AN ABSTRACT OF THE THESIS OF

Margaret K. Bates for the degree of Master of Science in Movement Studies for the Disabled present on July 28, 1989.

Title: Effect of Peer Group Presence on the Gross Motor Performance of Young Children

Abstract approved: Redacted for Privacy
John M. Dunn

The purpose of this study was to determine if passive peer group presence had a significant effect on the performance of students on the Test of Gross Motor Development (TGMD).

Fifty-eight volunteer nonhandicapped children aged five, eight, and ten years were subjects for the study. There were 18 subjects aged five years and 20 subjects in each of the eight and ten year age group. Subjects were volunteers from Crooked River Grade School and a pre-school classroom in Prineville, Oregon. The subjects were free from obvious physical or mental disabilities.

Subjects were tested on the 12 skills of the Test of Gross Motor Development (Ulrich, 1985). These skill items included seven locomotor, and five object control skills.

All 58 subjects were administered the TGMD twice. One test session was conducted with the subject and the

experimenter present. Another test session was conducted with four of the subject's peers and one adult observer present as a passive audience. Subjects were randomly assigned to an initial testing condition to counterbalance any effect of one condition over the other. To reduce observational learning, the peer audience was comprised of children who were not subjects or subjects who had previously completed all testing. All subjects were tested under both conditions during a two week period.

A 3 x 2 (age x condition) analysis of variance (ANOVA) for the individual skills indicated only the run and gallop to be significantly different by condition. These two skills were the first skills tested, which may have contributed to the difference in performance.

All skills had significant differences by age, except the run and leap. This finding would be expected as 5-, 8-, and 10-year-olds commonly perform skills differently, with older children generally having more skills mastered. Ulrich (1985) reported acceptable discrimination power of the TGMD skills by age level. The mastery level of the subjects on the run and leap was very high and therefore, the means did not differ significantly among age groups. There were no significant interactions of age x condition for any skill.

This study revealed more subjects performing at a mastery level in the nonpresence than presence condition, but significant differences were noted in only two skills, run and gallop. This result does not seem to coincide with the generally accepted theory of simple tasks being sensitive to social facilitation. The performance difference may be due to an order effect. The run and gallop were the first skills performed during each test session. Apprehension of audience reaction may have inhibited performance of the initial skills.

The effect of an audience was apparent at the beginning of a testing session. The skills of run and gallop were the first two skills tested in each testing session and, whether mastered or not, results indicated these skills were influenced by the presence of a passive peers.

Effect of Peer Group Presence
on the Gross Motor Performance
of Young Children

by

Margaret K. Bates

A THESIS

submitted to

Oregon State University

in partial fulfillment of
the requirements for the
degree of

Master of Science

Completed July 28, 1989

Commencement June 1990

APPROVED:

Redacted for Privacy

Professor of Exercise and Sport Science in charge of major

Redacted for Privacy

Chairman of the Department of Exercise and Sport Science

Redacted for Privacy

Dean of College of Health and Human Performance

Redacted for Privacy

Dean

Date thesis is presented July 28, 1989

Typed by Margaret Bates for Margaret Bates

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

LIST OF TABLES

List of Appendix Tables

EFFECT OF PEER GROUP PRESENCE ON THE GROSS MOTOR PERFORMANCE OF YOUNG CHILDREN

CHAPTER I

INTRODUCTION

Public Law 94-142 (Education for All Handicapped Children Act, 1975), mandates that students with disabilities be provided an education appropriate to their needs. In addition, the law requires that students be educated in the least restrictive environment, the setting in which the students can best learn. The intent of the least restrictive environment concept is to provide a free, appropriate, public education for students with special needs in a setting where each can maximize his or her potential. Educating students in the appropriate setting is a complex process and is not accomplished simply through the integration and/or segregation of students with disabilities (Dunn & Craft, 1985).

Determining the proper educational setting involves an ongoing process of screening and evaluation. Valid and reliable tests can provide information to assist with development of programming objectives, which in turn aid placement decisions. Frequently, using invalid and unreliable data gathered in inappropriate testing environments, important educational decisions are made regarding placement and programming for individuals with handicapping conditions. One aspect, of particular concern to this study, is the effect of different testing environments on the motor performance of young children, (i.e. peer presence or peer nonpresence). Care needs to be exercised when determining the environment for test administration.

