECT NUMBER: _____

TESTOR NUMBER: _____

PLEASE NOTE: DO NOT TEST SUBJECTS ON THE LONG DISTANCE ITEM IN ENVIRONMENTS WHERE THE TEMPERATURE IS ABOVE 90 DEGREES OR BELOW 50 DEGREES. ALSO, DO NOT TEST IF THE TEMPERATURE PLUS THE HUMIDITY EXCEEDS 175. EXAMPLE: 85 (TEMP) + 90 (HUM) = 175.

*Noninstitutionalized - subject attending a school not totally segregated by handicapping condition or which is integrated to some degree.
Institutionalized - public or private school or agency attended only by students with handicapping conditions.
Resident - pupils live at the educational center during the school week.
Nonresident - pupil commuting from home to school.
**Subjects are classified in accord with the AAMD definition of mental retardation or equivalent. IQ range of 52-68 on Stanford Binet or 55-69 on WISC or equivalent would be coded as 69 or 69 to 90 for "slow learner."

PART I. Classification and subclassification

Stationary Classification (check one): ___ A ___ B ___ C ___ D Locomotor Classification (check one): ___ I ___ II ___ III ___ IV

Subclassification (check one):

___ Runs and jumps freely and unassisted
___ Ambulates unassisted with a slight limp
___ Ambulates unassisted but has obvious balance and coordination difficulties
___ Ambulates with assistive device
___ In track, uses and propels wheelchair with arms using forceful and continous arm pushes
___ In track, primarily uses and propels wheelchair with arms (slowly and/or choppy)
___ In track, primarily uses and propels wheelchair with feet

PART II. Stationary (Nonlocomotor Items)

1. Skinfold (A, B, C, D) (nearest mm)

	Triceps Measure	Subscapular
1.	___ ___.	___ ___.
2.	___ ___.	___ ___.
3.	___ ___.	___ ___.

2. Grip Strength (A, B, C) (nearest kg)

	Right	Left
1.	___ ___ ___ kg	___ ___ ___ kg
2.	___ ___ ___ kg	___ ___ ___ kg
3.	___ ___ ___ kg	___ ___ ___ kg

3. Softball Throw (girls only A, B, C) (distance in feet and inches)

1.	___ ___ ___ ft	___ ___ in
2.	___ ___ ___ ft	___ ___ in
3.	___ ___ ___ ft	___ ___ in

___ Check here if an over the shoulder throw was used

4. Flexed Arm Hang (boys only A, B) (nearest second)

1. ___ ___ ___ sec 2. ___ ___ ___ sec

5. Sit and Reach (A, B) (nearest cm)

1. ___ ___ cm 2. ___ ___ cm

PART III. Locomotor Items

6. Dash (I, II, III) (round to nearest tenth of a second, i.e. 7.7) Wheelchair used in event (if any): ___ Sport ___ Nonsport

In same trial, record these times: 50-yard time: _____ 50-meter time: _____

7. Long Distance Run (I, II, III) Procedures and Scores (check one and enter results)

Ages 10-12		Ages 13-17	
___Moved 1 mile: ___ minutes ___ seconds	or ___Moved 9 minutes: Distance covered (to nearest yard): ____	___ Moved 1 1/2 mile: ___minutes ___ seconds	or ___Moved 12 minutes: Distance covered (to nearest yard): _____

Wheelchair used in event (if any): ___ Sport ___ Nonsport

***When rounding, round number 5 or above to next highest number.

Note: Record 0 if a subject attempts an item appropriate for that person but scores zero. Leave blank if an item is not appropriate, the individual was not tested on an item, or opportunity was not provided for testing on the item.

CONDITION CODES

Identify the code that best represents the medical condition of each subject. Each subject is to receive only ONE three digit code. Use the major headings to locate the general condition a subject possesses, then find the specific condition that most accurately identifies the condition of the subject being tested. The code is the 3-digit number in the far left column.

