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THE EFFECTIVENESS OF PARENTS AS TUTORS FOR CHILDREN
WITH GROSS MOTOR SKILL DEFICIENCIES

By

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ABSTRACT

THE EFFECTIVENESS OF PARENTS AS TUTORS FOR CHILDREN WITH GROSS MOTOR SKILL DEFICIENCIES

By

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The purpose of this study was to determine the effectiveness of parental involvement in the remediation of basic motor skill deficiencies in children through programs implemented in the home. Children ranging in age from five to eight years were screened for deficiencies in the performance of selected basic motor skills. Ten of the forty-seven parents who gave permission for their children to participate in the study volunteered to serve as tutors in the study. Children of these volunteer parents were assigned to a parent tutored experimental group, while the remaining children were randomly assigned to an experimental group taught by a physical education specialist or to a control group.

The three treatment groups differed in the type of instructional intervention employed. Children in the parent tutored group received one hour of basic motor skill instruction from their parents each week. Parents met with a specialist in physical education to learn principles and techniques of the teaching-learning process for motor skill acquisition. Children in the specialist taught group received instruction in small groups twice a week for half an hour. The third group was a

control group which received no additional motor skill instruction outside of that provided by the classroom teacher.

The performance of each child was recorded on 8mm film before and after a treatment period of fourteen weeks. Separate analyses were performed for data based on developmental stages and for data expressed as subroutines. The subroutine analysis was conducted in the event a child improved in performance without advancing to the next developmental stage of a skill. All scores within each set of data were standardized and then summed to form a composite score. Analysis of covariance using the pretreatment scores as the covariable was the test statistic used for both analyses. All hypotheses were tested at the .05 level of confidence. The overall hypothesis tested was that there were no significant differences among the three instructional groups. The hypothesis was rejected ($p < .001$) indicating that there was an instructional effect on children deficient in basic motor skills.

In addition to the overall hypothesis, three secondary hypotheses were proposed:

1. The motor skill development of children instructed by their parents did not differ from that of children instructed by a specialist in physical education. This hypothesis was rejected, instruction by a specialist resulted in significantly greater ($p < .001$) development of basic motor skills.
2. The motor skill development of children instructed by their parents did not differ from that of children receiving no additional instruction in motor skills. Judgment was reserved for this hypothesis due to the lack of sufficient power of the test to detect a significant difference.

3. The motor skill development of children instructed by a specialist in physical education was greater than that of children receiving no additional instruction in motor skills. This hypothesis was supported.

The question regarding the effectiveness of parents as tutors for children with basic motor skill deficiencies has not been resolved. Further research involving a larger sample size and a greater delineation of variables is needed. This study does indicate that children with motor skill deficiencies can improve their development through instruction by a specialist in physical education.

To My Family, Friends
and All The Children

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Chapter 1

INTRODUCTION

A major factor contributing to the learning problems of children is the lack of experience resulting from an inadequate environment (23) (30). Without an environment that permits sufficient practice, basic skills that are required for the subsequent learning of more advanced skills either do not develop at all or develop only to immature levels (13) (30). Thus, the nature of the environmental stimuli and the conditions under which they occur have a direct influence on the ability of a child to respond effectively when the same pattern of stimuli and conditions reoccur in the environment (12).

Early intervention has been recognized as an effective means for preventing some of the serious educational problems confronting children (25) (45). However, in situations where early intervention was not possible, enrichment programs have been used successfully to develop compensatory behaviors for existing inadequacies. The school is undoubtedly the most appropriate agency for providing such compensatory programs. Unfortunately, it does not always have adequate staffing, time or financial resources to do so (13). Thus, school aged children with learning problems may not receive the individualized attention they need. Under such circumstances, other alternatives must be made available.

One alternative to the lack of individualized attention within the school is the development of compensatory programs that can be implemented by parents in the home. There is support for the view that remedial education should begin in the home, since this is where the child receives some of its most important education (19) (28). The home not only provides the initial learning environment for the child, but it also supplements the educational experiences provided to the child by educational agencies in subsequent years (53) (54) (62). Todd (54) emphasizes that parental influence during the first five years of life is the ultimate in individualized instruction.

Although parents are considered by many to be the child's first and most important teachers (50) (64), some parents have been led to believe that they lack the ability to help their children learn (51). The Head Start project began on the premise that children should be rescued from the influence of their parents. Many parents have the impression that they cannot be or should not be teachers of their children (20). Indeed, some parents are not acquainted with the processes, techniques and principles required to teach their children (13) (28). However, this does not mean that the parents cannot learn to do so. Strom (50) has shown that parents can change their self-concept as teachers and their knowledge of the teaching-learning process. In the Home Start program, the goal was changed from one of overcoming family influence to that of enlisting family support (50) (51).

If the view is taken that parents have an obligation to teach their children, then perhaps the schools should accept the responsibility of providing services so that parents may learn how to teach their children effectively (13) (51). One way to provide such services

is by expanding the definition of inservice education to include parents (51). The success of this approach depends upon improved communication between parents and the schools. Some teachers are indifferent to parents as educators because they are of the opinion that teaching and learning are sole prerogatives of the school (64). For effective learning to occur, teachers must understand the importance and role of parents, just as parents must understand the importance and value of the instruction that takes place within the school (59).

A program in which parents serve as tutors could overcome some of the problems imposed by the lack of specialists, time and funds, especially in the area of basic motor skill learning. Even when physical education is included in the elementary school curriculum, it is not always conducted by a specialist in physical education. Frequently, specialists in physical education are assigned to teach at two or more schools. Consequently, their services are often provided to the classroom teacher and not directly to the children. Thus, children with gross motor dysfunction may fail to be identified or, if identified, may not have the opportunity to learn motor skills from a teacher who specializes in remedial motor education. The specialist in these cases may be most helpful by educating the parent to tutor the child in the improvement of basic motor skills.

Purpose

The purpose of this study was to determine the effectiveness of parental involvement in the remediation of basic motor skill deficiencies in children through programs implemented in the home.

Nature and Scope of the Study

This study was designed to determine if tutoring by parents is an effective method for teaching children with deficiencies in the basic motor skills. The hypothesis tested was that instruction by parents has no effect on the development of basic motor skills. Teachers of kindergarten, first and second grades from six elementary schools¹ within the Lansing Public School District in Lansing, Michigan, volunteered to assist with the study. Children ranging in age from five to eight years whose parents had given their permission for them to participate in the study (see Appendix A) were screened for basic motor skill problems. The screening instrument used (see Appendix B) provided qualitative and quantitative information concerning the stage of development for six motor skills; throwing, catching, running, hopping, skipping and jumping.

Children were eligible for participation in the study only with the written consent of their parents. Letters were sent to parents of children with motor deficiencies (see Appendix C) requesting the participation of the children and their parents in the study. Only a portion of the parents who gave permission for their children to participate in the study volunteered to participate in the study as tutors. Children of these volunteer parents were assigned to a parent tutored experimental group, while the remaining eligible children were randomly assigned to an experimental group taught by a specialist or to a control group. The groups differed in the type of intervention employed.

¹Maple Grove, Gunnisonville, Cavanaugh, Forest View, Genesee and Post Oaks elementary schools.

- A. Children in one group received instruction from their respective parents. The parents met with a specialist in physical education once a week for the first half of the study and every other week during the second half of the study to learn principles and techniques of the teaching-learning process. They tutored their own children in basic motor skills for sixty minutes each week.
- B. The children taught by the specialist received extra instruction in small groups during the regular school hours. The specialist in physical education taught the children basic motor skills twice a week for a total of sixty minutes.
- C. The control group did not receive any additional instruction in basic motor skills either inside or outside of the school setting. In school, children from all three groups participated in activity sessions conducted by their respective classroom teachers.

In addition to the overall hypothesis that instruction by parents in motor skills has no effect on the development of basic motor skills, three secondary hypotheses were proposed.

- 1. The motor skill development of children instructed by their parents did not differ from that of children instructed by a specialist in physical education.
- 2. The motor skill development of children instructed by their parents did not differ from that of children receiving no additional instruction in motor skills.
- 3. The motor skill development of children instructed by a specialist in physical education was greater than the

development of children receiving no additional instruction in motor skills.

Limitations

This study was subject to several limitations. The subjects constituted an available sample from the Lansing Public School District, Lansing, Michigan. Thus, the results are generalizable only to other children with similar characteristics within the five to eight year age range. The results are limited to the basic motor skills of throwing, catching, running, hopping, skipping and jumping. Stages and sub-routines for each skill provided ordinal levels of measurement. The assumption was made that changes from one stage to another stage or from one subroutine to another subroutine were of equal importance and of equal value. The results of this study are therefore subject to the limitations of these assumptions.

Definitions

Basic motor skill¹--a movement which involves two or more body segments for the purpose of transferring or receiving the body or some external object, i.e., running, jumping, throwing, catching.

Learning--a process by which behavior is initiated or modified through practice.

Mature pattern--a combination of subroutines that allows for maximum efficiency in the performance of a skill.

¹Modified from a definition developed as part of the Motor Performance Study at Michigan State University, East Lansing, Michigan.

Motor development¹--a study of the variations in motor behavior which occur as the result of an interaction between a physiologically changing individual and the environment.

Stage²--a level of development within a basic motor skill distinguished by specific coordinations of the various body parts.

Subroutine--a specific coordination of a body part or parts characteristic of a level of development.

¹Definitions developed as part of the Motor Performance Study at Michigan State University, East Lansing, Michigan.

²Modified from a definition developed as part of the Motor Performance Study at Michigan State University, East Lansing, Michigan

Chapter 2

REVIEW OF THE LITERATURE

There is little available information about programs that involve parents for enhancing the motor skill development of children with gross motor deficiencies. Most of the motor programs that have been implemented do not include techniques or teaching principles that are useful to parents as tutors. This also is true for other areas of development such as reading, speech and language. After a review of the literature, Freeburg (15) found little evidence that parents use specific instructional techniques even for the development of cognitive skills in young children. However, since the work of Freeburg in the late sixties, there has been an increase in the number of programs involving parents as tutors in various curricular areas.

The review of the literature will focus on the following topics: (1) the need for early intervention to circumvent the effects of learning disabilities, (2) the effectiveness of compensatory motor programs, (3) the effectiveness of programs of parental involvement in other subject areas, (4) factors that influence parent-child interactions, and (5) characteristics of children with learning problems.

Early Intervention as a Preventive Measure

Programs of early intervention have served as effective measures in preventing more serious learning problems (22) (23) (25) (53) (54) (62). Bensen, et al. (4) maintain that children should receive parental help through school programs on early childhood education that are designed specifically to assist parents in becoming more efficient teachers. It was emphasized that disadvantaged children are not exposed to appropriate stimuli for the development of basic learning skills. Scott (45) also advocated a richer environment with more varied experiences for children. Wall and the staff at Maury School (58) conducted a program of weekly conferences and home visits so that both parents and teachers could learn the importance of the role of each in the development of learning skills in children. Thus, the need for early intervention and for cooperation between parents and school personnel are essential if the learning problems of children are to be avoided or minimized.

Motor Programs

Few motor programs have been implemented for the purpose of remediating motor skill learning problems. Most motor programs have been initiated in an attempt to improve cognitive processing. The programs of Kephart (30), Barsch (40), Getman (55), and Delacato (36) are examples of those that include a motor curriculum and suggestions for the remediation of motor skill deficiencies. However, the central purpose of these programs is the attainment of higher mental processes through the development of motor and perceptual systems (36) (42). Gould, Henderson and Scheele (21) reported a visual-motor-perception program based on Piaget's theory. The underlying theory was that the

development of vision is determined by sensory-motor experiences. It was implied that a direct relationship existed between the variety of sensory-motor experiences and the development of cognitive structures. Yet, in spite of programs such as those cited above, there is little empirical evidence to suggest that motor skill learning is necessary for developing higher mental processing abilities.

Another purpose of motor skill programs is to contribute toward the social development of children. Golick (19) emphasized the role of motor skills in social development by pointing out that without the skills acquired through play children cannot "join the gang."

Only a few studies have focused attention on motor difficulties as a learning problem that warrants a program of remediation (9) (40). Chrietzburg (9) demonstrated that mothers have an influence over the motor performance of their children during the early years (29 1/2-40 1/2 months). She indicated that skill level, cooperation and frequency of performance all increased as the child imitated a greater proportion of the mother's modeling. Olson (38) found that a supplementary physical education program significantly improved the motor skill performance of children who were deficient in selected motor skills in grades one, two and three. The skills tested were the jump and reach, zig zag run, throw and catch, and kick. Eighty-five children were divided into four groups, two experimental (with and without instruction) and two control (children with deviant behavior and those with normal behavior). All groups improved significantly ($p < .05$), suggesting that improvement in motor performance was related to chronological age. After the supplementary program, both experimental groups performed significantly better than the group with deviant behavior.

Gains made by both experimental groups brought them to the level of the control group with normal behavior. On the final test for retention, the experimental group with instruction was still not significantly different from the normal control group. It was concluded that for children with motor skill deficiencies, a supplementary program with instruction appears best for the improvement and retention of gross motor skills.

Modeling has been effective in improving the performance level of children. Modeling techniques have been used both directly and indirectly. Chrietzburg (9) demonstrated that as children imitated a greater proportion of available modeling behavior their skill level, cooperation and frequency of performance increased. Golick (19) acknowledged the importance of games such as "catch" and "jump rope" in promoting play skills. Here, again, the medium for learning was the imitation of behaviors modeled by the participants during play.

Skill analysis has been shown to be an effective approach in teaching children low in motor skill performance. A supplementary physical education program conducted by Olson (38) provided instruction fifty minutes per day, five days a week for six weeks to primary grade children whose performance in selected motor skills was low. An instructional group that received demonstrations, skill analysis and verbal instructions was more effective on tests of retention than a comparable group without instruction. Goldsmith (17) provided a program of activity, including some instruction, for a group of ten year old boys who were neurologically impaired. The program goal was to execute basic locomotor skills with rhythm and ease. The provision of activity alone was not sufficient to achieve this goal. It was necessary to

return to the developmental stages and to teach basic motor skills. These results indicate that neurologically disturbed children younger than ten years of age would benefit from instruction in basic motor skills.

Mothers have been shown to be effective instructors of children when the content to be learned involved motor skills. Chrietzburg (9) demonstrated a positive relationship between skill level and information provided by the mother. The children of mothers who provided more information about the quality of a child's performance were more proficient. Even though the age range in Chrietzburg's study was below that used in the current study, it is logical to assume that the principles of modeling and the provision of qualitative information would also positively effect skill acquisition beyond this age range.

