



Qualitative comparison of basic movement patterns of preschool age children
by Virginia Dawn Tubbs

A thesis submitted in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE
in Physical Education

Montana State University

© Copyright by Virginia Dawn Tubbs (1980)

Abstract:

This study was designed to examine the effect that physical education instruction had on the overall quality of basic movement patterns of three and four year old children: 1) enrolled in a preschool with a physical education program, 2) enrolled in a preschool with no physical education program, and 3) not enrolled in any type of preschool program. Assessment of the quality of basic movement patterns was accomplished by the utilization of The Ohio State University Scale of Intra Gross Motor Assessment.

This study defined preschool as a day care environment in which children attended three or more days per week and not less than four and one half hours per day. Basic movement patterns were defined as: walking, running, skipping, hopping, jumping, throwing, catching, kicking, and striking.

Descriptive statistics were computed for all variables: sex, age, preschool with a physical education program, preschool with no physical education, and no preschool enrollment.

Significant differences were revealed among the overall quality of basic movement patterns and the age of the children. The type of preschool involvement also had a significance. Those preschool children enrolled in a preschool with a physical education program generally were better performers. The sex variable was determined to have no significance among the nine items.

It was hypothesized that preschool age children may benefit from the early introduction to basic movement skills. These skills will be the building blocks for specific sport and dance skills which may later be used to participate in recreational activities.

STATEMENT OF PERMISSION TO COPY

In presenting this thesis in partial fulfillment of the requirements for an advanced degree at Montana State University, I agree that the library shall make it freely available for inspection. I further agree that permission for extensive copying of this thesis for scholarly purposes may be granted by my major professor, or, in his absence, by the Director of Libraries. It is understood that any copying or publication of this thesis for financial gain shall not be allowed without my written permission.

Signature

Virginia White

Date

5/30/80

QUALITATIVE COMPARISON OF BASIC MOVEMENT
PATTERNS OF PRESCHOOL AGE
CHILDREN

by

VIRGINIA DAWN TUBBS

A thesis submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF SCIENCE

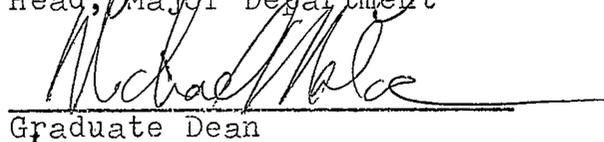
in

Physical Education

Approved:


Chairman, Graduate Committee


Head, Major Department


Graduate Dean

MONTANA STATE UNIVERSITY
Bozeman, Montana

May, 1980

ACKNOWLEDGMENTS

I am especially indebted to my advisor, Dr. James Phillips, who gave of his time, offered guidance and encouragement, and provided much counseling during the various levels of this investigation. Very special thanks and gratitude are extended to Ms. Barabara E. Miller for her unselfish assistance and cooperation during the video taping and collection of data of this study. Appreciation is also offered to Dr. Bette A. Lowery, also a member of my committee, for her recommendations and concerns throughout the duration of this investigation.

Sincere appreciation is expressed to the preschool age children and their parents for their cooperation during the observations of this study. Thanks are offered to Ms. Anne K. Olson for her unselfish involvement with the collection of data and reinforcement and to Dale Olson and Diana Talcott for their professional assistance.

Genuine recognition is shown to Ms. Kathleen Taylor and Pauline Foy, associates in Munchkin House Preschool and Day Care Center, which ultimately led to the initiation of this study. To my father, Robert, and mother, Donna thank you for your individual supports and interests.