Public Law 94-142 specifies that physical education services must be provided to students with handicapping conditions. Physical education is defined as the "development of:

> a) physical and motor fitness;
>
> b) fundamental motor skills and patterns;
>
> c) skills in aquatics, dance, individual and group games and sports (including intramural and lifetime sports).
>
> ii) the term includes special physical education, adapted physical education, movement education and motor development" (Federal Register, 1977:Sec. 121a.346).

Public Law 94-142 infers that an individual's participation in a special physical education program will be determined, in part, by valid and reliable assessments performed by knowledgeable individuals. Professionals must be trained to administer tests which are appropriate for populations with various disabilities.

One factor, among others, that affects the validity and reliability of a test is the test environment. Within specific test parameters, the environment in which the test is administered needs to be structured to achieve valid and reliable results. Many motor tests are only valid when administered individually. This creates a challenge when screening or assessing a number of children. Research has found that the testing environment has a significant impact on test results (Martens & Landers, 1969; Zajonc, 1965).

Due to time constraints, physical educators often administer tests in small groups. If one of the test parameters is to administer the test individually, then administering the test to a small group would violate that test parameter. One aspect of test validity is based on the assumption of maximal or near maximal efforts by the student. Barrow and McGee (1973) state that "A student has not been tested until he has given maximum effort" (p. 54). The presence of others during performance may inhibit or enhance the performance of the student.

Zajonc (1965), proposed that the learning or acquisition of new responses is hindered by the presence of others, while performance of previously well-learned responses is facilitated by the presence of others. Simple motor performances would seem to be sensitive to social facilitation (Zajonc, 1965).

The Test of Gross Motor Development (Ulrich, 1985) is an evaluation tool that contains many characteristics of a well-designed assessment test. One attribute of the test is the effort of the test developer to provide evidence of acceptable levels of validity and reliability. The Test of Gross Motor Development (TGMD) is both norm-referenced and criterion-referenced. The normative data may be used for recommendations of further diagnostic testing or placement decisions, while criterion-referenced data may be utilized in developing instructional plans.

The TGMD is economical, requires no special equipment, and is relatively quick to administer. The test directions state that "although the test administrator should observe one student performing at a time, it may be more economical in terms of time to test two to three students together" (p. 5). Ulrich, the test developer, however, provides no data examining the effects of social facilitation for any age group.

The major focus of the study is to analyze the effects of passive peer presence and peer nonpresence on children's gross motor performance of the Test of Gross Motor Development. Testing children in the presence of peers is considered the most time-efficient method to screen and assess physical skills. The influence of passive peer presence on a young child's performance may enhance the performance of an already mastered skill, inhibit the performance of an unmastered skill, or may have no effect on either mastered or unmastered skills. This study will provide valuable information for physical educators who are presently utilizing the TGMD.

Purpose of Study

The purpose of this study was to determine if passive peer group presence had a significant effect on the performance of students when being assessed with the TGMD. The peer group was instructed to form a passive audience with no verbal or visual interaction with the subject. They quietly observed the subject during his or her skill performance.

Significance of the Study

Before a child can be given an in-depth diagnostic test in physical education, there must be physical education assessment results (usually from a screening evaluation) indicating probable cause that a child may need some additional help in physical activities. To begin the process of successful physical education programming, proper psychomotor assessment of students is paramount. "Without it, systematic individualized programming essential to the success of mainstreaming is lost" (Lavay & DePaepe, 1987, p. 99). But, "faced with a heterogeneous group of students to evaluate, and armed with a 'mixed bag' of available motor tests, the physical educator may find test selection a frustrating dilemma" (Werder & Kalakian, 1985, p. 31).

A test that indicates either individual or group administration, but has no sample field test data to support such claims, should be scrutinized carefully. Standardized motor development and motor performance tests should specify whether the test is to be administered individually or in a group setting. This is essential so test results can be interpreted accordingly.

There has been much research of social facilitation involving college students in learning paradigms (Baron, Moore, & Sanders, 1978; Beatty & Payne, 1984; Haas & Roberts, 1975; Knowles, 1983; Martens & Landers, 1972). There is, however, an apparent void of investigation concerning the effects of the presence of others during the assessment of children. Though social facilitation has been examined through college-aged students, results of those studies can not be generalized to a younger population.