The literature on motor skills indicates that motor learning programs do not contribute significantly to academic skill development. However, the teaching of motor skills for the purpose of improving motor skill efficiency is a justifiable and logical approach (60). Methods of modeling and the provision of qualitative information to the child have been effective procedures when used by parents in the teaching-learning process.

Reading Programs

Some of the literature on reading programs has addressed the question of whether or not reading should be taught in the home. Todd (54) pointed out that the process of learning how to read may already begin in the home. He stressed the motivational aspects of a child wanting to prepare for school in order to avoid disappointment. On the

other hand, Peck (41) viewed the family as having the potential to undermine the remediation efforts of the school. He described families of children with reading problems as being closed systems, the elements of which defend against change and growth in individual members. The efforts of the school can be ignored and defeated by the family if the influence of the home is overlooked by the school. An awareness of the family's potential role in the child's reading ability is essential.

One of the difficulties encountered in reviewing studies dealing with parent involvement in reading programs for children was the failure of investigators to subject the data to statistical analysis. Otto (39) described the PAL (parent assisted learning) program for reading in which a regular daily schedule of activities was encouraged unless the child was having an "off day." Seventy-four children were in the program but no data were reported. Duncan and VonBehren (14) initiated a reading program called "Pepper" where parents of second grade children in low socioeconomic neighborhoods tutored their children at home. The scope of the program was limited to word drills and practice in oral reading. The reason given for the limited scope of the program was to avoid frustration on the part of the children. Daily activities were conducted for fifteen to thirty minutes with a new activity each session. Numerical gains after twenty weeks were greater in word and paragraph meaning for the "Pepper" group than for the control group. Unfortunately, no statistical analysis was made of the data, therefore limiting their value.

Small sample sizes were another problem encountered in reviewing studies of reading programs dealing with the relationship between parental involvement and the retention of learning material.

Koven and Lebow (31) worked with the parents of three children to help correct the reading and spelling inadequacies of their children. They used a procedure whereby a reading program and a spelling program were first taught to the mothers. The programs then were introduced to the children by the investigator. Subsequently, the mothers were responsible for conducting the sessions. Initially, the mothers taught under supervision. Later they taught alone while maintaining phone contact with the investigator. The three male children, seven to eight years of age, showed improvement with good retention after two months.

Parents have assisted in helping children develop complex reading behavior patterns. Ryback and Staats (43) had parents use methods that had been successfully established by supervisory personnel. Four children selected from a sample population of poor readers were pretested and then posttested after twenty sessions with their parents (5-7 month period). Parents were instructed in the use of a token-reinforcer system. They received detailed explanations on the administration of procedures and data collection. Direct supervision was provided the first few weeks and then phased out. Subsequently, half-hour group meetings on assigned weeks were held. The results indicated that the children covered a lot of reading material, learned to read a large number of new words both in and out of context, and retained a good proportion of the learned material.

Motivation is an important consideration for programs based in the home. There are various forms of motivation; however, rewards are the form most commonly used in the education of children. Otto (39) used rewards and encouraged a regular daily schedule of activities unless the child was having an "off day." Activities were discouraged

during an "off day" because of the tendency for motivation levels to be too low for effective learning to occur. Duncan and VonBehren (14) had parents keep a monthly calendar of progress made on word drills and oral reading as a motivational technique. They also limited the scope of the program to avoid frustration and had a new game for each session. The mothers in the Koven and LeBow (31) program used a behavior modification strategy for rewarding correct reading and spelling responses with tokens that were redeemable for objects. The three children participating in the program showed improvement with good retention after two months.

Remedial reading programs have varied widely in the extent of participation and responsibilities of the parents involved in them. Parents have been required to record the child's progress (14) (39), use rewards (31) (39), observe correct responses (31) (39), conduct drills (14), supervise practice (14) and learn previously established programs (31) (43).

In summary, the literature on reading programs involving parents demonstrates the positive role that parents can have in the teaching-learning process for children with learning deficits. The studies indicate that it is beneficial for a skill (reading) to be analyzed into its component parts for use by parents in tutoring their children with deficits. The programs involving parents in developing the reading skills of children were characterized by parent supervision and the use of structured techniques in the teaching-learning process. However, the relative contribution of some reading studies was limited by small sample sizes or the failure to subject the data to statistical analysis.

Speech Programs

The end product of speech is a motor response. Perhaps the data from speech programs have greater application to basic motor skills than those from either reading or language because speaking is largely a motor skill. The literature on speech programs helps to establish the necessity of teaching and to define various types of teaching methods.

Parents who attended and then reinforced therapy sessions given by a speech clinician helped their children improve to a greater degree than parents who completed assignments sent to the home. Fudala (16) hypothesized that if parents attended speech sessions with their child and practiced at home to reinforce the work of the clinician, speech would be improved faster and would be more permanent than improvements without the added practice. Ninety-two children with nonorganic disorders were divided into a control group and an experimental group. Parents in the control group did not attend sessions but had regular daily five-minute assignments that were completed in the home. Periodic telephone conferences provided information on the children's progress. If no telephone was available, written reports were sent to the parents by the investigator.

Parents in the experimental group were divided into two subgroups depending upon whether they attended once a month or once a week. The clinician worked with two children at a time. The children were grouped according to the frequency of their errors, grade level (first to fifth grades) and sex. Twenty-five minute sessions were conducted once a week for one semester (16 weeks). Mothers and/or fathers attended the sessions. Mean improvement scores compared by t-test

showed that the attendance of parents at sessions was related to improvement in their child's speech. There was no significant difference between the improvement scores for the group attending once a week and the group attending once a month. Fudala hypothesized that the improvement made by the children who only worked with the clinician would be more permanent, but retention was not measured. An evaluation of the parent's participation showed that parents believed they had learned a great deal and would continue the program.

Mothers, "trained" either individually or in groups, function more effectively as speech tutors than do "untrained" mothers. Sommers (48) investigated the effectiveness of mothers trained to aid in speech correction. Questions were answered, specific suggestions were given and home assignments were provided to all the mothers during daily contacts with the speech clinician. Each contact was two minutes or less in duration. Mothers who were trained had fifteen minutes of lecture, fifteen minutes of discussion, fifteen minutes of observation and five minutes of demonstration each day. The material used by the mothers was obtained from written articles. The results pertaining to the improvement of articulation showed that the groups with trained mothers made significantly greater progress than the groups with untrained mothers. In addition, children with normal intelligence improved more than the slow learners. Both findings were independent of the type of training the mother received from the clinician in school. Group and individual instruction was equally effective.

Instruction by "trained" parents sometimes can be as effective as instruction by a speech therapist. Tufts and Holliday (56) investigated the effectiveness of using trained parents as speech therapists

for the improvement of articulation problems in children four to six years of age. Three groups were compared: (a) a maturational control group which received no instruction in speech correction, (b) a group instructed by a therapist, and (c) a group instructed by parents. All sessions lasted twenty-five weeks. The group taught by speech therapists met for half an hour twice a week and focused on individual speech errors. The group instructed by parents met once a week for an hour during which the first half hour was devoted to instruction in the fundamentals of correcting articulatory problems and the second half hour was spent in group discussion of problems affecting their children. Analysis of variance showed improvement to be dependent upon instruction. Subsequent analysis indicated that there was no significant difference between the groups who had been taught by parents or the speech therapist. In other words, the improvement made by the group taught by parents was not significantly different from the improvement made by the group taught by the therapist. Parents who understand the process and methods for correction can be adequate teachers for children with moderate articulation problems.

In summary, parents "trained" in speech therapy provide more effective instruction to their children for the remediation of speech problems than do "untrained" parents. The performance of parents trained in groups was as effective as that of parents trained individually in remediating the speech problems of children. The more completely the processes and methods for correction are understood by the parents the more effective is their instruction, even to the point of being as effective as that of a speech therapist.

Language Programs

The literature on language also supports the view that parents can learn to implement the teaching-learning process for the benefit of their children. The children of parents utilizing teaching-learning principles have gained in self-control and have acquired skills specific to the area of instruction.

Parents can learn about the teaching-learning process while helping their children to improve their language skills and self-concepts. Strom (50) reported on a play curriculum for the improvement of language and self-concept. Two inventories were used for the evaluation of self-concept. One inventory evaluated the parent as a teacher and the other evaluated the child as a learner. The program was based upon the principles of reinforcement and reward, both of which were provided by the parent. Children in the program made significant gains in word recognition, understanding and elaboration. The parent's knowledge of the teaching-learning process also changed significantly. In addition, the parent's self-concept as a teacher and the child's self-concept as a learner were influenced significantly.

Providing an instructional process for language development is a successful technique for the preparation of parents as tutors. Vukelich (57) worked with the mothers of thirty-four Head Start children to help them acquire a process through which they could further the linguistic development of their children. The parents provided their children ten minutes of instruction daily. Comparisons were made to two other groups, one in which college students initiated conversations with the children for ten minutes and a second that participated only in a Head Start program. The parent group showed significantly greater

improvement than either of the other two groups on the visual association subtest of the ITPA and significantly greater improvement than the student assisted group on two other subtests of the ITPA as well as the Peabody Vocabulary test.

The progress of children is specific to the areas on which instruction is focused. Gray and Klaus (23) instructed parents once a week in an attempt to develop an awareness of instrumental activities involved in a child's perceptual, cognitive and language attainment. Children 3.5 to 4.6 years of age in the two experimental groups had significantly higher picture vocabulary and ITPA scores than the two control groups on all subtests except motor encoding. This is not surprising since the motor aspect was not included in the program. The experimental group also had higher scores on the preschool screening test for entry into first grade and closely approximated the scores of nondeprived children.

As with reading and speech, the language skills of children with learning problems have been shown to improve significantly under the tutelage of parents. Parents can gain a significant amount of knowledge concerning the teaching-learning process, but gains by the child are made only in those skills in which instruction is given. The principles of reinforcement and reward were shown to be a major factor in the learning process.

Parent-Child Interaction

A parent tutorial program requires the parents to relate to their child in a way which may be inconsistent with past interactions. The possibility that the home environment is partially responsible for

a child's learning problem cannot be overlooked. A program which increases the parents' understanding of their child's learning problems and offers a potential means of dealing with these problems may help to improve interactions between the parent and the child.

Parent-child interactions are related to dependency, aggression, distractibility and hyperactivity in children. They are also related to the reading readiness and categorization styles of children. Feedback and punishment are major means of interaction used as variables by investigators in studies of parent-child interaction. Sears, et al. (47), conducted a study of the child-rearing antecedents of dependency and aggression in children who were 3.4 to 5.5 years of age. Negative attention (the act of securing attention by disruption, aggressive acts and defiance) was used as a subcategory of both dependency and aggression. For both sexes, there was a strong negative relationship between the amount of nurturance a child received and the amount of negative attention behavior displayed. It appears that a mother who is too busy to answer a child's questions and who pushes the child away when she is busy creates a whiney child who seeks attention by being disruptive and annoying.

Maternal punitiveness had contrasting effects on the dependent and aggressive behavior of girls and boys. Correlations between maternal punitiveness and dependency and between maternal punitiveness and aggression were positive for boys, but negative for girls. An attempt was made to explain this difference as an effect of the severity of the punishment received by the child. It was theorized that, for both boys and girls, the amount of dependency or aggression may increase with the severity of punishment until a critical level of

severity is reached after which the proportion of dependency or aggression begins to decrease (47). The application of this theory to the correlation differences between boys and girls implies that the girls have been more severely punished. An alternative implication was that girls perceive themselves to be more severely punished because of a greater tendency to identify with their mothers (47).

The quantity of maternal feedback may be a contributing factor to hyperactivity in boys. Campbell (7) compared the mother-child interactions of hyperactive, learning disabled (LD) and normal boys between the ages of 8 and 9 years. Results showed that mothers of hyperactive boys provided: (a) more structure and suggestions than mothers of normal children, (b) more intervention in problem-solving situations than mothers of LD children, and (c) more disapproval, encouragement, non-specific suggestions and impulse control than mothers of LD or normal children. There were no significant differences between the learning disabled and normal groups. Hyperactive boys were observed to be more talkative and more dependent upon maternal feedback.

The quality of feedback by parents may be a factor in the distractibility of children. Bee (3) found that parents of less distractible 9 year old children were more attentive to the child than parents of more distractible children. Parents of less distractible children were nondirective and provided fewer suggestions than parents of more distractible children. When offering suggestions, parents of less distractible children provided less specific directions, but more evaluative comments and reinforcement of task persistence. They also were more encouraging. The mothers of less distractible children provided less negative encouragement for boys and more for girls than

mothers of more distractible children. The children who were less distractible responded to parental feedback by interacting more with their parents, but rejected help from their parents more often than the more distractible children.

Both the quantity and quality of feedback that children receive from their environments have been related to their reading readiness. In a study of the relationship between reading readiness and parent-child interactions, high scoring children were compared to low scoring children (Milner, 35). High scoring first grade children were found to have richer verbal family environments than low scoring first grade children. There also were more opportunities for emotionally positive interactions with parents for the higher scoring children. The responses obtained from mothers showed that high scorers had more stress placed on self-responsibility than low scorers. During breakfast, the focus was on total family interaction with positive permissive tones and high verbal content. The environment for low scorers was the opposite. There was greater overt expression of affection between parent and child for high scorers whereas expression of affection for low scorers was inconsistent. Both groups responded negatively toward differing forms of discipline. High scorers were exposed to controlling, preventing and prohibiting disciplinary techniques. Low scorers were exposed to direct physical punishment.

Feedback may be more meaningful to the child if supported by both the mother and the father. Davis and Lange (10) found no significant relationship to the preschool child's categorization style when the influences of the mother and the father were considered separately.

They stressed the importance of the combined significant influence of the mother and father as a unit.

Parents' attitudes of acceptance or rejection of their children's learning disabilities are distinctive. Wetter (63) surveyed the attitudes of parents toward their learning disabled children. Mother's attitudes showed overprotection, overindulgence and rejection toward the child. Fathers and mothers did not differ in their perception of their child's adjustment to the learning disability. Parents of children with learning disabilities demonstrated greater disagreement in assessing the child's overall adjustment than parents of children without learning disabilities.

Parent-child interactions have been shown to be related to characteristics of the learning disabled child. Parental influence appears to be partially sex dependent and undesirable behaviors a result of parental pressures for achievement. Data indicate that a favorable environment for parent-child interactions would include: (1) encouragement in tasks and of verbal expression, (2) overt expressions of affection, (3) stress on self-responsibility (independence), (4) specific but positive suggestions, (5) patience with questions, and (6) a sharing of time. It is indicated also that the family may interact better as a unit--child, mother and father together than with parents interacting separately with their child.