CEREBRAL PALSY - SPASTIC

180 = monoplegic - right arm
181 = monoplegic - left arm
182 = monoplegic - right leg
183 = monoplegic - left leg
184 = diplegic - major involvement in lower limbs and minor involvement in upper limbs
185 = triplegic - right arm, left arm, right leg
186 = triplegic - right arm, right leg, left leg
187 = triplegic - left arm, right leg, left leg
188 = triplegic - right arm, left arm, left leg
189 = hemiplegic - right arm, right leg
190 = hemiplegic - left arm, left leg
191 = Paraplegic - right leg, left leg
192 = quadriplegic - all four extremities - partial or complete

CEREBRAL PALSY - ATHETOID

200 = monoplegic - right arm
201 = monoplegic - left arm
202 = monoplegic - right leg
203 = monoplegic - left leg
204 = diplegic - major involvement in lower limbs and minor involvement in upper limbs
205 = triplegic - right arm, left arm, right leg
206 = triplegic - right arm, right leg, left leg
207 = triplegic - left arm, right leg, left leg
208 = triplegic - right arm, left arm, left leg
209 = hemiplegic - right arm, right leg
210 = hemiplegic - left arm, left leg
211 = paraplegic - right leg, left leg
212 = quadriplegic - all four extremities - partial or complete

CEREBRAL PALSY - TREMOR

220 = monoplegic - right arm
221 = monoplegic - left arm
222 = monoplegic - right leg
223 = monoplegic - left leg
224 = diplegic - major involvement in lower limbs and minor involvement in upper limbs
225 = triplegic - right arm, left arm, right leg
226 = triplegic - right arm, right leg, left leg
227 = triplegic - left arm, right leg, left leg
228 = triplegic - right arm, left arm, left leg

229 = hemiplegic - right arm, right leg
230 = hemiplegic - left arm, left leg
231 = paraplegic - right leg, left leg
232 = quadriplegic - all four extremities - partial or complete

CEREBRAL PALSY - RIGIDITY

240 = monoplegic - right arm
241 = monoplegic - left arm
242 = monoplegic - right leg
243 = monoplegic - left leg
244 diplegic - major involvement in lower limbs and minor involvement in upper limbs
245 = triplegic - right arm, left arm, right leg
246 = triplegic - right arm, right leg, left leg
247 = triplegic - left arm, right leg, left leg
248 = triplegic - right arm, left arm, left leg
249 = hemiplegic - right arm, right leg
250 = hemiplegic - left arm, left leg
251 = paraplegic - right leg, left leg
252 = quadriplegic - all four extremeties - partial or complete

CEREBRAL PALSY - ATAXIC

260 = monoplegic - right arm
261 = monoplegic - left arm
262 = monoplegic - right leg
263 = monoplegic - left leg
264 = diplegic - major involvement in lower limbs and minor involvement in upper limbs
265 = triplegic - right arm, left arm, right leg
266 = triplegic - right arm, right leg, left leg
267 = triplegic - left arm, right leg, left leg
268 = triplegic - right arm, left arm, left leg
269 = hemiplegic - right arm, right leg
270 = hemiplegic - left arm, left leg
271 = paraplegic - right leg, left leg
272 = quadriplegic - all four extremities - partial or complete

CEREBRAL PALSY - MIXED

280 = monoplegic - right arm
281 = monoplegic - left arm
282 = monoplegic - right leg
283 = monoplegic - left leg
284 = diplegic - major involvement in lower limbs and minor involvement in upper limbs
285 = triplegic - right arm, left arm, right leg
286 = triplegic - right arm, right leg, left leg
287 = triplegic - left arm, right leg, left leg
288 = triplegic - right arm, left arm, left leg
289 = hemiplegic - right arm, right leg
290 = hemiplegic - left arm, left leg
291 = paraplegic - right leg, left leg
292 = quadriplegic - all four extremities - partial or complete

UNIQUE WRITTEN TEST

NAME _____

DATE _____

Identified below are the questions that comprise the written test. There are 20 questions each worth 5 points. Write the letter of the correct answer in the space provided.