Most studies have concentrated on evaluating the effects of audience presence or absence during <u>learning</u> of simple or complex tasks (Haas & Roberts, 1975; Hollifield, 1982; Landers, Bauer, & Feltz, 1978; Sanders & Baron, 1975; Zajonc, 1965). Thus, there is a need to investigate the effect of <u>testing</u> simple or complex tasks under different audience (presence or nonpresence) conditions. The effects may or may not be synonymous with equivocal learning results.

If, as Ulrich (1985) implied, there is no significant difference between the testing environments of peer presence and peer nonpresence, then it would be unnecessary to deem the presence of passive others as having an impact on test scores. However, if testing children with an audience present, produces significantly different scores than those without an audience, this may indicate that the presence of others has an effect on performance.

This study will provide information as to the effect of passive peer presence on a child's performance during an assessment of gross motor skills.

Methodology

Fifty-eight volunteer nonhandicapped children aged five, eight, and ten years were subjects for the study. There were 18 subjects aged five years and 20 subjects in each of the eight and ten year age group. The subjects were tested on the 12 skill items of the Test of Gross Motor Development (Ulrich, 1985). These items included seven locomotor, and five object control skills.

Each subject was given the opportunity to perform the 12 skill items of the TGMD under two conditions. The test conditions were: only the experimenter present (peer nonpresence) or in view of four peer spectators (peer presence), an adult observer, and the experimenter. The audience was seated near the testing area and observed the performance of the subject quietly, with no verbal interaction. An adult observer was present to monitor the behavior of the peer subjects, and inhibit any verbal and/or visual distractions of the peer spectators during the subject's performance.

A 3 x 2 (age x conditions) between and within Analysis of Variance (ANOVA) with repeated measures on two factors (presence and nonpresence of audience), with a counterbalance of the second factor, was performed on each of the 12 test items to detect the magnitude of significant difference between conditions. The Gross Motor Development Quotient (GMDQ) was analyzed with the use of a paired-t-test to determine if there was a significant difference between independent variables (conditions) on the Test of Gross Motor Development.

Hypotheses

The following hypotheses were tested:

1. Under the conditions of passive peer presence and peer nonpresence, the performance scores of the subjects will be equal among age groups.

2. Performance scores under conditions of passive peer presence and peer nonpresence for mastered skills will be equal among age groups.

Delimitations

This study was limited to the effects of passive peer presence on the performance of the 12 locomotor and object control skills on the Test of Gross Motor Development (Ulrich, 1985). The subjects were 58 volunteer nonhandicapped children aged 5-, 8-, and 10-years, enrolled in public school or pre-school in Crook County, Oregon during the 1989-90 school year. No special shoes or clothes were required for participation. The TGMD was administered by the principal investigator.

Limitations

The subjects involved with the study did not have similar prior testing experience in physical education or physical activity. Presence or absence of peers during previous assessment experiences of locomotor and object control skills were not the same. However, it was assumed that the children were familiar with some or all of the test items.

Subjects were volunteers and may have been more motivated and comfortable participating in a test of gross motor skills than a random selection of subjects.

Definitions

For the purposes of this study, terms are defined as follows:

Behavioral (Performance) criteria: Performance components comprising each gross motor skill of the TGMD.

Coaction: The action of two or more individuals performing the same task simultaneously in view of each other.

Dominant response: The response most likely to consistently occur. In a task that has been well-learned, the dominant response will be the correct response but, if the task has not been well learned, the dominant response will be the incorrect response.

Gross motor control: is, according to Williams (1983), "...the skillful use of the total body in large muscle or gross motor activities that require intricate temporal and spatial coordination of movement of a number of body parts or segments sequentially or simultaneously" (p. 10).

Gross Motor Development Quotient (GMDQ): A type of composite standard score comprised through summation of the subtest standard scores and a tabled value on the Test of Gross Motor Development (TGMD). The GMDQ allows a broad indication of gross motor skill and has a mean of 100 and a standard deviation of 15.

Mastered Skill: A skill will be classified as mastered when the subject performs 100% of the behavioral criteria for that skill.

Motor development: The aspect of motor behavior and motor control that is involved with the study of qualitative and quantitative change in motor performance during a lifespan (Gallahue, 1982; Haywood, 1986).