Remediation Principles and Techniques

The remediation approach for a program involving parents as tutors must consider the knowledge of the parents in the remediation of the child. Since the remediation of the child's problem depends upon

the capability of the parent, it is important that the parent's understanding of the child's learning problem and of the teaching-learning process be as complete as possible.

An essential element of the remediation of basic motor skills involves an accurate diagnosis of the problem. Diagnosis should include the level and manner of performance and also should seek to formulate specific disabilities in precise terms (2). The diagnostic process thus becomes a delineation of disabilities which leads directly to remedial planning. The remedial process begins by focusing on a narrow primary area of the disability and gradually broadens to include more general areas (2).

Individual remediation techniques should combine a prescribed educational curriculum with an educational clinical support system (1). Remedial techniques should aim toward the achievement of program objectives. O'Keefe (37) described four program objectives applicable to programs for parents: (a) to enhance parent's knowledge and understanding of early childhood development through information materials on how to be a better educator, (b) to provide educational materials, (c) to help parents reinforce the child's positive behavior, and (d) to help improve the child's language ability and understanding of basic concepts. Home visitors were used to educate the parents in the use of a broadly based practical technique. This required three to four weeks and was followed by an in-service training program.

The everyday home environment has much to do with the process of remediation. Adamson (1) stressed two important principles concerning the home environment. First, the parent should listen to what the child has to say and be specific in asking questions. Second, the

child should be encouraged to express personal feelings and to tell the truth (1). The learning disabled child often attempts to gain sympathy from the parent by denying a part in a problem situation and by placing the blame on other children, teachers or siblings. The child should be helped to face failures and to understand personal involvement in such situations.

The parent's attitude toward the child and the skill to be remediated is considered an important variable in the remediation process (14) (39) (62). Weiser (62) stressed that parents must show a respect for reading and convey this respect to the child by helping the child to participate in reading. This could be accomplished by setting aside a regular library trip and by reading to the child. The way a parent speaks of books and shows interest in what the child is reading also should convey this respect. Duncan and VonBehren (14) had four recommendations for parent-tutors:

1. Respect the child.
2. Use a positive approach.
3. Break time into separate activities.
4. Do not scold, beg or bribe your child.

Otto (39) encouraged a regular daily schedule of activities. Emphasizing the importance of motivation, a day of activities was avoided if there was evidence of low motivation. The following teaching techniques were also advocated by Otto:

1. Be objective and natural as though working with someone else's child.
2. Reward, if correct, verbally or with physical contact.
3. If incorrect, do not spend time prompting or hinting.
4. Do not feel unhappy about not knowing correct answers.
5. In recording child's progress, use stars and not blackmarks.
6. Use of rewards should be geared to the child. A reward is NOT a bribe, but a reinforcement for a positive behavior.

The characteristics of successful parents were studied by Hickman (28). He determined that successful parents: (a) make themselves available, (b) encouraged experiments, (c) allow for self-discovery, and (d) do not try to play the teacher role or schedule activities. The last characteristic mentioned is contrary to recommendations of Weiser (62), Duncan and VonBehren (14), and Otto (39) in that they encourage parents to tutor their own children and to schedule activities.

Parents may need assistance in dealing with their child's learning problem in order to improve their tutorial skills. Gray (22) implemented a program that focused on the basic concerns of the parent rather than on those of the child. The assistance provided to the parents was specific to the child's problem rather than of a general nature for children with similar problems. No member of the family was excluded from participation during the home visit. Use was made of learning materials that were readily available or simple to construct. Help was given to parents in using positive reinforcement techniques and moving toward independence in planning for the child.

The child acquires complex skills by building on simpler skills and habits. It was found necessary by one investigator to return to developmental stages when teaching basic motor skills (17). Weiser (62) used the same principle for teaching reading skills to children. Exploration and play were encouraged in Weiser's program because they were considered to be natural ways of learning in the four to five year age range. It must be recognized that children need an opportunity for self-expression, participation and direct experience. Scott (45) also

used play behavior techniques in conjunction with verbal stimulation as a means to promote learning in children.

The type and frequency of information provided for the improvement of motor skill performance are important variables in the learning process. Chrietzburg (9) found a positive relationship between skill level and the information provided by the mother. Children whose mothers provided more information about the quality of performance demonstrated greater skill levels than children whose mothers failed to provide such information.

Presentations involving both verbal instruction and demonstrations are necessary for learning to occur. The two most important variables of presentations are the methods used and the frequency of occurrence. In a guide to parents, Golick (19) suggested the following learning principles relating to the method and frequency of presentations.

1. Children learn best through activity.
2. Intensive repetition may be very important for some learning disabled children.
3. Teaching through many senses seems to work best.
4. Teaching sessions too widely spaced produce a high rate of forgetting in children with learning problems.
5. Children learn better if the materials or situations have an emotional impact.
6. Children learn a tremendous amount from other children.

Characteristics

There are many characteristics associated with learning problems. Parents must become familiar with the most common characteristics in order to understand observable behaviors that may at first seem unrelated to the learning problem. McCarthy and McCarthy (33) provide a list of ten of the most frequently cited characteristics of children

with learning problems which is representative of many such available lists. These characteristics are included below in their order of frequency with an example of the degree of corroboration which is available from other investigators:

1. Hyperactivity. (7) (8) (34) (44)
2. Perceptual-motor impairments. (44)
 - poor motor coordination (8) (19) (34)
 - poor grasp of sequence (19)
 - poor sense of rhythm (19)
 - poor posture (61)
3. Emotional lability. (34) (44)
 - inability to function independently (61)
4. General orientation defects.
 - poor body awareness (19) (34) (44)
 - problems with space and time concepts (19) (34) (44)
5. Disorders of attention. (8) (19) (34) (44) (61)
 - short attention span
 - distractibility
6. Impulsivity. (8) (34) (44)
7. Disorders of memory and thinking.
 - inability to complete tasks (44) (61)
 - "forgetting syndrome" (34) (44) (61)
8. Specific learning disabilities in reading, arithmetic, writing and spelling. (19) (34)
 - underachiever (8) (34)
 - achievement level at least 1 1/2 years below grade level in reading (34) (44), arithmetic and spelling (61)
9. Disorders of speech and learning. (34) (44) (61)
10. Equivocal neurological signs and electroencephalographic irregularities.

Goldsmith (17) reported similar characteristics observed during a movement class. These were specific to children with gross motor difficulties:

1. Hyperactivity.
2. Poor coordination.
3. Inability to reproduce rhythmic sequences.
4. Tense or flaccid muscle tone.
5. Poor body awareness.
6. Short attention span.
7. Perseveration of movement activity.
8. Poor body control with eyes closed.

Parents must become familiar with the ways in which typical characteristics are portrayed in everyday behaviors. Capobianco (8)

provided a descriptive list of typical behaviors that could be of further help in understanding the inconsistent behavior of a child with a learning problem.

1. Follows no logical pattern of behavior.
2. Never sticks with anything over a long period of time.
3. Wanders aimlessly about the room, concerned with everyone else's business.
4. Never sits still, runs but does not walk.
5. Acts before thinking, does not consider consequences.
6. Repeats a task or movement excessively.
7. Seems out of control, does not hear you.
8. Rapidly changes mood or temperament.

Some attempt has been made to determine the frequency with which some of the characteristics of learning disabled children occur. Denckla (11) identified some clinical syndromes of children with learning disabilities. In examining the first 100 cases of 190 private patients, 15 percent were found to have gross motor problems. The distribution of disorders for the entire group studied (190) was as follows:

- 70% - exhibited a mixture of symptoms.
- 30% - displayed easily recognized dramatic clusters of signs (syndromes):
 - 15% - specific language disorders.
 - 5% - specific visuo-spatial disorders.
 - 10% - dyscontrol syndrome.

The dyscontrol syndrome was characterized by:

1. Poor control over own muscles.
2. Poor control over impulses and responses to sensory stimuli.
3. Verbal command does not override visual or auditory stimuli in terms of motor responses evoked.
4. Unharnessed energy.

The learning disabled child usually has poor self-control. Often, this lack of self-control prohibits successful remediation of

the child's disability. Methylphenidate (ritalin) has been shown in a study by Wade (58) to significantly increase the consistency of performance on a balance task of hyperactive children when on medication as compared to their performance when given a placebo. There were twenty-four children in the study, twelve normal children and twelve hyperactive children matched by age and weight. The medication enabled the hyperactive children to approach the absolute magnitude of the normal group's motor performance, as well as reach a level of consistency which was not significantly different from that of the normal group. The dosage level was carefully adjusted for each child on the medication. With strict supervision and careful adjustment of dosage, drugs have been found to be successful in helping the child to make adjustments to the changing environment.

Characteristics typical of children with learning problems occur in various academic, motor, social and emotional areas and may not be consistent from one situation to the next (44). There is considerable agreement among investigators in identifying the most typical behavioral characteristics of children with learning problems. Parents should review characteristics as often as possible to continually remind themselves that the various behaviors they may observe in their own child may be manifestations of learning problems.

Summary

There is a need for intervention programs as a preventative measure to more serious learning problems. The literature on motor skill development has shown instruction to be necessary for improvement, but is limited to the use of modeling and the provision of qualitative

information as techniques for parents to use in assisting their children.

Literature from the academic areas of reading, speech and language has shown instruction by parents to be effective in the improvement of skills for children with learning problems. Instruction by the parents has been effective when structured techniques for the teaching-learning process have been established. Processes and methods of correction must be completely understood by the parents for their instruction to have its greatest effect. Parents have been instructed effectively in groups or individually at a frequency rate of either once a week or once a month. Improvements occur within a specific area of instruction and cannot be assumed to transfer from one area to another. Literature in the motor skill area provides little insight into the effectiveness of parents as tutors for children with motor skill problems.

Some principles of the teaching-learning process have been emphasized; motivation, repetition and knowledge of results. Motivation was approached in two ways: first, the provision of reward and reinforcement to keep motivation high and second, the avoidance of working on days when the child's behavior indicated that motivation was low. The frustration level during instruction was regulated by limiting the scope of instruction. Presentations in the form of verbal instruction and demonstrations should include intensive repetition. Parental attitudes play a major role during presentations. Parents should show enthusiasm and respect for the areas of learning. Knowledge of results provided to the child should be both quantitative and qualitative for

best results. The more information about the performance available to the child, the more that is available to be used as feedback.

Characteristics of children with learning problems have been identified by researchers in many various areas of learning. Characteristics identified by investigators in the academic and motor skill areas have shown that children with learning problems possess similar behavioral traits, regardless of their specific areas of learning dysfunction.

Chapter 3

METHODS

The purpose of this study was to determine the effectiveness of parents as tutors for children with basic motor skill deficiencies. Three groups of children were compared; one group was taught at home by parents, a second group was taught by a specialist in physical education during school hours, and a third group received no special instruction in basic motor skills. Each child's performance on selected basic motor skills was assessed in order to determine the stage of development attained for each skill. This assessment also provided an estimate of the level of proficiency in motor achievement when the subjects' scores were compared to norms for children who were of the same sex and chronological age.

Subjects

Permission was sought and granted to conduct this study within the Lansing Public School District in Lansing, Michigan. The physical education consultant for the district, Mrs. Reba Rudolph, played an instrumental role in recruiting schools for this study. Mrs. Rudolph notified the principals and teachers of elementary schools within the district of the study and helped to establish interviews with school representatives who were interested in participating. Meetings were

held at each school to answer questions that the teachers or principal had formulated in an effort to alleviate any apprehensions toward participation in the study. Teachers of the kindergarten, first and second grades from six elementary schools¹ within the Lansing Public School District volunteered to cooperate with this study.

Children ranging in age from five to eight years whose parents had granted permission (see Appendix A) were screened for their performance on the basic motor skills of throwing, catching, running, hopping, skipping and jumping. Any child who demonstrated less than the assigned stage for a particular age on two or more of the designated skills (see Tables 3.1 and 3.2) was considered to be deficient in motor skill development (see Appendix B for a description of the developmental stages for each skill). Those children found to be deficient in their basic motor skill development were eligible to participate in this study providing they were not mentally impaired or physically handicapped.

Table 3.1. Minimum stages of skill development for children five to six years of age.

Skill	Boys	Girls
Throwing	Stage 3	Stage 2
Catching	Stage 3 (successfully)	Stage 3 (successfully)
Running	Stage 4	Stage 3
Jumping	Stage 2 (34" minimum)	Stage 2 (30" minimum)
Skipping	Stage 0	Stage 2
Hopping	Stage 1	Stage 1
	4 or more hops on either foot	dominant foot--10 or more hops nondominant foot--7 or more hops

¹Maple Grove, Gunnisonville, Cavanaugh, Forest View, Genesee and Post Oaks elementary schools.

Table 3.2. Minimum stages of skill development for children seven to eight years of age.

Skill	Boys	Girls
Throwing	Stage 5	Stage 5
Catching	Stage 4 (successfully)	Stage 4 (successfully)
Running	Stage 4	Stage 4
Jumping	Stage 3	Stage 3
Skiping	Stage 2	Stage 3
Hopping	Stage 2	Stage 3
	6 or more hops on either foot.	10 or more hops on either foot.

The developmental norms presented in Tables 3.1 and 3.2 are based on the results of a study conducted by Lerner (31) on the performance of motor skills by young children. She recorded the developmental stages of children 36 to 65 months of age. The stages established as the minimum level for acceptable motor achievement in Table 3.1 were demonstrated by at least 60 percent of the children in the 60-65 month age range in Lerner's study. A deficiency in two or more of the skills listed was arbitrarily set as the criterion for identifying the subjects for this study. Table 3.2 is an extrapolation of Table 3.1. Since Lerner's data indicated consistent developmental progressions with increasing age on all of the skills measured, a stage more mature than that for the five to six year olds was established as the performance criterion on each skill for seven and eight year old children.

For example, Lerner's data for the development of catching skill in boys showed that in the 36-41 month age range about 62 percent of the boys performed at or above the stage two level. Over 60 percent of the boys in the 60-65 month category were able to catch at stage three or better (Table 3.1). It was assumed that some development

would occur with increasing age therefore stage four was selected as the criterion level of performance for catching in seven and eight year old boys (Table 3.2). Quantitative measures for the standing long jump and the hop were also used. Those for the jump were based upon data obtained in the Motor Performance Study at Michigan State University.