TABLE OF CONTENTS

<u>Chapter</u>		<u>Page</u>
	VITA	ii
	ACKNOWLEDGMENTS	iii
	TABLE OF CONTENTS	iv
	LIST OF TABLES	vi
	ABSTRACT	vii
I	INTRODUCTION	1
	Purposes	2
	Definition of Terms	2
	Null Hypotheses	4
	Delimitations	5
	Limitations	5
	Justification of Study	5
II	REVIEW OF LITERATURE	8
	Summary	20
III	METHODOLOGY	22
	Selection of Subjects	22
	Instrumentation	23
	OSU SIGMA	23
	Administration	25
	Analysis of Data	26
IV	ANALYSIS OF RESULTS	29
	Descriptive Statistics	29
	Hypothesis Testing	31
	Discussion of Results	40
V	SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	48
	Summary	48
	Conclusions	49
	Recommendations	51
	APPENDIXES	53
	Appendix A Introduction Letter and Parental Permission Form	54
	Appendix B OSU SIGMA	55
	Appendix C Score Sheet for OSU SIGMA	66
	Appendix D Table 4. Correlation Coefficients Between Scores of Each Judge for First and Second Test	67

Table 5 Correlation Coefficients Among the Judges for First and Second Tests	68
Appendix E Explanation of Results to Preschools and Parents	69
BIBLIOGRAPHY	71

LIST OF TABLES

<u>Table</u>		<u>Page</u>
1	Means, Standard Deviations, and t-test Values for Males and Females, Age, and Group Identification	33
2	Chi-Square Analysis of Judges' Ratings on Each of the Nine Items as Performed by the Male and Female Children	36
3	Chi-Square Analysis of Judges' Ratings of Each Group and the Nine Items of the OSU SIGMA	39
4	Correlation Coefficients Between Scores of Each Judge for First and Second Test	67
5	Correlation Coefficients Among the Judges for First and Second Test . . .	68

ABSTRACT

This study was designed to examine the effect that physical education instruction had on the overall quality of basic movement patterns of three and four year old children: 1) enrolled in a preschool with a physical education program, 2) enrolled in a preschool with no physical education program, and 3) not enrolled in any type of preschool program. Assessment of the quality of basic movement patterns was accomplished by the utilization of The Ohio State University Scale of Intra Gross Motor Assessment.

This study defined preschool as a day care environment in which children attended three or more days per week and not less than four and one half hours per day. Basic movement patterns were defined as: walking, running, skipping, hopping, jumping, throwing, catching, kicking, and striking.

Descriptive statistics were computed for all variables: sex, age, preschool with a physical education program, preschool with no physical education, and no preschool enrollment.

Significant differences were revealed among the overall quality of basic movement patterns and the age of the children. The type of preschool involvement also had a significance. Those preschool children enrolled in a preschool with a physical education program generally were better performers. The sex variable was determined to have no significance among the nine items.

It was hypothesized that preschool age children may benefit from the early introduction to basic movement skills. These skills will be the building blocks for specific sport and dance skills which may later be used to participate in recreational activities.

CHAPTER I

INTRODUCTION

Quality early education serves as the foundation upon which subsequent educational tenets are built. Before any school age child learns to write, that child is first introduced to and then drilled on the components of the written language and the alphabet. Mathematical facts are first introduced to children by rote memory of sequential counting. From this point, progressions of arithmetical functions continue through recognition of the numerals and the corresponding quantities. With proficiency of understanding, the student is then directed to addition, subtraction, multiplication, division, and on to higher mathematical procedures.

Beyond the basis of the written language, the student is encouraged to explore the creative combinations that are possible with the language. Poetic or prose combinations are advocated so that mastery of combinations will be experienced.

Similar arguments are beginning to appear within the study of physical education. Researchers tell us that motoric abilities are developed qualitatively at an early age (Singer, 1968; Corbin, 1973; and Briggs, 1975). The

scope of the argument of growth and maturation versus learning is narrowing the boundaries as more and more interest is being generated for the preschool age child's introduction to movement.

"Good movers" are the result of the scope of movement experience to which they were exposed at an early age. An extensive repertoire of motor skills afford an individual a broad choice of activities in which that individual may choose to participate throughout life.

Purposes

The purpose of this study was to examine the effect that a physical education program had on the quality of basic movement patterns of preschool age children. Specifically, this study was designed to examine the basic movement patterns of three and four year old children:

1. enrolled in a preschool with a physical education program,
2. enrolled in a preschool with no physical education program, and
3. not enrolled in any type of preschool.

Definition of Terms

Physical Education Program. This study defined physical education program as specific instruction in

basic movement patterns not including free play.

Basic Movement Patterns. Basic movement patterns, as defined by this study, were the general pattern of movements employed for the fundamental skills of: walking, running, hopping, skipping, jumping, throwing, catching, striking, and kicking (Wickstrom, 1977).