Nonmastered Skill: A skill will be classified as unmastered when the subject performs below 100% of the behavioral criteria for that skill.

Passive peer presence: A condition where an audience of peers is present within the area where the subject is performing the skills, but has no verbal or visual interaction with the performer.

Social facilitation: The enhancement of a subject's dominant responses by the physical presence of an audience. This is generally independent of any informational or interactional influence exerted by others.

CHAPTER II

REVIEW OF LITERATURE

There is a large body of knowledge and research in the literature which documents and attempts to define and quantify the social facilitation phenomenon. Social facilitation research has typically concentrated on the behavioral effects that audiences have on performance.

The following review will investigate the effects of the presence of others on human learning and performance. First, some of the major research contributors in social facilitation will be reviewed, then studies concerning social facilitation and motor performance with various age groups will be explored. Third, social learning theory applied to children will be discussed and finally, a review of the test instrument, the Test of Gross Motor Development, and its significance will be presented.

Early Research of Social Facilitation

The study of social facilitation began with the development of experimental social psychology. The first experiment to assess the influence groups exert on individual performance was conducted by Triplett (1898). He observed that cyclists racing against one another rode much faster than cyclists riding alone against the clock. To further understand this phenomenon, Triplett conducted and reported the first study in which the subjects' performance was compared under conditions of isolation versus group presence. He observed that children, even when urged to work as rapidly as possible, wound line around a reel at a much faster rate when working in coacting pairs or groups than when working alone (Triplett, 1898).

Most social facilitation research conducted in the early 1900's was done by educators interested in discovering whether students' academic performance would be better when working in a group than when working in isolation (in Jones & Gerard, 1967). Discussion and debate regarding the qualitative and quantitative effects of observation on academic performance became issues of importance. Allport (1924) was one of the first psychologists to explore the various aspects of social facilitation as a basic scientific issue. He conducted a variety of experiments comparing the performance of small groups of graduate students to the performance of graduate students working in isolation. Tasks generally involved mental work (e.g. multiplication, verbal reasoning and verbal association). Reviewing his results, Allport suggested that the presence of others increases the quantity and vigor of responses at the expense of their intellectual quality, a generalization which has been remarkably well substantiated in the subsequent literature (Jones & Gerard, 1967).

Dashiell (1930), a former student of Allport, identified four distinct types of audiences: a) quiet spectators, b) vocal supporters or hecklers, c) co-working noncompetitors, and d) rivalrous competitors. Dashiell manipulated the type of audience and observed the effect on individual performance in undergraduates. Dashiell's research indicated that rivalry or competition enhanced performance, especially when the observation was perceived as intense, for example, when the observer was considered an expert at the experimental task. Pessin (1933), in a study of recall and retention, found his experimental subjects made more errors when learning a list of nonsense syllables in the presence of a passive audience than when working alone. However, recall and retention was greater for those who learned in front of an audience than for those who learned in isolation.

The early investigations of the social facilitation phenomenon suggested that the presence of others improved individual performance only under certain conditions. Influential variables may be the nature of the performance measure (i.e., quantity vs quality; Allport, 1924), the nature of the audience (i.e., quiet, vocal, co-working, and rivalrous competitors; Dashiell, 1930), and the timing of the performance assessment (i.e., learning new skills vs performance of previously learned skills; Pessin, 1933).

The 1965 Reexamination

During the ensuing years many investigations were conducted to determine the effects of the simple physical presence of others on task performance. These experiments involved a wide variety of species, tasks, and contexts and yielded highly inconsistent results. It seemed that results involving audience and no audience conditions had an equal chance of either improving or impairing performance, or of having no observable effect at all (Sanders, 1981).

In 1965, Zajonc synthesized the literature on social facilitation. In accounting for the more general effects of the presence of others, Zajonc proposed that mere presence of conspecifics would increase generalized drive or arousal. From a Hull-Spence model of drive, $E = f(H \times D)$, where "E" is the behavior, "D" is the generalized drive and "H" is the habit strength (Spence, 1956), it was predicted that simple or well-learned responses would be facilitated by the mere presence of others and that complex or poorly learned responses would be inhibited. However, Landers and McCullagh,(1976) reviewed the literature, and suggested these conclusions were valid only in situations involving quantitative (i.e., endurance or speed) measures and not when qualitative (accuracy) measures were involved.