Potential subjects were identified by comparing the results of their performance on the screening test with the developmental norms. Letters then were sent to the parents of those children who qualified (who were deficient in two or more skills) inviting them to enroll their children in the study. (Copies of the letters and the registration forms are presented in Appendix C.) The schools whose teachers volunteered to participate in the study were situated in various parts of the district. The children attending these schools represented various geographic locations, socioeconomic levels and races within the Lansing school system although there was no intentional stratification. Of the available sample of forty-seven children whose parents consented to participate in the study, the parents of ten children volunteered to participate in the program as tutors for their children. These ten children comprised Experimental Group One. The remaining thirty-seven children were randomly assigned to either Experimental Group Two or the control group within each school (see Table 3.3). Assignments to these two groups were made within each school to eliminate the possibility that all or most of the eligible children attending a particular school would be assigned to the control group (see Table 3.4). The number of children in two schools (labeled 5 and 6) was so small that they were randomly assigned as a school to avoid a possible one-to-one teaching situation in Experimental Group Two (the specialist taught group).

Table 3.3. Distribution of sample among groups (N = 47).

	AGE GROUPS		SEX		RACE		
	5-6 years	7-8 years	Boys	Girls	White	Black	Other ^a
Experimental 1	5	5	6	4	9	1	0
Experimental 2	6	12	12	6	14	3	1
Control	8	11	7	12	14	3	2

^aOne Hispanic and two Oriental children participated in the study.

Table 3.4. Distribution of children within groups by school.

	SCHOOLS											
	1		2		3		4		5		6	
	5-6	7-8	5-6	7-8	5-6	7-8	5-6	7-8	5-6	7-8	5-6	7-8
Experimental 1	0	2	1	1	0	2	0	3	1	0	0	0
Experimental 2	1	4	0	3	1	3	0	4	0	2	0	0
Control	0	4	2	1	0	5	0	4	0	0	3	0

Conditions

Children in Experimental Group One were tutored by their parents in their respective homes. Parents in the parent tutored group were assigned to one of two subgroups. Each subgroup of parents met once a week until the end of the study. Each hour session was comprised of lecture, demonstration and discussion. The parents met to learn principles and techniques of teaching motor skills, including skill analysis and activities, and to discuss individual difficulties. These parents instructed their children in the subroutines of six basic motor skills (throwing, catching, running, hopping, skipping and jumping) two or three times a week. Each session lasted from 20 to 30 minutes, depending upon the responsiveness of the child. The total time each week equalled 60 minutes. Children in the parent tutored group were pretested, received instruction from their parents for 14 weeks and then were posttested.

The children assigned to Experimental Group Two received instruction in small groups from a specialist in physical education. Children in this group were pretested and then assigned to one of four subgroups. Each subgroup met twice a week for 30 minutes of instruction. This schedule was used to approximate the amount of time spent in a physical education program at the primary grade level. Instructional activities focused on the subroutines of the six basic motor skills. Children attended sessions for 14 weeks and then were posttested.

Members of the control group did not receive any special instruction in the basic motor skills. Children in this group were pretested at the same time as the children in the two experimental groups and also were posttested with the experimental groups. The

purpose of this group was to account for the maturational changes of the children during the treatment period. A series of parent-tutor weekly sessions was arranged after the final assessment for those parents who wished to participate.

Data Collection

The performance of children on the six basic motor skills was recorded on 8mm film prior to the onset of the treatment sessions. The procedures employed to elicit the performance for each skill are presented in Appendix D. Following the treatment period, the performances of the children on these skills again were recorded on film. These films provided the information necessary for the evaluation of skill performance and for subsequent analyses.

Evaluation of Skill Performance

The performance of each skill by the children as recorded on film was evaluated independently by two observers versed in the developmental stages for each skill. The observers determined the stage of development exhibited by each child for each skill. Whenever a difference in judgment occurred between the two observers concerning the level of performance for a particular child, the recorded performance was reviewed until a mutual agreement was reached.

One observer also evaluated the stage of development for each subroutine within a skill. Appendix E contains a listing of the subroutines for each skill. Information concerning subroutines was later used to determine performance changes within skill stages.

Analysis

The data obtained from the films were analyzed by developmental stage and by subroutine. The numerical value of the assessed stage for each skill was summed to obtain a composite score for each child. A composite score was calculated because of the small range of stage values for each skill. The subroutine assessment was made to determine if improvement occurred within the stages of a skill. Subroutines were totaled and then summed for each skill to obtain a composite score for each child. The subroutine analysis was conducted in the event a child improved in performance without advancing to the next developmental stage of a skill. It was assumed that the assessment of subroutines would provide a more precise measurement of skill development. The composite scores for stages and the scores for subroutines were statistically analyzed to permit comparisons among the various treatment groups.

There were two major concerns when dealing with the analysis of stages and subroutines. First, they were ordinal levels of measurement. There is no way, at present, to determine whether an increase from stage one to stage two is equivalent to an increase from stage three to stage four within a particular skill. The assumption, therefore, was made that changes from one stage to another stage or from one subroutine to another subroutine were of equal importance and of equal value.

Second, the number of developmental stages and subroutines differ by skill (see Table 3.5). There are five stages in throwing and catching, and four stages in running, hopping, skipping and jumping. Allowing for the possibility that a child could not perform a skill successfully even at stage one (resulting in a score of zero), the

Table 3.5 An example of differences in the number of stages and subroutines for two skills.

SKILL	STAGES	SUBROUTINES
Catching	5	13
Hopping	4	24

possible range of scores for the skill becomes six and five, respectively. To avoid placing more importance on one skill than on another skill due to the difference in possible ranges, the scores for each skill were standardized by the use of z-scores prior to analysis. A z-score was calculated for each child within each skill.

The number of subroutines used for the discrimination of ability level within stages differed even more than the number of stages from one skill to another (see Appendix E for a comparison of subroutines). This underscored the need for standard scores for purposes of analysis.

In making comparisons between the groups, it was important to account for differences on the pretreatment assessment, especially since the parent tutored group was not randomly assigned. The appropriate technique for analysis was an analysis of covariance (AOC) with the pretreatment scores as the covariable (27). After the application of an AOC to test for significant differences among groups, between group differences were tested for through the use of two a priori tests of significance.

Summary

Children ranging in age from five to eight years were screened for their performance on selected basic motor skills. Based upon a

minimum level of basic motor skill development, children found to be deficient in their development were eligible to participate in this study. Parental permission was acquired for each step in the process of subject identification. Of the 47 children whose parents consented to participate in the program, the parents of ten children volunteered to participate in the program as tutors for their children. These children formed Experimental Group One. The remaining 37 children were randomly assigned to either Experimental Group Two (the specialist taught group) or the control group.

The three treatment groups differed by the type of instructional intervention employed. Children in Experimental Group One received basic motor skill instruction from their parents. Parents met with a specialist in physical education to learn principles and techniques of the teaching-learning process for motor skill acquisition. Children in Experimental Group Two received instruction in small groups from a specialist in physical education. In both the parent tutored and the specialist taught groups, the instruction to the children (a) focused on the subroutines of the motor skills, (b) was limited to 60 minutes a week, and (c) was conducted for 14 weeks. The third group was a control group which received no additional motor skill instruction.

The performance of each child was recorded on 8mm film before and after the treatment period. The stage of development exhibited for each skill and each skill subroutine was evaluated from the film. A separate analysis was performed for the data based on stages and subroutines. To account for differences on the pretreatment assessment, an analysis of covariance was selected for the statistical analysis.

Chapter 4

RESULTS AND DISCUSSION

Two sets of data were collected for the purpose of determining the effectiveness of parents as tutors for children with basic motor skill deficiencies. One set was based on the assessment of developmental stages. The other set was based on the assessment of subroutines for each skill. All scores within each set were standardized and then summed to form a composite score. The hypothesis tested was that instruction by parents in basic motor skills has no effect on the development of the six basic motor skills of throwing, catching, running, hopping, skipping and jumping. A separate analysis was performed on each set of data.

The consequences of making a type I (alpha) error and a type II (beta) error were considered before the alpha and beta levels were established for the analyses. By making a type I error (α), the null hypothesis would be rejected when, in fact it was true. This would result in concluding that additional instruction in basic motor skills could help children deficient in motor skills when, in fact, it would not be beneficial. The consequence of providing children with additional instruction when it was not beneficial was not considered to be a detrimental consequence for the child. However, there would

be serious economic consequences in terms of expenditures of time and money. Hence, the economic consequences of making a type I error required that a relatively strict alpha level, $\alpha = .05$, be chosen.

A type II (β) error would result in acceptance of the null hypothesis when, in fact, it was false. This would result in concluding that additional instruction in basic motor skills would not benefit a child deficient in basic motor skill development when, in fact, it would be beneficial. The consequences of withholding needed and beneficial instruction would be very detrimental. The acceptable beta level, therefore, was arbitrarily set at .20.

Stage Analysis

The assessed stages for six basic motor skills were standardized and summed for each child on both the pretreatment and posttreatment assessments. A one-way fixed effects analysis of covariance (AOC) was applied to the data using the pretreatment z-scores as the covariable. The hypothesis tested was that instruction in motor skills has no effect on the development of basic motor skills. The critical region of rejection for the null hypothesis was calculated to be any F value ≥ 3.21 . Analysis of the computed scores for stage performance resulted in the rejection of the null hypothesis ($F = 18.532$) (see Table 4.1). There was a significant difference ($p < .001$) in the performance of skill stages among the three treatment groups. The multiple regression coefficient squared (R^2) was .628 indicating that 63 percent of the variation in method was explained by the treatment. It was concluded that there was a significant ($p < .001$) instructional effect upon the development of six basic motor skills for children with motor skill deficiencies.

Table 4.1. Analysis of covariance comparing the stage of motor skill performance of the three instructional groups.

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F	Significance of the F
Methods	287.037	2	143.519	18.532	0.000
Residual	333.009	43	7.744		
Total	894.274	46	19.441		

After determining that a significant difference in performance between the three groups existed, the next step was to identify the location of the differences. Inspection of the means and standard deviations of the three treatment groups (see Table 4.2) indicated that the greatest difference for these values occurred between the specialist taught group (Experimental Group Two) and the control group. Therefore, if the difference between the parent tutored group (Experimental Group One) and the specialist taught group was significant, it could be assumed that a similar significant difference existed between the specialist taught group and the control group.

Table 4.2 Means and standard deviations (SD) of skill performance by stage of the three experimental groups on the posttreatment assessment.

GROUP	MEAN	SD
Parent tutored	20.500	4.002
Specialist taught	26.833	1.249
Control	20.263	3.984

Two a priori tests were then administered to test the following hypotheses. The first of these was that the motor development of those children instructed by their parents (Experimental Group One) was not

significantly different from the motor skill development of children instructed by a specialist in physical education (Experimental Group Two). The second hypothesis was that the motor skill development of children instructed by their parents did not differ significantly from the motor skill development of those receiving no additional instruction in motor skill (control group). A one-way AOC between two groups was applied to test both hypothesis. The F values used to define the critical regions of rejection were 4.24 and 4.23, respectively, based on the same α level (.05) as used in the overall AOC.

The skill development of children instructed by a specialist was significantly ($p < .001$) different from the skill development of children instructed by their parents. Thus, the first hypothesis was rejected ($F = 38.531$) (see Table 4.3). Seventy-two percent of the variation between the groups was accounted for. It was concluded that for children with basic motor skill deficiencies instruction by a specialist in physical education results in significantly greater ($p < .001$) development of basic motor skills than instruction by parents.

Table 4.3. A priori analysis of covariance comparing the motor skill development of the parent tutored group to that of the specialist taught group.

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F	Significance of the F
Method	187.075	1	187.075	38.531	0.000
Residual	121.379	25	4.855		
Total	426.712	27	15.804		

The comparison between the specialist taught group and the control group was based upon the results of the comparison between the

parent tutored group and the specialist taught group. Since the difference of means between the specialist taught group and the control group was greater than the difference of the means between the parent tutored group and the specialist taught group, it was logically determined that there was a significant difference ($p < .001$) in motor skill development of children instructed by a specialist as compared to the motor skill development of children who received no additional instruction in motor skills. Furthermore, it was concluded that instruction by a specialist results in significantly greater ($p < .001$) development of basic motor skills than the development due to maturational changes in children who received no additional instruction in motor skills.

The second hypothesis was that the motor skill development of children instructed by their parents did not differ significantly from the motor skill development of those receiving no additional instruction in motor skills. The second hypothesis was not rejected ($F = 0.161$) (see Table 4.4). No significant difference ($p < .692$) was found in motor skill development between children instructed in motor skills by their parents and children who received no additional instruction in motor skills. The multiple correlation coefficient squared (R^2) was .417, thus only 42 percent of the variation between the groups was explained. Before accepting the null hypothesis, the power of the test was calculated to determine the degree of confidence with which it could be accepted, if indeed, it could be accepted at all. The power of the test was found to be very low ($1 - \beta = .05$). Due to the low power of the test, the second hypothesis was not accepted. Judgment was reserved pending further information based on a larger sample size, since the power of the test is directly related to the size of the

Table 4.4. A priori analysis of covariance comparing the motor skill development of the parent tutored group to that of the control group.

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F	Significance of the F
Method	1.565	1	1.565	0.161	0.692
Residual	252.926	26	9.728		
Total	434.141	28	15.505		

sample. No conclusion could be drawn as to the effectiveness of the parent tutored group compared to that of the control group for the development of motor skills.

Subroutine Analysis

The subroutines of each motor skill were assessed in an attempt to provide a more precise measure of improvement. These measures were standardized and summed for each child for both the pretreatment and posttreatment assessments. A one-way fixed effects analysis of covariance (AOC) using the pretreatment scores as the covariable was the technique chosen for the analysis. The same hypotheses tested in the stage analysis were tested in the subroutine analysis using the same alpha level ($\alpha = .05$) and the same critical region of rejection ($F \geq 3.21$). It was assumed that, if the subroutine score was a more precise measure, the probability of detecting a significant difference would be increased.

The primary hypothesis tested was that instruction by parents in motor skills has no effect on the development of basic motor skills in children with motor deficiencies. The AOC resulted in an $F = 16.105$ and a rejection of the null hypothesis (see Table 4.5). There was a

Table 4.5. Analysis of covariance comparing the motor skill subroutine performance scores of the three instructional groups.

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F	Significance of the F
Method	234.738	2	117.369	16.105	0.000
Residual	313.375	43	7.288		
Total	940.440	46	20.444		

significant difference in the performance of skill subroutines among the three treatment groups. The R^2 was .67 indicating that 67 percent of the variation in method was explained by the treatment. It was concluded that instruction does have a significant effect ($p < .001$) on the development of six basic motor skills.