Preschool Age Children. For the purpose of this study, preschool age children were represented by the range of ages three years zero months to four years eleven months at the time of the data collection.

Preschool. This study referred to preschool as a day care environment in which children attended three days per week or more and not less than four and one half hours per day as licensed by the Department of Social and Rehabilitative Services (SRS) of the State of Montana.

Motor Learning. Motor learning for this investigation was described by Sage (1977) to be a permanent change in motor performance resulting from practice and not influenced by maturation, motivation, or training.

Motor Development. Motor development was used in this study to refer to a procurement of competencies necessary for movement and the succeeding motor skill acquisition.

Null Hypotheses

The following null hypotheses were tested:

1. There will be no significant differences between the preschool age males and the preschool age females in the overall quality of motor performance,
2. There will be no significant differences between the three year old children and the four year old children in the overall quality of motor performance,
3. There will no significant differences among the three groups of preschool age children and the overall quality of motor performance,
4. There will be no significant differences among the male preschool age children and the female preschool age children and the performance of each of the specific movements patterns of the OSU SIGMA, and
5. There will be no significant differences among the performances of the three groups of preschool age children and each specific item of the OSU SIGMA.

Delimitations

This study was delimited to seventy-one preschool age children residing in Bozeman, Montana. Additional delimitations of this study were the calendar period March 13, 1980 to March 28, 1980 and the selected basic movement patterns identified by The Ohio State University Scale of Intra Gross Motor Assessment (hereafter referred to as OSU SIGMA).

Limitations

This study was limited by the quality of basic movement pattern instruction offered to the preschool age children within the physical education program. The researcher considered all of the preschools having basic movement instruction as a preschool with a physical education program.

The participants of this study were limited to the first twenty-five individuals satisfying the requirements for inclusion in each of the two preschool groups and the first twenty-one individuals satisfying the requirement of not being enrolled in a preschool.

Justification of Study

The increase in numbers of single parent families

and working mothers has directly effected the number of child care facilities in the United States. Individual states are becoming increasingly aware and involved in the establishment of guidelines for maintaining quality day care environments in which parents may choose to entrust the lives of their children.

Social, intellectual, and emotional domains of the preschool child are addressed in the directives of the governing body for the State sanctioned day care provisions. Suggestions for developing these areas of a child's experience offer a diverse background from which the young individual may grow and mature. The suggestions addressing motor skill development are broad and general. Individuals involved in providing for the early experiences of the young child are left to their own ingenuity relative to movement content.

Research into the value of skilled movement pattern acquisition is copious. Montessori (1964), Piaget (1970), Kephart (1971), Espenschade and Eckert (1980), and Corbin (1980) have addressed the positive worth of movement exposure in the early years of an individual's growth and maturation. In addition, movement is a crucial ingredient in the young child's understanding of and adjustment to

the world of people, places, things, and ideas (Corbin, 1973).

Cratty and Martin (1969) also purported that basic movement patterns are highly valuable in comprising an integral part of the individual's preschool years. However, there is a lack of concern by most individuals toward the development of a training program for the enrichment of motor proficiency in children (Singer, 1973).

As additional research is completed and made public, educators may become increasingly sensitive to the importance of movement training programs as vital components of preschool curricula. This study, then, may be of interest to directors of preschools and coordinators of governing boards for preschool curricula. Also, those individuals involved in the training of early childhood educators may use the results of this investigation to augment their course of study with the inclusion of basic movement patterns.

CHAPTER II

REVIEW OF LITERATURE

Ontogenetic versus Phylogenetic Skill Acquisition

Developmental theorists have proposed that all individuals within a species acquire certain motor patterns irrespective of the environment. Harrow (1972) described those skills of a human infant which virtually unfold without the benefit of teaching as: visual tracking, reaching, grasping, crawling, creeping, and walking. Connally (1970) used the term phylogenetic development to describe the above mentioned patterns of movement which are procured independent of learning. He explained the addition of phylogenetic abilities to be the essence of maturation.