Zajonc's general drive theory stimulated a renewed interest in social facilitation which still exists.

Alternatives to the drive theory proposal have been forwarded, but none have received much wide-spread support. The drive-theoretical explanation has been supported by dozens of researchers (Glaser, 1982), but is being questioned due to its total concentration on the elicited response, rather than the meanings or qualities of the stimulus in social situations (Kushnir & Duncan, 1978).

Several theories have been developed which attempt to account for many of the reported inconsistencies in the literature. Theorists, such as Cottrell, Wack, Sekerak, and Rittle (1968), disagreed with Zajonc's mere presence theory. Cottrell et al. (1968), in a study of undergraduate psychology students suggested an evaluation-apprehension hypothesis. This study used a pseudorecognition task of exposing subjects to various nonsense words a different number of times and then having them guess the words from a subliminal presentation. It was believed that the more frequently seen and more well-learned words would be dominant responses and would be said more often when another person was present.

Cottrell et al. (1968) found that when subjects performed the task in the presence of two observers, they emitted more dominant responses than subjects who performed alone. The subjects who performed in front of two inattentive blindfolded persons gave dominant responses at the same rate as did isolated subjects. From this, Cottrell et al. (1968) postulated that drive arousal occurs as a result of a state of learned apprehension, experienced by the subject due to perceived evaluation. In the subject's past, other people have been associated with positive and negative consequences. Through learned evaluation-apprehension, subjects learn to anticipate evaluation by the presence of an audience.

Cottrell et al. (1968) and Cottrell (1972) defined social facilitation as a learned source of drive rather than a source of generalized drive which could be considered innate or "wired into" the organism. According to Cottrell (1972), newborns do not have a motivational reaction to the mere presence of others. Individuals learn from social experiences as to anticipation of positive and negative outcomes by virtue of the presence of others. These anticipations result from previous observations, rather than, as Zajonc might suggest, an innate arousal to an audience.

Paulus and Murdoch (1971) reported the results of a study similar to Cottrell et al. (1968). They tested college students on a pseudorecognition task. The audience conditions were: (1) alone with no evaluation, (2) alone with evaluation, (3) audience with no evaluation, and (4) audience with evaluation. Subjects were directed to write their responses, rather than answering verbally, to reduce the monitoring factor of the audience during the condition of no evaluation. Results revealed an increase in dominant responses during anticipation of evaluation of performance. Presence or nonpresence of an audience did not significantly alter the emission of dominant responses.

Other theorists such as Duval and Wicklund (1972), attempted to account for social facilitation effects through nondrive terms. They suggested that social facilitation should be interpreted through an objective self-awareness theory in which attention is focused entirely inward upon the self. Their theory attempted to measure social facilitation effects in terms of cognitive behavior and self-monitoring. Specifically, performance increments occur as "self-aware" subjects note, in the presence of an audience, perceived discrepancies between their present states and previously established standards. The discrepancies lead to enhanced conformity to the standard, resulting in a performance facilitation.

The Last Decade of Research

Recently, researchers have incorporated and manipulated various conditions to further investigate the effects of social facilitation. Much of the current research recognizes cognitive factors present during the stimulus of the task. Effects thought to occur in the presence of another person include cognitive or physical conflict while trying to attend to the task and being distracted by the person present (Baron, Moore, & Sanders, 1978); increased effort from trying to make a good self-presentation to the person present (Bond, 1982); and an increase of conformance to public and private norms due to increased self-attention caused by the presence of an audience (Carver & Scheier, 1981).

Baron, Moore, and Sanders, (1978) in their study of 64 female undergraduates, attributed social drive to an attentional conflict and termed it distraction-conflict theory. Baron et al. (1978), closely replicating the study of Cottrell et al. (1968), found that an individual seeks information regarding the adequacy of his or her performance from others. The source of social comparison data attracted the performer's attention, and attention to others conflicted with attention to the task at hand. Baron et al. (1978) forwarded that this attentional conflict was a source of generalized drive.