The means and standard deviations were inspected for the subroutine assessments (see Table 4.6). It was observed that the greatest difference was between the specialist taught group and the parent taught group. In order to determine the location of the significant difference, two hypotheses were tested. First, that the motor skill development of children who were instructed by a specialist in physical education was significantly greater than the motor skill development of children who received no additional motor skill instruction. Second, that the motor skill development of children who were instructed by their parents did not differ significantly from the development of children who received no additional motor skill instruction.

The first hypothesis was supported ($T = 4.52$) using the T value of 1.69 to define the one-tailed critical region of rejection based on an alpha level of .05 (see Table 4.7). The skill development of children instructed by a specialist in physical education was

Table 4.6. Means and standard deviations (SD) of the skill subroutine scores of the three experimental groups on the posttreatment assessment.

GROUP	MEAN	SD
Parent tutored	95.200	17.300
Specialist taught	121.389	5.147
Control	96.632	15.826

Table 4.7. A priori T-test comparing the motor skill development of the specialist taught group to that of the control group.

Variable	Mean	SD	Degrees of Freedom	T	Significance of the T
Specialist taught	2.0824	2.600	35	4.52	0.000
Control	-1.9731	2.840			

significantly greater ($p < .001$) than that of children who received no additional instruction in motor skills. Fifty-four percent of the variance between the two groups was accounted for by the treatment.

The difference between the mean of the parent tutored group and the mean of the specialist taught group was greater than the difference between the means of the specialist taught group and the control group, therefore, it was assumed that the difference between the parent tutored group and the specialist taught group was also significant ($p < .001$). It was concluded that the skill development of children instructed by a specialist in physical education was significantly greater than the skill development of children instructed by their parents.

The second hypothesis tested in the subroutine analysis was that the motor skill development of children who were instructed by

their parents did not differ significantly from the development of children who received no additional motor skill instruction. Using an F value (4.21) to define the critical region of rejection based on the same α (.05) as used in the overall AOC, this hypothesis was not rejected ($F = 0.757$) (see Table 4.8). There was no significant difference ($p < .392$) in the skill development of children instructed by their parents and the skill development of children who received no additional motor skill instruction. The power of the test was low ($1 - \beta < .07$), therefore, the null hypothesis was not accepted. Judgment was reserved until further information based on a larger sample size could be obtained.

Table 4.8. A priori analysis of covariance comparing the motor skill development of the parent tutored group to that of the control group.

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F	Significance of the F
Method	6.206	1	6.206	0.757	0.392
Residual	213.171	26	213.171		
Total	484.562	28	17.306		

Discussion

No conclusion can be drawn concerning the effectiveness of the parent tutored group when compared to that of the control group. The power of the second a priori test comparing these two groups was low ($1 - \beta < .05$) because the sample size of 47 was too small to detect a significant difference. Moreover, the parent tutored group was not randomly assigned. Based on these limitations, a judgment of the effectiveness of parents as tutors of the basic motor skills for their children was reserved until further information could be obtained.

Two factors which may have had an influence on the results of the parent tutored group were the extent of parental participation and the length of the study. Of the ten parents who participated in the study, six parents attended meetings regularly. The other four parents had sporadic attendance records. However, telephone conferences with these parents provided assurance that they were working each week with their children. The mean improvement in the stage of development for the children of parents with regular and sporadic attendance was 2.2 and 1.0, respectively. The length of the study may have been a handicap for the parent tutored group. Perhaps fourteen weeks was an insufficient time for the parents to both learn and teach the basic motor skills, whereas, the specialist in physical education only had to be concerned with the aspect of teaching the motor skills.

Three other variables that could have affected the results of this study were considered in an attempt to explain the lack of significance between the parent tutored group and the control group. The variables examined were (a) level of proficiency, (b) sex, and (c) age. Since the analysis for stages and subroutines yielded the same results, only results of the stage assessment were used in the following discussions.

Level of Proficiency. The first two questions are concerned with the initial level of proficiency of each group. How did the level of proficiency in the motor skills of the children in the parent tutored group compare to that of the children taught by the specialist and to that of the control group? Perhaps one or more of the groups had a greater potential for improvement than the others. Figure 4.1 represents

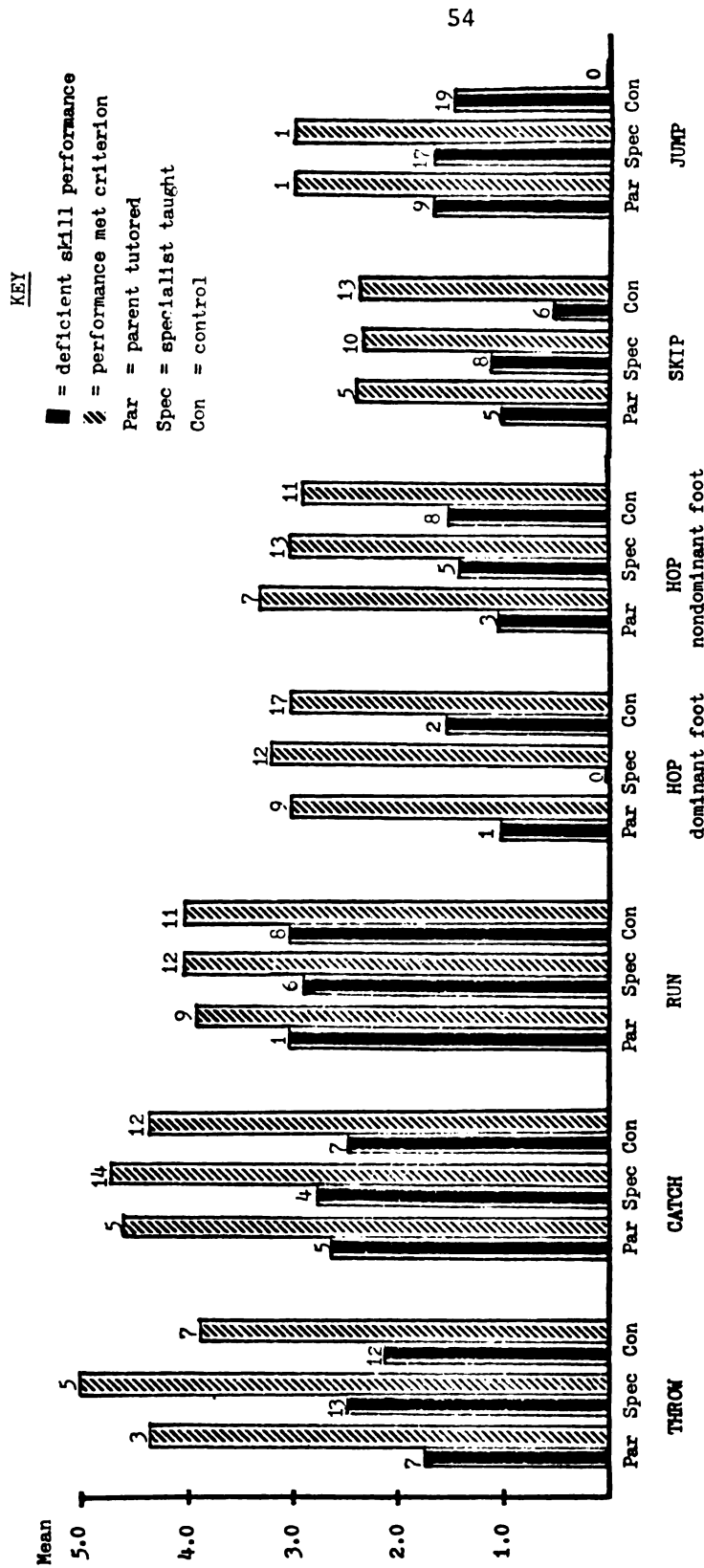


Figure 4.1: Pretreatment performance means for children deficient in motor skill development and for those who met the criterion level.

the pretreatment performance means of children deficient in motor skills () and the performance means of those children who met the criterion level of proficiency () for the parent tutored, specialist taught and control groups, respectively. Some children were at the criterion level of a skill because children only had to be deficient in two skills to be accepted in the study. Figure 4.1 indicates that the children in the parent tutored group were more deficient than the children of the control group in three skills (throw, hop on the dominant foot and hop on the nondominant foot), at the same level of deficiency as the control group in running and less deficient than the children in the control group in catching, skipping and jumping. When compared to the performance of children in the specialist taught group, the performance of children in the parent tutored group was more deficient in four skills (throw, catch, hop on the nondominant foot and skip) and less deficient in three skills (run, hop on the dominant foot and jump). Thus, children in the parent tutored group who were deficient in specific motor skills had potential for improvement that was equal to or greater than the potential for children in either the control group or the specialist taught group.

The second question was, "How did the performance level of those children who met the criterion level of proficiency for individual skills in the parent tutored group compare to that of the children in the specialist taught group or the control group?" Figure 4.1 shows that children in the parent tutored group had more potential for improvement than children in the control group in only one skill (run), were equal in ability in one skill (hop on the dominant foot), and had less potential for improvement in five skills. When compared to the

performance of the children who met the criterion level of proficiency in the specialist taught group, the children in the parent tutored group had more opportunity for improvement in four skills (throw, catch, run and hop on the dominant foot), were of equal ability in one skill (jump), and had less potential for improvement in two skills. The children in the parent tutored group thus had less potential for improving those skills in which they met the criterion level of performance than did the children of the control group. However, they had more potential for improvement than the children in the group taught by a specialist in physical education.

The answers to the first two questions have little meaning without the knowledge of where improvements occurred. Did the children improve in all skills or only in those in which they were deficient? Figure 4.2 depicts the mean changes in performance of those children who were deficient in specific motor skills () and the average changes for those children who met performance criteria on the pretreatment assessment (). The data are presented for children in the parent tutored, specialist taught and control groups, respectively. Children who did not meet criterion performance levels for specific motor skills on the initial assessment improved in mean performance on all skills in each of the groups, except in three instances. Children in the parent tutored group who were deficient in running and in hopping on the dominant foot failed to show a gain, but remained at the same level of performance. Since all of the children in the specialist group met the criterion for hopping on the dominant foot, no opportunity for gain or loss was possible (see Figure 4.1).

KEY

- = deficient performance
 ▨ = performance met criterion
 Par = parent tutored
 Spec = specialist taught
 Con = control

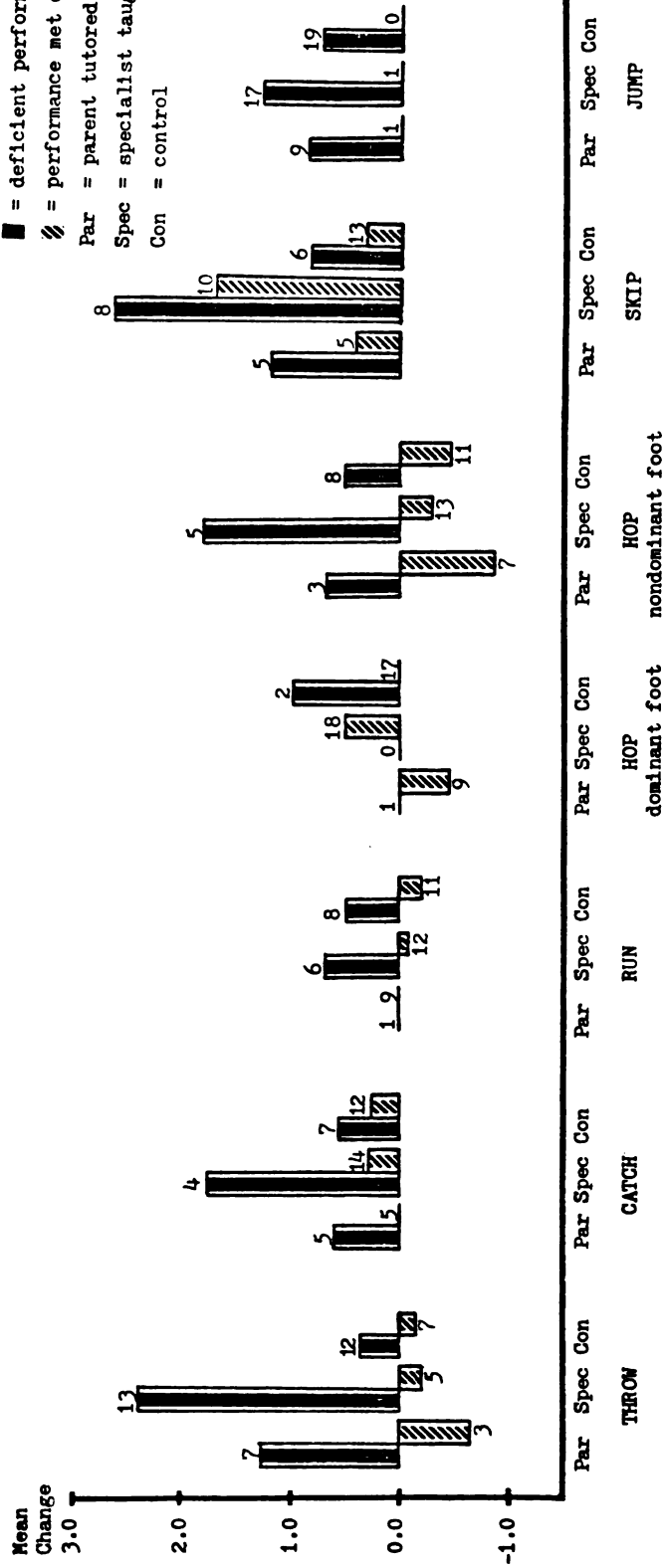


Figure 4.2: Mean changes in performance for children deficient in motor skill development and for those who met the criterion level.

The amount of improvement possible for children who met criterion was dependent upon the pretreatment mean. For those motor skills in which performance means started at the mature stage (a score of 5.0 for the throw and catch, 4.0 for all other skills), no improvement could be shown. However, there was greater potential for demonstrating a loss in performance in these skills due to the regression effect than in motor skills where mean performance was below the mature stage. The pretreatment performance means of the parent tutored group (see Figure 4.1) indicate that there was potential for improvement in all skills. The only skill which did improve, however, was the skip (see Figure 4.2). This skill had the lowest pretreatment mean and the greatest potential for gain. For the other six motor skills in the parent tutored group, the posttreatment performance means of three demonstrated a loss whereas three remained unchanged.

The pretreatment means of the specialist taught group (see Figure 4.1) indicate that all children who met criterion performance levels for the throw and the run exhibited the mature pattern. However, performance on both skills demonstrated a small decrease on the post-treatment evaluation (see Figure 4.2). Performance on the motor skill with the lowest pretreatment mean and the greatest potential for improvement, the skip, and on the motor skill with the greatest pretreatment mean and the least potential for improvement, the catch, improved to the mature stage. Of the three remaining motor skills, mean performance for the hop on the dominant foot improved, that for the hop on the nondominant foot demonstrated a loss and that for the standing long jump remained unchanged.