Normal motor development has a morphological design to progress cephalo-caudally (from head to feet) and proximo-distally (from body's midline to the body's periphery). Time is the only variable inherent in the phylogenetically acquired talents (McClenaghan and Gallahue, 1978). Those abilities which were accomplished without the benefit of learning but as a function of time have been maturationally developed.

Singer (1968) and Corbin (1973) have described those

skills mastered as a result of teaching to be ontogenetically acquired. Singer (1968) purported that motor learning is usually independent of maturation. But practically speaking, maturation is related to the ability to learn. Learning and maturation are inextricably interwoven. Consequently, neither should be spoken of without reference to the other. Maturation is one factor that determines the individual potential for learning and learning defines the upper limits for performance (Singer, 1968).

Singer (1973) explained growth of an individual to be an increase of stature (height and weight) and the development of the individual to be the increasing structure and function. Singer further contended that the attainment of more complex skills (i.e. specific sport, dance, and recreational skills) and most behavioral patterns as identified by adult standards are principally the result of an interaction of maturation and experience.

McClenaghan and Gallahue (1978) supported Singer stating that an individual's biological timeclock is no longer a stable determinant of movement pattern procurement. They further fortified the argument for the relationship of learning and maturation by reporting; if an individual is deprived of environmental opportunities

and the development of mature patterns of movement is left to chance, the later proficient level of movement execution may be permanently impaired.

Growth, Maturation, and the Effects on Learning

Insufficient movement pattern experience may retard general physical development and most definitely will hinder more complex motor learnings (Harrow, 1972). In fact, many adults never achieve the mature level of execution of fundamental movement skills remaining at a very primitive stage of motor development throughout life (Halverson, 1966). Singer (1973) defined an individual's critical learning period as the level of maturation of the nervous system for any given activity of skill.

Corbin (1973) emphasized that the importance of an alertness to the critical learning periods of young children be understood in relation to their developing characteristics and abilities. He also stated that the movement ability and motor learning of the young child are woven together with growth and maturation. Consequently, planned movement experiences insure that the sensitive periods for motor learning will not be neglected (Herkowitz, 1977).

Age as a Motor Learning Variable

McCaskill and Wellman (1938), Godfrey and Kephart (1969), Harrow (1972), and Singer (1977) wrote that learning at any level will be facilitated if all relevant subordinate skills are present in the learner and that careful scrutiny must be given to the prerequisites of such learning. Their further contention was that the presentation of basic and complex skills should not be attempted until the child has acquired a readiness for such.

Flinchum (1975) declared that children do not transcend the same experiences simply according to chronological age, but rather according to critical learning periods or stages. Flinchum (1975) and Corbin (1980) agreed that there is probably no motor act that a child cannot learn by the age of six years and that generally, by this age, no new basic skills appear in the movement repertoire of children through adulthood. Rather, basic pattern development continues to improve.

Harrow's (1972) taxonomy for the psychomotor domain lists movement development in order, beginning with: reflex movement, basic movement, perceptual-motor development, physical abilities, skilled movement, and ending with creative movement. Flinchum (1975) suggested that perhaps

the optimal period for refinement of abilities through Harrow's third level, perceptual-motor movement, should occur during the first five years of life. Flinchum further contended that the preschool child is developing the basic movements upon which he or she depends for future development of motor skills.

Henry (1972) wrote that if the rate at which motor learning changes with age, the rate appears to become slower with increasing age rather than faster in older subjects. From observation, Halverson (1966), Cratty (1969), Corbin (1969), and Henry (1972) have written that the young child can do far more motorically than we know.

Sex as a Performance Variable

Noble, Baker and Jones (1972) expressed that two of the major variables effecting human learning and performance are sex and age. However, they reported that rarely is there any consistent superiority of one sex over the other at the preschool age level. Variations in performance appear to be directly correlated to the opportunity to experience, the number of siblings, and/or the number of peers which may influence performance patterns of children. Specific motivational processes which could be culturally different between the sexes

could lend itself to be considered another variable.