_____ 1. Data generated from Project UNIQUE:

a. will identify the physical fitness of adolescents with cerebral palsy ages 10-17
b. will provide normative data on the populations tested
c. will provide excellent assessment of social development through a longitudinal evaluation
d. a and b
e. none of the above

_____ 2. Project UNIQUE will provide information that will be useful:

a. to regular and special physical education teachers
b. in facilitating future placement of children in either mainstreamed or adapted programs
c. in identifying unique physical fitness needs
d. b and c
e. all of the above

_____ 3. The physical fitness test items used in Project UNIQUE:

a. will assist in identifying various fitness needs
b. will provide educators with a physical fitness test that can be used in a similar manner that the national youth (AAHPERD) fitness test is used
c. will allow educators to develop individual educational programs from a data base
d. a and c
e. all of the above

_____ 4. The skinfold measurement at the triceps should come from:

a. the back of the dominant arm midway between the elbow and the shoulder
b. the back of the non-dominant arm midway between the elbow and the apex of the armpit
c. the back of both the dominant and non-dominant arm midway between the elbow and the shoulder
d. the front of the dominant arm midway between the elbow and the apex of the armpit
e. none of the above

_____ 5. The sit and reach test of flexibility:

a. requires subjects to bob or bounce with their torso in order to achieve full extension
b. requires that subjects hold their reach for one second
c. requires a partner who will hold down the subjects knees
d. b and c
e. all of the above

_____ 6. The grip strength test item requires:

a. subjects to be tested from a seated position
b. subjects to be tested from a standing position
c. subjects to have three trials with the right hand and three trials with the left hand
d. a and c
e. none of the above

_____ 7. When testing subjects on the 50 meter/yard dash:

a. record the time for meters only; the yard time will be converted after testing
b. emphasize to run for 50 meters so that the subject does not stop at 50 yards
c. mark off only one finish line and have it measured to the 50 yard/meter distance
d. a and c
e. all of the above

_____ 8. Which of the following statements is NOT a procedure to be followed during the softball throw?

a. allow subjects sufficient supervised warm-up time prior to allowing them to throw for distance
b. allow subjects a three-step running start to the throwing line
c. emphasize both the angle of throw and distance aspects of the throwing event
d. none of the above

_____ 9. The 1/½ mile 9/12 minute run is the measure of cardiorespiratory endurance. Which of the procedures listed below should be followed by the tester?

a. encourage subjects to walk if they are not running
b. mark off 10 yard intervals with tape to facilitate the accurate recording of yardage
c. proceed to the center of the track after the run has begun to facilitate precise time and distance recording
d. emphasize to subjects that they should maintain their spot if they stop until the tester or an assistant records the distance they covered
e. all of the above should be followed

_____ 10. A basic procedure to be followed on <u>all</u> running test items is:

a. the instructor should have a signal for "ready" and one for "go"
b. allow subjects more than three trials
c. drop the lowest performance score on multiple trial tests
d. a and b
e. all of the above

_____ 11. Subjects being assessed on anthropometric measures should be instructed to:

a. be dressed in lightweight athletic attire
b. indicate to the tester which hand/arm is dominant
c. include prosthetic devices as a part of weight
d. a and b
e. all of the above

_____ 12. When providing instructions for the sit and reach test:

a. emphasize that the subject should bob their torso in order to get full reach.
b. allow subjects to bend their knees no more than 6 inches off the floor
c. point out the similarity of the sit and reach to a sit-up
d. a and c
e. none of the above

_____ 13. The grip strength instructions:

a. require subjects to be seated
b. point out the importance of bending the knees in the standing position
c. emphasize the use of the dominant hand
d. a and b
e. none of the above

_____ 14. Instruct subjects participating in the flexed arm hang to:

a. use an overhand grip on the bar
b. use their lower body as leverage to keep their chin above the bar
c. keep their chin above the bar for as long as possible
d. a and c
e. all of the above

_____ 15. The instructions for the softball throw should emphasize:

a. the type of throw
b. the distance of the throw
c. the angle of the release
d. a and b
e. all of the above

_____ 16. Important instructions to emphasize during the long distance run are:

a. pace yourself; if you stop, stay at the spot where you stopped
b. pace yourself, you may walk if you are tired but if you stop, stay at that spot
c. pace yourself, you may walk and then run again
d. b and c
e. all of the above

_____ 17. Which of the following is incorrect?

a. subjects may conduct the long distance run using different methods of ambulation
b. two test trials are given in the sit and reach test
c. the 50-yard and 50-meter dash are conducted during the same trial
d. subjects must be tested individually (as opposed to a pair) on the dash
e. c and d

_____ 18. Cerebral palsy subjects with class D stationary classification should:

a. not participate in the grip strength test
b. not participate in the flexed arm hang
c. not participate in the sit and reach test
d. b and c
e. all of the above