The pretreatment means of the control group (see Figure 4.1) indicated that all of the children were deficient in the standing long jump and began at the mature stage on the run. Performance for the run showed a small decrease on the posttreatment assessment (see Figure 4.2). Of the five motor skills which showed potential for improvement, mean performance for the catch and the skip gained, that for the throw and the hop on the nondominant foot indicated a loss, and that for the hop on the dominant foot remained unchanged.

Those children who failed to meet criterion levels of performance on the pretreatment assessment showed improvement on nearly all motor skills across the three groups. Such improvement did not occur on all skills for those children who initially had met criterion levels of performance. Therefore, it is possible that a group with more deficiencies would show more improvement than one with fewer deficiencies. During the discussion of the first question, it was pointed out that children in the parent tutored group had greater skill deficiencies than children in the specialist taught group, but the same skill deficiency as the children in the control group. Hence, the parent tutored group had a greater potential for improvement than the specialist taught group, but not the control group.

A regression effect may occur for children with more advanced performance on motor skills. The mean performance of children with mature patterns at the pretreatment assessment showed some deterioration at the posttreatment assessment. A group whose motor skill performance is at or close to the mature pattern on the pretreatment assessment may have a greater proportion of the negative changes on the posttreatment assessment. During the discussion of the second question it was noted

that the performance means of those children in the parent tutored group who met the skill criterion were not as great as those of the skilled children in the specialist taught group and were greater than the skilled children of the control group. Therefore, the motor skills of the parent tutored group had less potential for regression in performance than the specialist taught group and more potential for regression than the control group. On the other hand, the motor skills of the specialist taught group had a greater potential for loss through regression than either of the other two groups. Pretreatment conditions in regard to level of proficiency, both in terms of degree of deficiency in motor skills and in the regression potential of motor skills where the criterion level was met, favored the parent tutored group in comparison to the specialist taught group, but not in comparison to the control group.

Sex. The distribution of boys and girls was not equal across the groups. Two questions pertain to the differences between the motor skill performance of boys and girls. First, did the children of one sex start at a lower level of proficiency, therefore having a greater potential for improvement? Figure 4.3 indicates that the mean performance of the pretreatment scores for boys was less than that for girls in four of the seven skills. A group with a greater proportion of boys than girls may have a greater potential for improvement.

The second question was, "Did the children of one sex have a greater tendency to make developmental gains in motor skills than children of the other sex?" The mean changes of the control group would be an indication of the sex that would improve over time in the absence of

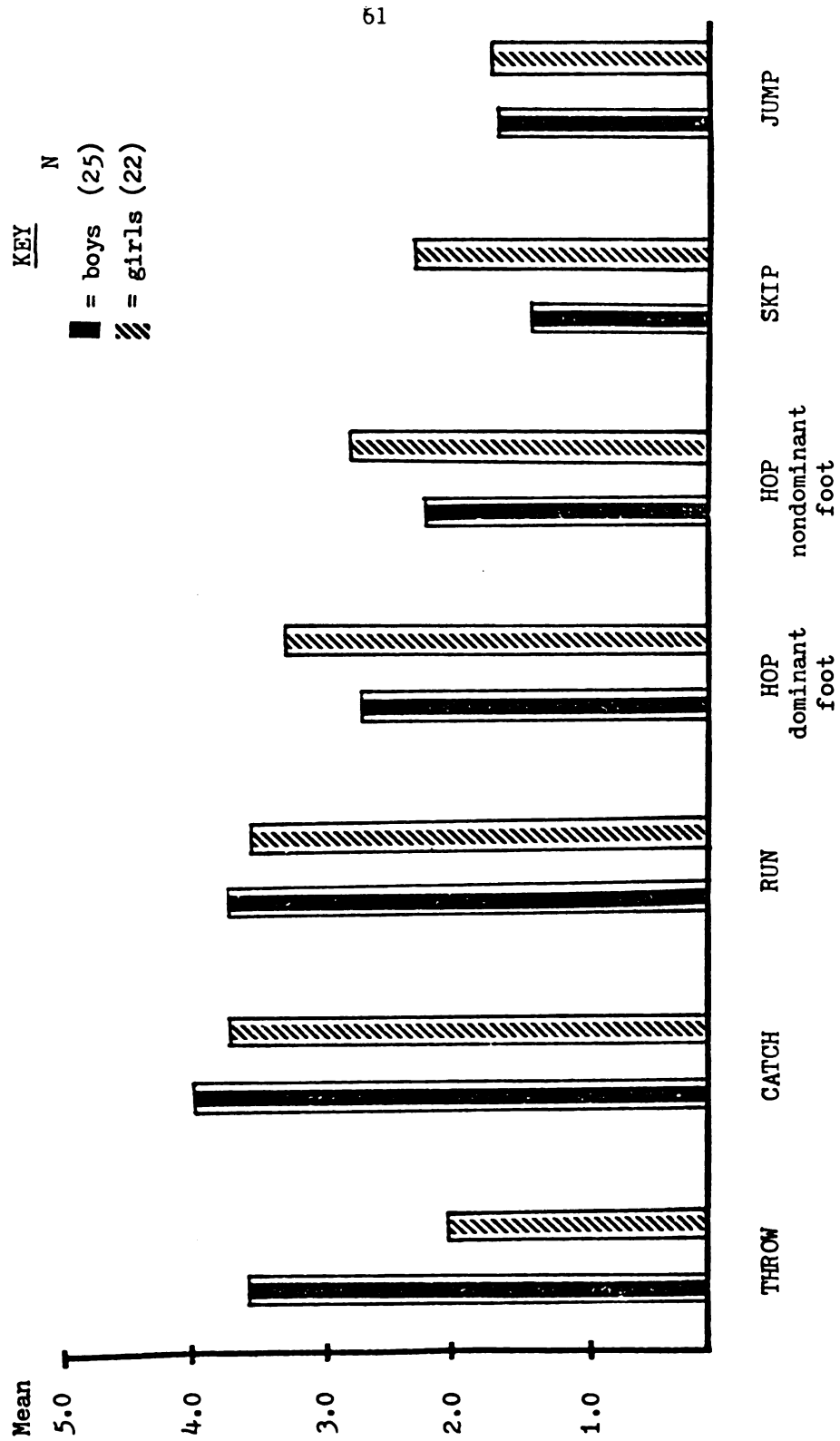


Figure 4.3: Pretreatment performance means for boys and girls.

additional instruction in motor skills. The mean changes of the control group (see Figure 4.4) show that in six of the seven skills (all except the run) the boys made greater improvement than the girls. It might be assumed from this that a group with a greater proportion of boys than girls would have a greater inherent tendency for improvement. The specialist taught group had a greater proportion of boys than girls when compared to the parent tutored group and the parent tutored group had a greater proportion of boys than girls when compared to the control group. Sex may be a variable which favored improvement by the parent tutored group over the control group, but not over the specialist taught group.

Age. The distribution of children in the 5 to 6 year age range and in the 7 to 8 year age range was not equal across the groups. Did one age group make greater gains than the other age group? The control group again was used to indicate changes in the absence of additional instruction in motor skills. It can be observed in Figure 4.5 that the older children in the control group improved to a greater extent than the younger children in five of the seven skills. Thus, a group with a greater proportion of children in the seven to eight year age range would have a greater inherent tendency for improvement than a group with a greater proportion of children in the five to six year age range. The specialist taught group had a greater proportion of children in the seven to eight year age range. Age, consequently, was a variable which may have favored greater improvement by the specialist taught group when compared to the parent tutored group and the control group.

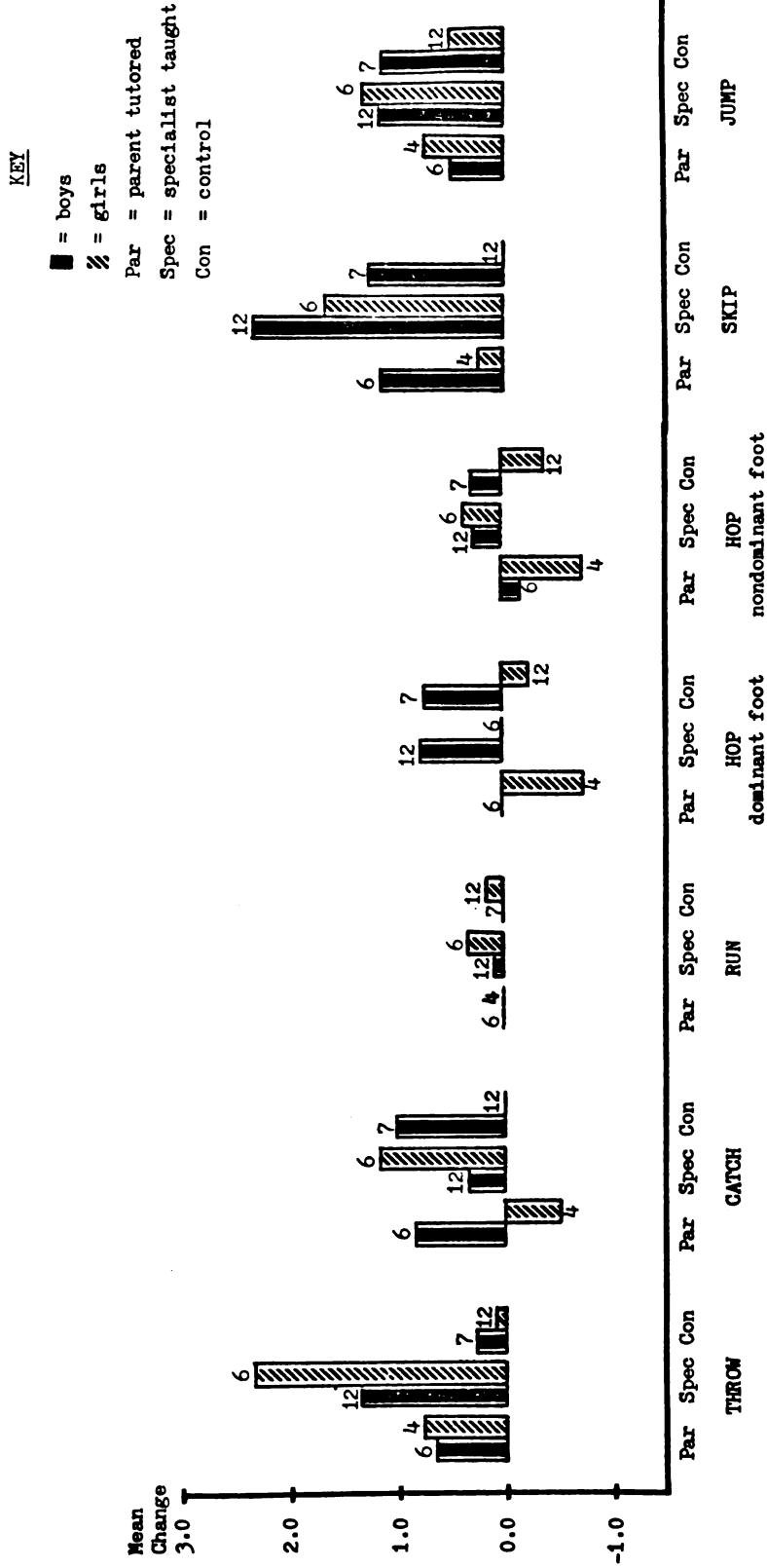


Figure 4.4: Mean changes in motor skill performance for boys and girls.

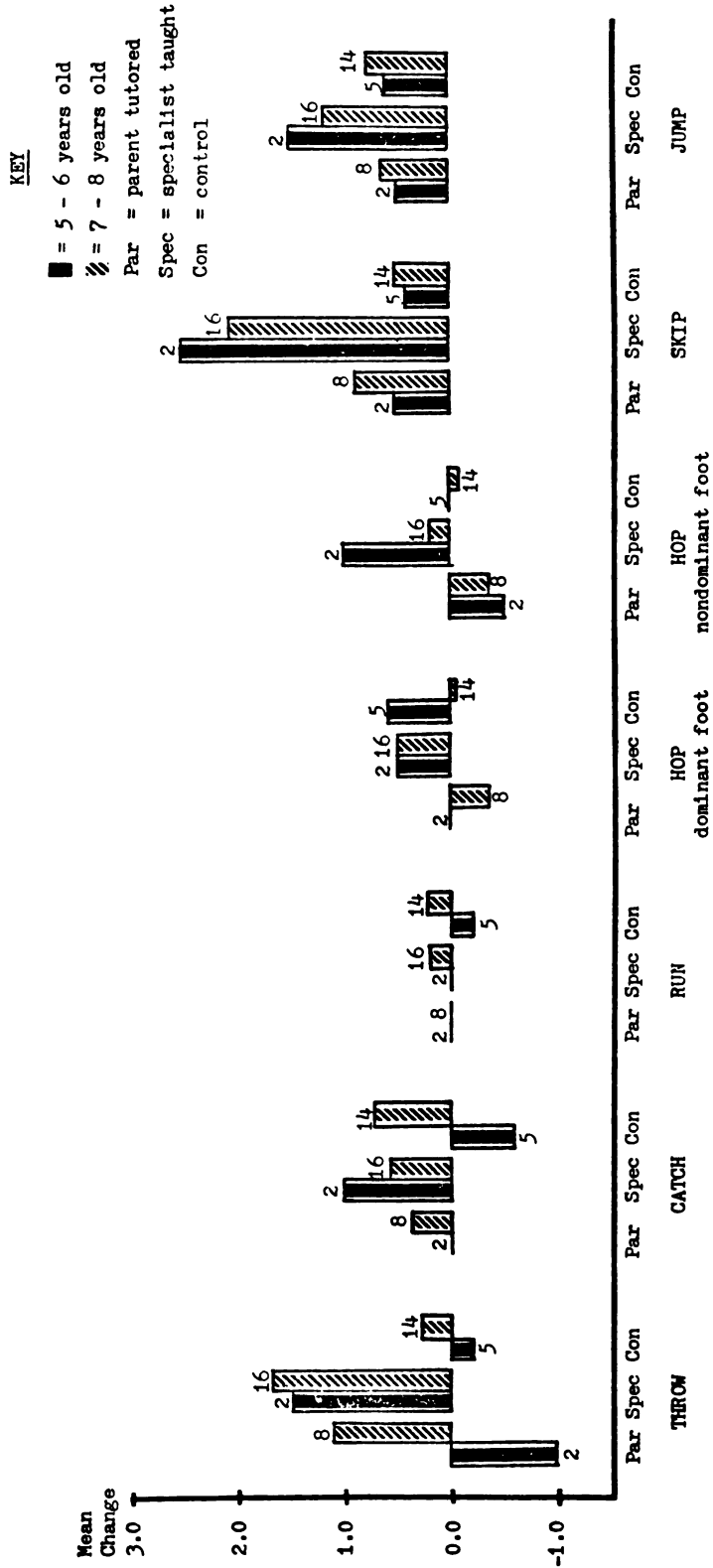


Figure 4.5: Mean changes in motor skill performance for children 5 - 6 years of age and for those 7 - 8 years of age.