Herkowitz (1977) presented the proposal that cultural and social conditions may be offset if planned movement experiences are presented to the preschool age child. An early exposure to movement skills may eliminate difficulty in acquiring sport, work, and dance skills (Herkowitz, 1977). Goodenough and Smart (1938) suggested prior to Herkowitz's work that motor ability is dependent on a combination of variations: age, sex, size, strength, intelligence, and other traits. They suggested that the optimum time to examine the implications of variables upon the movement skill development appears to be during early childhood prior to social and cultural influences.

Evaluating Quality Motor Performance

When reference is made to formative evaluation of motor performance, an attempt is made to determine the degree to which a specific task is mastered.

Deficiencies in the learner should be noted in order to provide assistance toward a proficient level of skill execution (Singer, 1977). Conscious movement is best understood as movement skills and the majority of scientific studies agree on seven broad areas of movement that have been delineated as component elements of all movement:

coordination, agility, strength, flexibility, speed, balance, and endurance (Frostig and Maslow, 1969).

General types of movement activities are most beneficial during the early years of a child's education (Halverson, 1966). The analysis of these general activities is a way of assessing maturation of the child and is an important method of studying the total personality. Cratty (1973) argued that movement behavior is worthy of investigation but does not need to be related to physiological-anatomical processes which accompany that behavior. He cautioned that a comprehensive approach should be taken toward the study of motor performance.

Implications for Physical Education Instruction

The preschool child is a dynamic individual with spontaneous inquisitiveness and multiple physical abilities. Movement education for the young child may consist of free play in a guided, environmentally designed play area. Guided activities are not enough to provide the situation for movement training; the learning setting must be properly directed as well, for the motor skills are the young child's special tool for experimenting and expanding the environment (Flinchum, 1975).

Children are most receptive to motor exploration

during the infant and preschool period. Therefore, movement experiences must surely be an integral element of the education of the preschool age child (Briggs, 1975). Corbin (1973) concurred that movement experiences are important responsibilities of the preschool and elementary school teachers.

From Bloom's research, Singer (1973) summarized that the preschool age and early years are highly important in the development of learning patterns and general achievement. He continued with the information that few individuals are concerned with the special training programs oriented toward enhancing the motor proficiency of young children.

The inclusion of movement education as an integral part of the preschool and elementary program should receive prime consideration in the search for new approaches toward helping children attain optimal movement potential (Corbin, 1980). He wrote that it is absurd that our best physical education programs are at the college and high school level in light of what is known concerning the influence that motor development has toward the development of young individuals.

Effect of Instruction on Preschool Performers

New abilities should be introduced to the learner in such a way that the individual performs during practice the way the individual is expected to perform in an actual situation. Following this, there is no set way for instruction. The point is that motor activity should be emphasized in early learning, especially young learners.

Although form in executing skills is unique from individual to individual, generally accepted good form is usually associated with the outstanding athlete in a given sport. The desirability of molding a beginner in the style of the champion is open to scrutiny, certainly reasons may be provided for and against such a practice (Singer, 1977). Singer reasoned that molding an individual to the form of a champion did not permit the learner to develop a personal performance style. Blankenbaker and Davis (1975) argued that movement education is an individualized approach. Consequently, there is little concern for age levels of the children involved. Instead, the children work within their own capabilities and at their own rate of speed with little concern for measuring up to specific standards.

Dauer (1972) wrote that the maturity level of children has a direct effect on the choice of method

employed for movement experience presentation. He proposed that the lower the chronological age of the learner, the more prevalent the exploratory approach. He wrote that the program should offer a wide experience in movement, so that the child will move with ease, coordination, fluency, and versatility. He also challenged early child educators to encourage children to become aware of their movement possibilities, so that in time the children will be able to move skillfully and with confidence.

Children should develop a movement vocabulary of basic skills to serve as a foundation for the more complex sport, dance, and recreational skills. The motor activities of the child become more important not only for their own sake, but for the contribution which may be made toward more complicated activities the individual may be required to perform later (Godfrey and Kephart, 1969).

Godfrey and Kephart (1969) also stated that when describing individual movement patterns and the elements and deviations pertinent to each pattern, primary consideration ought to be given to individual variability of execution. They reported that variability in an executed movement pattern referred to: change of pace, alteration to meet external environmental conditions, and the general

tenor of performance.