_____ 19. In regard to the classification of cerebral palsy subjects which of the following is correct?

a. the locomotor (run code) classification is designated as A, B, C, D
b. the actual test item administered to a subject depends on classification
c. Class I is associated with the least ambulate (on foot) of subjects
d. the sit and reach test is administered to a Class D subject
e. none of the above

_____ 20. A Project UNIQUE field tester:

a. should permit warm-up for the softball throw
b. record results on the data sheet
c. measure height and weight
d. a and b
e. all of the above

IMPLICATIONS OF PROJECT UNIQUE

The implications of UNIQUE Project II to curricular concerns in physical education and recreation are enormous. The ability to determine specific fitness needs of pupils with Cerebral Palsy will now become data based. Systematic programs enhancing the fitness of these individuals and complying with PL 94-142 will become a reality in the 1990's. Information will also be analyzed on the relationship between age, gender, nature of handicap, and the level of physical fitness possessed. Project UNIQUE's contribution will be of practical and scientific value in promoting our understanding of the fitness needs of special populations.

UNIQUE Project II

For additional information on how you and your school can participate in UNIQUE Project II, please call or write:

Joseph P. Winnick or Francis X. Short
Department of Physical Education and Sport
State University of New York
College at Brockport
Brockport, N.Y. 14420
(716) 395-2383

Project Advisory Board:

Claudine Sherrill - *Texas Woman's University (Chair)*
Geoffrey Broadhead - *Louisiana State University*
Julian Stein - *George Mason University*
Diane Lewandowski - *Chicago Public Schools*

UNIQUE Project II

The Physical Fitness of Adolescents with Cerebral Palsy

Sponsored by:
Special Education Programs
U.S. Department of Education
and
State University of New York
College at Brockport

Project Director: Joseph P. Winnick
Project Coordinator: Francis X. Short
Department of Physical Education and Sport
State University of New York
College at Brockport
Brockport, N.Y. 14420
(716) 395-2383

UNIQUE Project II is a federally sponsored project that is designed to study the physical fitness and performance of adolescents with Cerebral Palsy in school and institutional settings. The project will establish normative fitness data based upon testing from across the United States.

INTRODUCTION

The benefits of fitness in enhancing physical and mental well-being have been documented by scientists in several fields. It is not surprising that the past decade has witnessed a tremendous increase in the participation of Americans in activity programs. While the level of fitness possessed by Americans has been receiving nationwide attention, the physical fitness of several special populations remains unknown. The assessment of fitness and performance needs of children and youth with handicapping conditions will enhance the establishment of quality activity programs for these groups. Fitness and performance information will also facilitate the setting of program objectives, goals and individual education programs. Such information will expedite physical education curriculum compliance with PL 94-142. Improving UNIQUE needs will enable special populations to benefit fully from instructional, intramural, athletic and recreative programs.

PROJECT AIM

The aim of this project is to provide basic descriptive data which may be utilized by professionals who work with the activity and health needs of persons with handicapping conditions. This information provides a reference upon which to determine the UNIQUE needs of an individual. By determining the unique fitness needs of an individual with handicapping conditions, an appropriate program may be instituted. Such a program can provide meaningful and valuable experiences and increase the opportunity to enjoy the benefits derived from phy ical fitness.

PROJECT STRUCTURE

Testing will take place in urban, suburban and rural sections throughout the United States. Satellite center will have personnel prepared to conduct fitness testing. All participants will be tested on muscular strength/endurance, cardiorespiratory endurance, flexibility, and various anthropometric measures.

PROJECT DISSEMINATION

The results of Project UNIQUE will be disseminated through the development of publications. These publications will explain in detail the procedures. implications, and fitness status of the special populations tested. They will include information on the purpose of the testing program, test development, directions for test administration, test scoring, and norms for the various impaired populations.

The publications will serve as educational tools designed to assist the physical education teacher involved with students with Cerebral Palsy in schools, and agencies.