The younger children in the specialist taught group improved their performance to a greater extent than the older children in four of the seven skills (see Figure 4.5). This could indicate that the younger children responded better to instruction than the older children or that there was a "ceiling effect" for the older children. In this case, age would be a variable which would favor greater improvement by the parent tutored and control groups than by the specialist taught group because of the greater proportion of younger children in these two groups.

These results do not support findings in the literature which suggest that parents can be effective in assisting their children in the remediation of learning problems. Hickman (28) may have been correct in suggesting that parents should not play the role of the teacher. On the other hand, it may have been the nature of the task which limited the effectiveness of the parents' teaching. Cognitive skills may be more amenable than motor skills to parental tutelage. Before definite conclusions may be drawn, conditions which provide a larger sample size, a greater degree of parental participation and various techniques for parent learning and tutoring should be studied.

The results of this study confirm the effectiveness of the specialist in physical education to remediate basic motor skill deficiencies in young children. In comparison, the classroom teachers (control group) were ineffective in the remediation of motor skill deficiencies during the children's regular physical education class. The classroom teacher is not prepared to assess basic motor skill deficiencies, let alone attempt their remediation. The importance of early intervention and, consequently, diagnosis for the remediation of

learning problems has been well established. The setting for diagnosis and intervention of motor skill problems is the physical education class. This study clearly demonstrates the effectiveness of a qualified specialist in physical education with a background in motor learning for remediating motor skill deficiencies in children. This study did not succeed in demonstrating the effectiveness of parents in remediating motor skill deficiencies in their children.

Chapter 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to determine the effectiveness of parental involvement in the remediation of basic motor skill deficiencies in children through programs implemented in the home. Forty-seven children in grades K through 2, found to be deficient in at least two of six basic motor skills, were assigned to one of three instructional groups. Experimental Group One was tutored by parents in the home, Experimental Group Two received small group instruction from a specialist in physical education and a control group received no special instruction in motor skills. Both experimental groups received instruction in six basic motor skills: throwing, catching, running, hopping, skipping and jumping. Subjects were randomly assigned to Experimental Group Two and the control group, but Experimental Group One consisted of the children of ten parents who volunteered to participate in this study.

The pretreatment and posttreatment performance in each skill by all children were recorded on 8mm film. The films were analyzed to obtain two different assessments of performance. The first assessment yielded information about the stages of skill development exhibited by the children for each skill. The second assessment provided knowledge of improvement made by children within the motor skills by recording

changes in the subroutines of each skill. Due to the ordinal nature of the data, all scores were standardized and z-scores were assigned prior to analysis. The subroutine analysis was conducted to account for the possibility that a child could improve or decline in performance without demonstrating a change in the developmental stage of a skill.

It was determined that the pretreatment differences should be accounted for in the analysis, especially since the parent tutored group was not randomly assigned. The test statistic used was an analysis of covariance (AOC) with the pretreatment scores as the covariable. In both the stage analysis and the subroutine analysis, the hypothesis tested was that there were no significant differences among the instructional groups. Both analyses showed that there was a significant difference ($p < .001$).

Two a priori tests were performed to determine the effectiveness of parents as tutors under both the stage and subroutine analyses. It was found that the specialist taught group showed significantly greater improvement in the basic motor skills than either the parent tutored group or the control group. The parent tutored group was not found to be significantly different from the control group which did not receive additional instruction for the improvement of basic motor skills.

Conclusions

The following conclusions have been made for children deficient in the basic motor skills of throwing, catching, running, hopping, skipping and jumping. These conclusions are based upon the results of this study and are generalizable to the motor performance of children between the ages of five and eight years who attended schools in the Lansing Public School District in Lansing, Michigan.

1. There was a significant instructional effect ($p < .001$) upon the development of six basic motor skills.
2. Instruction in motor skills by a specialist in physical education resulted in significantly greater ($p < .001$) development of basic motor skills than motor skill instruction by parents.
3. Instruction in motor skills by a specialist in physical education results in significantly greater ($p < .001$) development of basic motor skills than no motor skill instruction.
4. Judgment as to the effectiveness of the motor skill instruction by parents compared to no motor skill instruction has been reserved due to the lack of sufficient power of the test to detect a significant difference. Such a judgment must be based on information from a larger sample.

Recommendations

The effectiveness of parents as tutors for children with basic motor skill deficiencies has not been resolved. Further research is needed which should take the following recommendations into consideration.

1. The sample size should be increased to increase the power of the test. Based on the ability to detect a difference in means of .5 (delta) with a moderate pattern of variability, the optimal sample size was calculated to be 64 children per group.
2. Procedures should be developed to allow for the random assignment of children to all groups, including the parent tutored group.
3. Sex and possibly age are variables which should be controlled.

4. An attempt should be made to control for the stage of development because the difficulty of attaining each stage and sub-routine has not been determined.
5. A period of time longer than fourteen weeks in duration should be planned to allow for the parents to become more familiar with the motor skills.
6. Different approaches in working with the parents should be attempted. It may be more effective to instruct the parents in motor skill development before implementing a teaching program to compare the effectiveness of parents' tutoring to that of a specialist in physical education.
7. An approach should be tried to provide the physical education specialist with more input concerning the effectiveness of parents as tutors. Perhaps the parents could be encouraged to do a portion of their motor skill instruction in a clinical setting under the supervision of the specialist.
8. A study which compared the home and the school as learning settings would be of value to determine if children can learn equally as well in each setting. Perhaps parents could be more effective teachers if the teaching took place in a school setting.
9. More data should be collected and reported on the child's development of basic motor skills and the determination of levels of proficiency in children.
10. The retention abilities of children with motor skill deficiencies should be determined. Perhaps a follow-up study of the children in the specialist taught group would be a place to begin.

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APPENDIX A

PERMISSION TO SCREEN

APPENDIX A

PERMISSION TO SCREEN

Dear Parent/Guardian:

The primary emphasis of public education is the development of cognitive abilities in children of all ages. However, the school also has a responsibility to the physical and social aspects of child development.

The motor development of the young child is revealed in the performance of basic motor skills such as jumping, throwing, catching, and kicking. The successful and efficient performance of these skills often serves as an avenue for social and cognitive development, while inadequate function in motor skills can have a detrimental influence on the child's self-concept. In addition, a child who is delayed in motor skill development is often excluded from the play experiences of other children. Frequently this exclusion is initiated by the child's peers; however, many times it is the personal decision of the child to pursue sedentary activities or to simply watch others play.

The child is usually aware of the fact that his/her skill level is not "good enough" to "join in the game." This can be a tremendous emotional burden to the child. Perhaps you know a child who is always chosen last for a team. Children know that "last" means being a liability rather than an asset to the team. The situation becomes even worse when the expectations of the peer group are confirmed by the child's unskillful performance.

If the motor skill problem can be detected early in a child's development, there is a better chance for substantial improvement in skill level through remedial education. The key lies in early detection. Children attending Gunnisonville Elementary School will have the opportunity to have their motor skills screened in the near future by a specialist in motor learning. Parents of those children who have been identified as having motor skill deficiencies will be contacted concerning a program to be offered later in the year. If you would like your child to receive the initial screening, please return the enclosed permission slip. There is no charge for this service.

Sincerely,

MOTOR SKILL SCREENING

PERMISSION SLIP

CHILD'S NAME: _____ BIRTHDATE: _____

PARENT/GUARDIAN: _____

ADDRESS: _____
(Street)_____
(City) (State) (Zip)

PHONE: _____

I give my permission for _____ to participate
(Child's Name)

in the motor skill screening.

Parent's/Guardian's Signature (Date)

APPENDIX B

SCREENING INSTRUMENT

APPENDIX B

SCREENING INSTRUMENT

The screening instrument assessed children on the same six basic motor skills as taught during the study. Following the recording forms are the descriptions of the developmental stages of each skill. The stages for the skip are the same as for the hop. Instructions used were the same as those found in Appendix D.

MOTOR SKILL DEVELOPMENT

Recording Form

		Minimum Development						
BOYS =		5-6 7-8	3 5	3 4	4 4	2-26" 3	1-4+ 2-6+	xxx 2
Date No	NAME	Gr AGE	Throw	Catch	Run	Jump	Hop* R L	Skip
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
GIRLS =		5-6 7-8	2 5	3 4	3 4	2-23" 3	1-10+ 7+ 3-10+	2 3
Date No	NAME	Gr AGE	Throw	Catch	Run	Jump	Hop* R L	Skip
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

*Circle dominant foot

Seefeldt
Haubenstricker
7-27-75

Developmental Sequence of Throwing

- Stage 1. The throwing motion is essentially posterior-anterior in direction. The feet usually remain stationary during the throw. Infrequently, the performer may step or walk just prior to moving the ball into position for throwing. There is little or no trunk rotation in the most rudimentary pattern at this stage, but those at the point of transition between stages one and two may evoke slight trunk rotation in preparation for the throw and extensive hip and trunk rotation in the "follow-through" phase. In the typical stage one the force for projecting the ball comes from hip flexion, shoulder protraction and elbow extension.
- Stage 2. The distinctive feature of this stage is the rotation of the body about an imaginary vertical axis, with the hips, spine and shoulders rotating as one unit. The performer may step forward with either an ipsilateral or contralateral pattern, but the arm is brought forward in a transverse plane. The motion may resemble a "sling" rather than a throw due to the extended arm position during the course of the throw.
- Stage 3. The distinctive pattern in stage three is the ipsilateral arm-leg action. The ball is placed into a throwing position above the shoulder by a vertical and posterior motion of the arm at the time that the ipsilateral leg is moving forward. This stage involves little or no rotation of the spine and hips in preparation for the throw. The follow-through phase includes flexion at the hip joint and some trunk rotation toward the side opposite the throwing.
- Stage 4. The movement is contralateral, with the leg opposite the throwing arm striding forward as the throwing arm is moved in a vertical and posterior direction during the "wind-up" phase. There is little or no rotation of the hips and spine during the wind-up phase; thus, the motion of the trunk and arm closely resemble those of stages one and three. The stride forward with the contralateral leg provides for a wide base of support and greater stability during the force production phase of the throw.
- Stage 5. The "wind-up" phase begins with the throwing hand moving in a downward arc and then backward as the opposite leg moves forward. This concurrent action rotates the hip and spine into position for forceful derotation. As the contralateral foot strikes the surface the hips, spine and shoulder begin derotating in sequence. The contralateral leg begins to extend at the knee, providing an equal and opposite reaction to the

throwing arm. The arm opposite the throwing limb also moves forcefully toward the body to assist in the "equal and opposite" reaction.

Developmental Sequence of Catching

- Stage 1. The child presents his arms directly in front of him, with the elbows extended and the palms facing upward or inward toward the mid sagittal plane. As the ball contacts the hands or arms, the elbows are flexed and the arms and hands attempt to secure the ball by holding it against the chest.
- Stage 2. The child prepares to receive the object with the arms in front of the body, the elbows extended or slightly flexed. Upon presentation of the ball the arms begin an encircling motion which culminates by securing the ball against the chest. Stage two also differs from stage one in that the receiver initiates the arm action prior to ball-arm contact in stage two.
- Stage 3. The child prepares to receive the ball with arms which are slightly flexed and extended forward at the shoulder. Many children also receive the ball with arms which are flexed at the elbow, with the elbow ahead of a frontal plane.
- Substage 1. The child uses his chest as the first contact point of the ball and attempts to secure the ball by holding it to his chest with the hands and arms.
- Substage 2. The child attempts to catch the ball with his hands. Upon his failure to hold it securely, he maneuvers it to his chest where it is controlled by hands and arms.
- Stage 4. The child prepares to receive the ball by flexing the elbows and presenting the arms ahead of the frontal plane. Skillful performers may keep the elbows at the sides and flex the arms simultaneously as they bring them forward to meet the ball. The ball is caught with the hands, without making contact with any other body parts.
- Stage 5. The same upper segmental action is identical to stage four. In addition, the child is required to change his stationary base in order to receive the ball. Stage five is included because of the apparent difficulty which many children encounter when they are required to move in relation to an approaching object.

Developmental Sequence of Running

- Stage 1. The arms are extended sideward at shoulder height (high-guard position). The stride is short, and of shoulder width. The surface contact is made with the entire foot, simultaneously. Little knee flexion is seen. The feet remain near the surface at all times.
- Stage 2. Arms are carried at "middle guard" (waist height), the stride is longer and approaches the mid-sagittal line. Contact is usually with the entire foot striking the surface simultaneously. Greater knee flexion is noted in the restraining phase. The swing leg is flexed and the movement of the legs becomes anterior-posterior.
- Stage 3. The arms are no longer used primarily for balance. Arms are carried below waist level and may flex and assume a counter-rotary action. The foot contact is "heel-toe." Stride length increases and both feet move along a mid-sagittal line. The swing leg flexion may be as great as 90 degrees.
- Stage 4. Foot contact is heel-toe at slow or modest velocities but may be entirely on the metatarsal arch during sprint running. Arm action is in direct opposition to leg action. Knee flexion is used to maintain the momentum during the support phase. The swing leg may flex until it is nearly in contact with the buttocks during its recovery phase.

Insufficient movements common to running patterns are: inversion or eversion of the foot during the support phase. Inversion results in a medial rotation of the leg and thigh during the support phase and is characterized by an oblique rather than an anterior-posterior pattern as the leg is brought forward in the swing phase.

Eversion of the foot during the support phase results in lateral rotation of the leg and thigh. This pattern is often accompanied by an exaggerated counter-rotary action of the arms in an attempt to maintain a uniform direction.