Movement educators need to be aware of and properly diagnose incomplete motor development early enough to correct inappropriate movement (Halverson, 1966). Halverson also stated that the purpose of using detailed information about the mature form of execution in the study of the child's movement is not to force one to conform to a pattern but rather to observe what the child does do at various developmental levels. It seems certain, according to Halverson, that with appropriate environmental stimulation and additional motor experiences, increasing numbers of children could reach first grade at mature levels of basic movement patterns than now may be true. Singer (1977) supported Halverson when he wrote that the potential role of physical education for the development of basic movement patterns in young children is virtually untapped.

Intellectual Gains from Early Movement Instruction

Previous early child developmentalists, Piaget (1970) and Montessorri (1964), were principally concerned with the contributions that motor skills made toward enhancing the learning process of cognitive skills. Concern of these theorists did not include motor abilities beyond the

contributions each had on the subsequent intellectual maturation during the preschool years.

Dauer (1972) stated that physical education can do more than develop the cognitive processes of the young child. It can show individuals how to learn. Ward (1975) reported that many educators believe that a quality preschool motor experience can provide readiness skills for much of the future learning, cognitive and motor.

Ward also wrote that intellectual development was, at least partially, dependent on motor development and recognized that motor activity was an important factor of perception. She further pointed out unless a child has adequate mental stimulation during the preschool years, the next ten years of school work may be wasted. With this implication, she challenged early childhood educators to become involved in movement experiences as a part of the curriculum for the preschool child.

Godfrey and Kephart (1969) fortified Ward's statement with the argument that preschool education culminates in a large number of skills, attitudes, and knowledges. Many of these abilities will be required as the framework for the later activities that the public school will later present.

Summary

The physical environment is experienced both through the senses and by active manipulation. It would be incorrect to assume that most children will develop efficient and mature patterns of movement without some form of instruction. Harrow (1972) reported that the reflexive movements of an individual will evolve regardless of experience. Beyond that, mature basic movement patterns are the result of carefully planned learning.

McClenaghan and Gallahue (1978), Corbin (1973), and Singer (1968) have written that an individual's timeclock is no longer to be considered a sole determinant of movement pattern development. They concurred that the acquisition of movement patterns is an interaction of growth, maturation and learning. They also contended that if an individual is deprived of motor experiences, the later proficient level of execution of said skill may be permanently impaired.

McCaskill and Wellman (1938), Godfrey and Kephart (1969), and Singer (1977) stated that specialized sport and dance skill procurement will be facilitated if the subordinate skill requirements are evident in the learner. The motor skills acquired during critical learning periods

of an individual are more easily accomplished than the chronological age at presentation.

Performance differences between male and female children have been reported to be related to the socialization processes (Corbin, 1973). By creating planned movement experiences, educators of preschool and elementary school age children may help to alleviate social and cultural implications of motor skill execution. Early and qualitative guidance of basic movement patterns may provide individuals with the background to further build sport, dance, work, and recreational skills in order to remain active and energetic throughout one's life.

CHAPTER III

METHODOLOGY

The purpose of this study was to determine the effect that a physical education program had on the quality of basic movement patterns of preschool age children. The method in which the preschool children were assessed is presented in the following order: 1) selection of subjects, 2) instrumentation, 3) OSU SIGMA, 4) administration, and 5) analysis of data.

Selection of Subjects

A listing of licensed preschools operating within the city of Bozeman, Montana was obtained from the Community Coordinated Child Care Office (hereafter referred to as 4-C's). The researcher contacted those listed and made arrangements with the administrators to involve the three and four year old males and females as study subjects.

The 4-C's office also published a listing of day care home providers which supplied the researcher with three and four year old children not enrolled in a preschool for inclusion in this study. Permission for participation was obtained from the day care providers who made appropriate contact with the individual parents (appendix A).

It was determined by verbal conversation with the

administrators that the children had been enrolled in their respective program for at least three months.

The total number of individuals participating in this study was seventy-one: twenty-five children enrolled in a preschool with a physical education program, twenty-five children enrolled in a preschool with no physical education program, and twenty-one children not enrolled in any type of preschool program as licensed by the State of Montana.