American Alliance © est. 1885

1900 Association Drive Reston, Virginia (703) 476-3400

June 20, 1986

Dr. Joseph P. Winnick
Project Director
UNIQUE II
SUNY College at Brockport
Brockport, NY 14420

Dear Dr. Winnick,

The American Alliance with its long term commitment to providing professional services and leadership to those members and practioners in the field working with individuals with handicapping conditions, is again pleased to write of our full support for UNIQUE Project II. As one of the supporting groups for Project UNIQUE I in the early 1980's and its successful completion and significant contributions in providing field physical fitness test batteries for those with handicapping conditions, the Alliance welcomes the opportunity to again support and participate, as appropriate, in phase II of the project. We believe that studying the effects of physical fitness on boys and girls with cerebral palsy and to include mildly mentally retarded as well, is certain to have long range implications for school age youngsters and others. We commend your leadership in the development of the phase II and applaud the awareness that the Department of Education, Special Education Programs, has demonstrated in granting funds for this project.

On behalf of the Alliance I extend our very best wishes to you for continuing success in all of your professional endeavors.

Sincerely,

Ray Ciszek

Raymond A. Ciszek
Vice President

RAC/bb

NCPERH

National Consortium on Physical Education and Recreation for the Handicapped

July 23, 1986

Dr. Joe Winnick
Department of Physical Education
State University of New York
Brockport, New York 14420

Dear Dr. Winnick:

I am pleased to inform you that after presenting an overview of your Project The Physical Fitness of Adolescents with Cerebral Palsy UNIQUE II to the Board of Directors of the National Consortium on Physical Education and Recreation for the Handicapped, the board voted unanimously to offer our support to your project.

I and the board feel that there is not only a need for the data which your project will provide, but that your testing procedures as outlined in your instructional manual are very appropriate and will take a minimum amount of time to administer.

We appreciate the opportunity to support UNIQUE Project II and we look forward to learning about, and utilizing the results of your research study. Please let me know if we can be of further assistance to your project.

Cordially,

Louis Bowers

Louis Bowers, Ph.D.
President of NCPERH

LB:lab

UNITED STATES OLYMPIC COMMITTEE

OLYMPIC HOUSE 1750 EAST BOULDER STREET, COLORADO SPRINGS, COLORADO 80909-5760
Tel: (303) 632-5551 Telex: 45-2424 Cable: "AMOLYMPIC CSP"

NATIONAL SPORTS FESTIVAL, Baton Rouge, Louisiana, July 22-August 4, 1985
X PAN AMERICAN GAMES, Indianapolis, Indiana, Tentative August 7-23, 1987
XV OLYMPIC WINTER GAMES, Calgary, Canada, February 23-March 5, 1988
GAMES OF THE XXIV OLYMPIAD, Seoul, Korea, September 17-October 2, 1988

June 18, 1986

Joseph P. Winnick, Ed.D.
Project Director, UNIQUE II
State University of New York
College at Brockport
Brockport, New York 14420

Dear Joe:

Congratulations on the funding of your project, UNIQUES II! It is important that we continue to expand our knowledge base regarding physical fitness of individuals with disabilities.

It is quite appropriate that there should be cooperation between your project and the work of the Research Subcommittee of the USOC Committee on Sports for the Disabled (COSD). In my capacity as chair of the Research Subcommittee, I would be willing to serve as a liaison for your project. Unless you have funding for me to attend your meeting, it will be impossible for to attend the meeting on July 17, 1986, in Maryland. I would like to receive a written summary of the meeting.

Please let me know how I can be of assistance.

Sincerely,

Karen P. DePauw, Ph.D.
Chair, Research Subcommittee
USOC Committee on Sports for the Disabled
Department of Physical Education, Sport, &
Leisure Studies
Washington State University
Pullman, WA 99164-1410

cc. R. Montague
M.M. Newsome

NEW YORK STATE ASSOCIATION FOR HEALTH,
PHYSICAL EDUCATION, RECREATION AND DANCE, INC.

91 FIDDLERS LANE, LATHAM NEW YORK 12110
TELEPHONE (518) 785-7699

September 24, 1986

Dr. Joseph P. Winnick, Ed.D
Special Physical Education Project
SUNY - Brockport
Brockport, NY 14420

Dear Joe:

The NYSAHPERD is pleased to inform you that we wholeheartedly support Project Unique as you study the effects of mental redardation on the physical fitness of boys and girls with cerebral palsy with the extension of the Unique test to include mildly retarded cerebral palsied youngsters.

NYSAHPERD has had a history of concern for those with any form of disabilities. We look forward to a report of your project and stand ready to assist in whatever form is needed.

Cordially,

John K. Ault
President
NYSAHPERD

JKA;mm

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