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9-22-75

Developmental Stages of Hopping

- Stage 1. The non-support knee is flexed at 90° or less with the non-support thigh parallel to the surface. This position places the non-support foot in front of the body so that it may be used for support in the event that balance is lost. The body is held in an upright position with the arms flexed at the elbows. The hands are held near shoulder height and slightly to the side in a stabilizing position. Force production is generally limited so that little height or distance is achieved in a single hop.
- Stage 2. The non-support knee is fully flexed so that the foot is near the buttocks. The thigh of the non-support leg is nearly parallel to the surface. The trunk is flexed at the hip resulting in a slight forward lean. The performer gains considerable height by flexing and extending the joints of the supporting leg and by extending at the hip joint. In addition, the thigh of the non-support leg aids in force production by flexing at the hip joint. Upon landing, the force is absorbed by flexion at the hips and the supporting knee. The arms participate vigorously in force production as they move up and down in a bilateral manner. Due to the vigorous action and precarious balance of performers at this stage, the number of hops generally ranges between two and four.
- Stage 3. The thigh of the non-support leg is in a vertical position with the knee flexed at 90° or less. Performers exhibit greater body lean forward than in stages one or two, with the result that the hips are farther in front of the support leg upon take-off. This forward lean of the trunk results in greater distance in relation to the height of the hop.
- The thigh of the non-support leg remains near the vertical (frontal) plane, but knee flexion may vary as the body is projected and received by the supporting leg. The arms are used in force production, moving bilaterally upward during the force production phase.
- Stage 4. The knee of the non-support leg is flexed at 90° or less, but the entire leg swings back and forth like a pendulum as it aids in force production. The arms are carried close to the sides of the body, with elbow flexion at 90° . As the non-support leg increases its force production, that of the arms seems to diminish.

Developmental Sequence of the Standing Long Jump

- Stage 1. Vertical component of force may be greater than horizontal, resulting jump is then upward rather than forward. Arms move backward, acting as brakes to stop the momentum of the trunk as the legs extend in front of the center of mass.
- Stage 2. The arms move in an anterior-posterior direction during the preparatory phase, but move sideward (winging action) during the "in-flight" phase. The knees and hips flex and extend more fully than in stage one. The angle of take off is still markedly above 45° . The landing is made with the center of gravity above the base of support, with the thighs perpendicular to the surface rather than parallel as in the "reaching" position of stage four.
- Stage 3. The arms swing backward and then forward during the preparatory phase. The knees and hips flex fully prior to take-off. Upon take-off the arms extend and move forward, but do not exceed the height of the head. The knee extension may be complete but the take-off angle is still greater than 45° . Upon landing, the thigh is still less than parallel to the surface and the center of gravity is near the base of support when viewed from the frontal plane.
- Stage 4. The arms extend vigorously forward and upward upon take-off, reaching full extension above the head at "lift-off." The hips and knees are extended fully with the take-off angle at 45° or less. In preparation for landing the arms are brought downward and the legs are thrust forward until the thigh is parallel to the surface. The center of gravity is far behind the base of support upon foot contact, but at the moment of contact the knees are flexed and the arms are thrust forward in order to maintain the momentum to carry the center of gravity beyond the feet.

APPENDIX C

REGISTRATION INFORMATION

APPENDIX C

REGISTRATION INFORMATION

Dear Mr. and Mrs.

The screening of developmental motor skills in which your child participated has been completed. Our results indicate that your child's skill development is delayed in several areas that are considered basic to further motor skill acquisition. Therefore, we would like to offer an opportunity for your child to become involved in a program designed to provide compensatory motor education to young children. The program is an experimental situation that will be conducted in the _____ Elementary School.

A study will be conducted to compare the effectiveness of two different teaching methods in providing compensatory motor skill programs for children. The study will have three parts: (1) a pretreatment assessment and recording of skills on film, (2) 14 weeks of lessons in motor skill development, and (3) a posttreatment assessment and recording of skills on film. Three groups of children will be involved in this study. One group of children will meet with a motor learning specialist twice a week during school for 14 weeks. A second group of children will be tutored by parents in their respective homes. Parents of these children will meet once a week after school for 14 weeks with a specialist in motor learning for the purpose of receiving assistance in the teaching of motor skills to their children. The third group will serve as control subjects. The children in this group will be assessed with the other children, but will receive no instruction. However, a weekly session of instructions for parents will be arranged after the final assessment for those who wish to participate.

Parents who desire to have their children participate in this study will be required to: (a) have their child's motor skills assessed and recorded on film before the study begins, (b) ensure that their child receives instructional sessions twice a week with a specialist, (or) attend a meeting once a week with a specialist and tutor their child at home, (c) make a commitment to participate for the entire duration of the study (14 weeks) and, (d) have their child's motor skills assessed and recorded on film at the end of the 14 week instructional period.

If you are interested in having your child participate in the instructional program or desire more information concerning its objectives and operational procedures, phone _____ from 10:00 a.m. to 8:00 p.m. or _____ any other time.

Sincerely yours,

MOTOR SKILL PROGRAM

Registration Form

CHILD'S NAME: _____ BIRTHDATE: _____

PARENT/GUARDIAN: _____

ADDRESS: _____
(street)

(city) (state) (zip)

PHONE: _____

I give my permission for _____ to participate in
(Child's Name)
the motor skill program referred to in the letter dated 12-17-76. I
will agree to the following conditions:

(Please check the appropriate spaces.)

- ___ 1. to allow my child to be filmed before the program begins.
- ___ 2. to allow my child to participate for 14 weeks in lessons conducted by a motor learning specialist.
- ___ 3. to attend a meeting for parents once a week conducted by a motor learning specialist and to tutor my child at home one hour per week for 14 weeks.
- ___ 4. to allow my child to be filmed after the 14 week instructional period.

I understand that any film taken will be used for educational purposes only.

I also understand that my child's name will be held in the strictest confidence.

Parent's/Guardian's Signature_____
Date

APPENDIX D

SKILL ASSESSMENT

APPENDIX D

SKILL ASSESSMENT

CATCHING

- PURPOSE: To measure the child's ability to catch a tossed ball.
- EQUIPMENT: One 8 1/2" inflated ball; space with adequate distance (15' minimum) and height (10' minimum) for tossing the ball.
- PROCEDURE: The child stands opposite the examiner at a distance of 10' to 15'. The examiner tosses the ball in an arc using an underarm pattern in such a manner that the ball is received by the child at chest height. The child attempts to catch the ball. Three trials are given. Film the third trial.
- INSTRUCTIONS TO THE CHILD: "Isn't this a nice ball. Hold it and see how light it is. See if you can catch it when I toss it to you. Ready? (Toss the ball.) Can you toss it back? Good! Here it comes again. Ready?"
- SCORING: Record the developmental stage of catching (see Appendix B) from the film.

HOPPING

- PURPOSE: To measure the child's ability to hop.
- EQUIPMENT: Space to hop 15' to 20' in length; starting boundary.
- PROCEDURE: The child begins at a designated starting position and hops on one foot as far as possible or until instructed to stop. The child then hops on the other foot. One or two trials are given for each foot. A minimum of 10 hops should be attempted. Film all attempts.
- INSTRUCTIONS: "I would like you to try and hop on one foot. Do you
- TO THE CHILD: know how to hop? (Demonstrate if child hesitates.)
Stand here (designate place). I'm going to sit here (indicate chair). When I say 'Go,' see if you can hop on one foot all the way over to there (indicate).
Ready? Go! Good! Let's try it again only this time on the other foot. Ready? Go!"
- SCORING: Record the developmental stage of hopping (see Appendix B) for each foot from the film; indicate the dominant foot.

JUMPING

- PURPOSE: To measure the ability to jump using a two-footed take-off.
- EQUIPMENT: A gym mat; starting line 1' from end of mat.
- PROCEDURES: The child stands with toes behind the starting line and jumps forward as far as possible using a two-footed take-off. Allow three trials. Film trial three.
- INSTRUCTIONS TO THE CHILD: "I want you to stand behind this line and take one big jump forward like this (demonstrate). Now you try it. Good! I'm going to sit over there (indicate chair) and when I say 'Go,' jump as far as you can. Stand behind the line. Ready? Go!"
- SCORING: Record the stage of development of jumping (see Appendix B) from the film.

RUNNING

- PURPOSE: To measure the child's ability to run.
- EQUIPMENT: Space to run with a minimum distance of 25'; starting and finishing boundaries with space beyond for stopping; chair.
- PROCEDURES: The child begins at a designated starting position and runs as fast as possible to a designated finishing position. Allow one trial.
- INSTRUCTIONS TO THE CHILD: "I want you to show me how fast you can run. Start behind this line. I'm going to sit over there (indicate chair). When I say 'Go,' run as fast as you can to ____ (designate location). Ready? Go! O.K. Good!"
- SCORING: Record the developmental stage of running (see Appendix B) from the film.

SKIPPING

- PURPOSE: To measure the child's ability to skip.
- EQUIPMENT: Space to skip 15' to 20' in length; starting boundary.
- PROCEDURE: The child begins at a designated starting position and skips across the space. Allow two trials. Film trial two.
- INSTRUCTIONS "Do you know how to skip? (Demonstrate if child
TO THE CHILD: hesitates to answer.) I want you to stand behind this line. I'm going to sit over there (indicate chair). When I say 'Go,' see if you can skip all the way to ____ (designate place). Ready? Go!"
- SCORING: Record the developmental stage of skipping (see Appendix B) from the film.

THROWING

- PURPOSE: To measure the child's ability to throw a ball overhand.
- EQUIPMENT: Three tennis balls; a wall or flat vertical surface at which to throw; a minimum space of 15' from which to throw. A nerf ball will be used whenever the 15' minimum distance cannot be met.
- PROCEDURES: The child stands in a designated position at least 15' from the wall and throws as hard as possible at the wall using an overhand pattern. Allow three trials. Use the first trial to determine the dominant hand, the second trial for practice and film the third trial. Retrieve the tennis balls at the completion of all three trials.
- INSTRUCTIONS "I want you to show me how hard you can throw this ball
- TO THE CHILD: at that wall (indicate wall). When I say 'Go,' throw the ball as hard as you can at the wall. Ready? Go! Good! I would like you to throw it again. Remember, throw it as hard as you can. Ready? Go!"
- SCORING: Record the developmental stage of throwing (see Appendix B) from the film.

APPENDIX E

RECORDING FORMS

APPENDIX E

RECORDING FORMS

Included in this Appendix are examples of the recording forms used in the stage and subroutine analyses. Also included are a list of the subroutines used in the analysis of each skill based on the defined stages.

Developmental Stage

The assessed stage becomes the child's score for each skill. These scores are then summed across all skills to obtain the total.

Subroutine Analysis

The stage of development for each subroutine is determined from the list provided and then the appropriate box is marked on the recording form. Each box opposite a defined subroutine is scored as one point, i.e., if the third box is marked, then the score for that subroutine is three. The stage of development, however, does not always correspond to the score provided for each subroutine. For example, the arm-leg action of the throw is the same for stages four and five. A contralateral pattern, therefore, would receive four points in the subroutine analysis. After each subroutine is scored, all the scores are then totaled across all skills and entered at the top of the form.

[illegible]

(date)

Subroutine Analysis

Number: _____ Group: _____ Pretest: _____ Posttest: _____

THROWING: 5 R L

Arm Motion				
Arm : Leg				
Rotation				
prep				
follow-				
through				
Force Production				

CATCHING: 5

Arm Prep				
Action				
contact				
secure				

RUNNING: 4

Arms				
Foot				
Contact				
Knee				
Flexion				
Stride				

HOPPING: 4 Dominant

Nonsupport				
knee				
thigh				
foot				
Trunk				
Force Production				
legs				
nonsupp				
support				
arms				
Landing				

Nondominant

SKIPPING: 4

JUMPING: 4

Arms				
Knees & Hips				
Angle of				
Take off				
Thighs				
Landing				

(evaluator)_____
(date)

SUBROUTINE DEVELOPMENT BY STAGE

Catching

	stage 1	stage 2	stage 3	stage 4	stage 5
Arm Prep	directly:front elbows ext palms upwd/inwd	in front elbows ext or flexed slightly	slightly flexed & ext fwd at shoulder or elbow flex ahead of frontal plane	elbow flexed - at sides or - ahead of frontal plane	elbow flexed ahead of frontal plane
Action contact	elbows flexed	arms encircle	chest 1st or hands 1st	hands	hands
securing	arms & hands to chest	to chest	to chest	hands only	moves to meet ball - hands

SUBROUTINE DEVELOPMENT BY STAGE

Hopping

stage 1 stage 2 stage 3 stage 4

Non-support knee	$\leq 90^\circ$	fully flexed	$\leq 90^\circ$	$\leq 90^\circ$
thigh	parallel: surface	nearly parallel	vertical	
foot	front of body	near buttocks		
Trunk	upright	flexed	greater fwd lean	
		slight fwd lean	hips fwd of supp leg at take-off	
Force Production	limited little ht or dist 1 hop	more ht than dist 2 - 4 hops	more dist than ht	
legs non support		flex hip jt	thighs remain vert	pendular swing
		flex & ext	knee flex may vary	
support		ext hip jt		
		up & down bilaterally	bilaterally upwd	diminish F prod as non-suppl leg increases
arms	flexed at elbows hands near shldr for balance			
Landing		flex at hips & support knee		

SUBROUTINE DEVELOPMENT BY STAGE

Jumping

stage 1 stage 2 stage 3 stage 4

Arms	backward "braking"	ant-post to sideward	bwd then fwd ext : head ht	vigorous fwd & upwd ext above head
Knees & Hips	force more vert than horizontal	ext more fully than stage 1	knee extension may be complete	extended fully
Angle of Take-off	more upwd than fwd	much $>45^\circ$	$>45^\circ$	$<45^\circ$
Thighs at Landing		perp to floor c of g above base	parallel c of g near base	parallel to surface as legs thrust fwd c of g behind base with contact knees flex arms thrust fwd c of g carried beyond ft

SUBROUTINE DEVELOPMENT BY STAGE

Running

stage 1 stage 2 stage 3 stage 4

Arms	high-guard sideward shldr ht	middle-guard waist height	below waist may flex counter-rotary	opposition:leg action
Foot Contact	entire foot	entire foot	heel - toe	heel - toe or metatarsal arch
Knee Flexion	little	greater	<90°	>90° buttock
Stride	short shldr width	longer approaches mid-sagittal	longer on mid-sagittal	

SUBROUTINE DEVELOPMENT BY STAGE

Throwing

	stage 1	stage 2	stage 3	stage 4	stage 5
Arm Motion	posterior-anterior	transverse plane	verticle-posterior	verticle-posterior	downward arc then backward
Arm : Leg	feet stationary	step with either ft	ipsilateral	contralateral	contralateral
Rotation prep	little or none	body about imaginary vert axis	little or none	little or none	hips & spine
----- follow-through	slight trunk none:extensive hip & trunk		hip flexion trunk: side opp throw (some)		hip, spine & shldr derotate in sequence
Force	hip flexion shldr protraction elbow extension				contralateral knee extension opp arm : body forcefully