Instrumentation

The instrument used in the qualitative assessment of basic movement patterns of preschool age children was The Ohio State University Scale of Intra Gross Motor Assessment (OSU SIGMA). The OSU SIGMA was employed to determine the level of proficiency of gross motor abilities, propulsion, and retrieving skills.

The Ohio State University Scale of Intra Gross Motor Assessment

The nine selected items of the OSU SIGMA: walking, running, skipping, jumping, throwing, catching, kicking, and striking (appendix B) were selected and utilized from the tool. Stair and ladder climbing were eliminated as items since these items were not deemed appropriate to

this particular study.

All of the items comprising the OSU SIGMA have been designed for administration to preschool age children and/or children classified as learning disabled. Verbal comprehension was not a variable to be considered in the selection of this instrument. The task instructions to the participants were limited to the phrases: "Hit the ball as hard as you can" (striking), "Throw the ball as hard as you can" (throwing), "Catch the ball" (catching), "Kick the ball as hard as you can" (kicking), "Jump as far as you can" (jumping), "Hop as high as you can" (hopping), "Run as fast as you can" (running), and "Skip as far as you can" (skipping). The simplicity of these statements does not require an extensive understanding of the language. In addition to the simplistic verbal instructions, the researcher was able to further clarify the directions by the use of visual demonstration of the various skills.

The reliability for each of the items of the instrument of this investigation were stated in terms of intra and inter-scorer reliabilities. Following are those values listed with the intra-scorer value first, then the inter-scorer value: walking, 1.000 and 1.000; running, .750 and .583; hopping, .666 and .666; throwing, .916 and

.750; catching, .916 and .916; jumping, .666 and .583; kicking, .750 and .666; striking, .833 and .833; and skipping, .916 and .833 (Loovis and Ersing, 1979).

Administration

Pilot tests were completed by the researcher under the supervision of Ms. Barbara E. Miller, instructor of Physical Education at Montana State University, Bozeman, Montana. Miller has had extensive exposure to and use of the OSU SIGMA during her involvement in the Bureau of Education for the Handicapped Physical Education Project for the Exceptional Individual. Ms. Anne K. Olson was also exposed to the execution of the OSU SIGMA under the supervision of Miller.

Administration of the OSU SIGMA was completed in Romney Gym on the Montana State University campus. Each of the seventy-one children had their individual performances recorded on a Sony Video Tape Recorder which was operated by a trained member of the Health and Physical Education staff at Montana State University. The investigator gave all instructions to all the subjects maintaining a consistent testing environment.

Following the administration of the OSU SIGMA, the researcher, Olson, and Miller were engaged in the

observation and scoring of the performances using video play back. Each of the judges simultaneously viewed the video tapes and individually determined the level of proficiency, as defined by the guidelines of the OSU SIGMA (scoresheet, appendix, C).

One week later the judges reviewed the video tapes in order to determine if any significant differences existed between the judges' first and second observations (called intra-reliability). The values of the judges are: judge 1, .7258; judge 2, .6818; and judge 3, .8997. Relationships were established among the three judges' ratings determining inter-judge reliability. Inter-reliability values for judge 1 to judge 2 was .864, judge 1 to judge 3 was .873, and judge 2 to judge 3 was .851 (inter and intra reliability values, appendix D).

The identification variables were not disclosed to Olson or Miller prior to the assessment of the skills. The researcher judge was aware of the identifiers prior to and during the assessment. The high relationship of statistical values supported the non-biased observation of the researcher judge.

Analysis of Data

Each of the nine items of basic movement patterns

had a maximum value of four and a minimum value of zero. A score of four delineated the most mature form of performance. Conversely, zero represented no activity; a score of one signified the most immature pattern of the specified skill; two signified a more mature form than that of score one; and a value of three was a level of execution quite similar to but still less mature than that of four.

The total of each of the subject's scores had the possibility of ranging from zero to 108. The three judges' scores were used to determine the summed total for each individual participant. These totals were then analyzed by the Sigma Seven Computer with Dr. Al Suvak of the Testing and Counseling Office of Montana State University supervising the programming. The following programs were used:

1. t-test--a subprogram to determine if significant differences existed between the mean scores of:
 - a) the male and female sample, b) the three and four year old children, and c) each of the three groups of preschool age children of this study;
2. CHI-SQUARE--a subprogram to analyze the significant differences of the variances which may have existed among the male and female preschool age children for each of the items of

the OSU SIGMA, and the three groups of children and the nine specific items of the OSU SIGMA.

Hypotheses 1, 2, and 3 were tested by subjecting the raw data to the t-test program. Hypotheses 4 and 5 were tested by subjecting the raw data to chi-square analysis. All null hypotheses were tested at the .05 level of confidence.

For purposes of clarity, the preschool with physical education instruction will be referred to as group 1, the preschool with no physical education instruction will be referred to as group 2, and group 3 will refer to those preschool age children not enrolled in any type of preschool.

Following the analysis of data, a letter of explanation was written to parents and the administrators of the participating preschools (appendix E).

CHAPTER IV

ANALYSIS OF RESULTS

The purpose of this study was to determine the effect that physical education instruction had on the quality of basic movement patterns of three and four year old males and females enrolled in a preschool with a physical education program, enrolled in a preschool with no physical education program, and preschool age children not enrolled in any type of preschool program. Descriptive statistics were computed for all the variables: age, sex, and preschool enrollment or no preschool enrollment.

This study defined group 1 as those children enrolled in a preschool with a physical education program, group 2 as those children enrolled in a preschool with no physical education program and group 3 as those children not enrolled in any type of preschool program.

Descriptive Statistics

The preschool children participating in this study showed no significant differences between the sex of the individual and the overall performance of the skills of the OSU SIGMA. There were significant differences between the ages of the children and the quality of motor performance.

The four year old children performed significantly better than the three year old children in the overall performance of basic movement patterns.

The children of group 1 executed the skills of the OSU SIGMA significantly better than the children of group 2 and better than the children of group 3. There were no significant differences between group 2 performance and group 3 performance.

An examination of the specific skills of the OSU SIGMA as performed by the males and females revealed that significant differences did exist between the ability to skip and the sex of the performer. Females were capable of skipping at a more mature level than the males. Sex of the performer also had an effect on the quality of striking ability. Males were significantly better strikers.

No significant differences existed between sexes and the remaining seven items: walking, running, hopping, jumping, catching, throwing, and kicking.

Walking, jumping, and kicking revealed no significant differences among the three groups of preschool age children. There were significant differences in the overall ability of skipping and catching which were executed significantly better by group 1 than either group 2 or group 3. The

individuals of groups 1 and 2 were better performers than those individuals of group 3 in the skills of running and striking. Throwing was executed better by the children of group 3 than by either group 1 or group 2. Hopping was performed significantly better by the individuals of groups 1 and 3 than the individuals of group 2.

Hypothesis Testing

The results of the hypothesis testing of this study will be presented according to the following format:

1. Statement of Hypothesis,
2. Description of statistical method of analysis,
3. Interpretation of test statistic,
4. Results of statistical analysis, and
5. Interpretation of test statistic.

Hypothesis 1

There will be no significant differences between the preschool age males and females in the overall quality of motor performance.

This hypothesis was subjected to t-test analysis. The t-test values revealed any differences that may have occurred between the sex of the performer and the quality of the OSU SIGMA skills.

The results of the hypothesis testing are presented in

Table 1 (\bar{X} for males was 24.89, \bar{X} for females was 25.06, and the t-test score was .380). Since the computed t, .380, was below the critical value of 1.96, the null hypothesis was not rejected. It was concluded that no significant difference existed between sex and the overall quality of basic movement pattern performance.

Hypothesis 2

There will be no significant differences between the three year old children and the four year old children in the overall quality of motor performance.

This hypothesis was subjected to t-test analysis. The t-test value revealed any differences that may have occurred between age and the quality of motor performance.

The results of the hypothesis testing are presented in Table 1 (\bar{X} for three year olds was 23.93, \bar{X} for the four year olds was 26.11, and the t score was 5.23). Since the computed t, 5.23, was above the critical value of 1.96, the null hypothesis was rejected. It was concluded that a relationship did exist between the quality of movement patterns of three and four year olds. The four year olds were better performers.