Bond (1982), suggested that the social facilitation phenomena could be explained through self-representational theory. Bond (1982) contended that an observed performer is motivated to project an image of task related competence. Social facilitation of successful task completion is accomplished when the subject is capable of maintaining a self-preserved image of competence. However, when an observed performer infers ineptness; embarrassment may occur resulting in the social impairment of task performance. When provided with a simple task, Bond (1982) assumed, the subject would sustain an image of task related competence resulting in the social facilitation of task performance, which is in agreement with drive theory. However, when the task is complex, social impairment occurs when the subjects' perceived image of competence becomes shattered and embarrassment occurs.

Bond (1982) utilized 72 undergraduates in a verbal paired-associate learning task. Each subject was tested individually or in the presence of a person passively attending. The observer's presence impaired complex verbal learning of the subjects. The observer had a much weaker effect, (in fact, statistically unreliable), on learning of simple verbal items embedded in a predominantly easy task. Bond's (1982) results did not support the general drive theory claim that the presence of others always facilitates the dominant response. Indeed, the presence of others may provoke no response, enabling the performer to maintain face and minimize the self-presentational significance.

While there is agreement that the presence of others often has drive-like effects (Bond, 1982; Cottrell, 1972; Sanders, 1981; Zajonc, 1965), there remains a great deal of controversy concerning the conditions that are necessary to produce these phenomena. To date, most of the debate in the literature (see Geen & Gange, 1977: Guerin, 1986 for reviews) has been between theorists who share the same basic drive framework. Recently, Carver and Scheier (1981) have suggested an approach to social facilitation that does not employ a drive construct. Their conceptualization, which developed from cybernetic accounts of motivation, is generally termed control theory.

Carver and Scheier (1982) propose that control theory provides a general approach to the understanding of self-regulation. The basic unit of cybernetic control utilizes a negative feedback loop, and was described as a "TOTE" unit by Miller, Galanter, and Pribham in 1960 (cited in Carver & Scheier, 1981). The term TOTE stands for Test-Operate-Test-Exit. The test phase is a comparison between the existing state and the behavioral standard or reference value. If there is a discrepancy, the operate phase of the sequence is initiated. The operate stage serves to change the existing state so as to reduce the discrepancy. This process can be interrupted, but often continues until there is no discriminable difference between the existing state and the standard.

A behavioral standard is the product of this system and determines the direction of behavior. A person could elect any of a variety of potential standards to match a situation. The behavioral standard that a subject in an experiment uses is said to depend on such factors as the instructions or aspects of the task. Carver and Scheier (1981) suggest that social facilitation is a consequence of the discrepancy-reducing feedback loop. In the presence of an audience, subjects are reminded to a greater degree of themselves, their present states, and the previously established standard, than would be evident if the audience were absent. This setting enhances conformity to the behavioral standard, and results in performance facilitation.

Children have limited backgrounds from which to form accurate behavioral standards to base their perceptions. In order to shift to higher levels of control, one would have to "...assume that an organism has a built-in tendency toward an increase in organization as it adapts continuously to its environment" (Carver & Scheier, 1982, p. 118). Piaget (1962), postulated just such a developmental process involving organization and adaptation through psychological growth.

In a study of 40 college students, Carver & Scheier (1981) found that performance in front of an audience produced an increase in palmar sweating, but the longer-term effect caused the subject to focus attention inward, to concentrate on performing well. Thus, there was a palmar sweating decrease following the task-performance period. Performance facilitation resulted from audience presence.

Research has not conclusively documented the effect of the presence of an audience on either simple or complex experimental task performance. In their most recent review of the social facilitation literature through a meta-analysis of 241 studies, Bond and Titus (1983) concluded that the presence of an audience does indeed impair the qualitative and quantitative performance of a complex task. However, they questioned the improvement of simple task performance quality through social facilitation. Bond & Titus (1983) imparted that although an effect appears to exist, contrary to existing theory, 40% of the published research reported subject observation resulted in a decrement of performance quality of simple tasks. These authors discovered that the older the subject, the more the presence of others had a facilitatory effect on simple performance quality. The facilitatory effect on physiological reactions or quantity were not significantly affected. Further, the presence of others both across and within subjects, significantly increased simple task quantity (not quality) and decreased both quality and quantity on complex tasks.

Motor Responses and Social Facilitation

In support of movement or motor responses being sensitive to social facilitation Allport (1924) stated, "Our study of social facilitation has in all cases shown it to be a release of augmentation of some form of movement" (p. 269). Zajonc (1965) also acknowledged that "Simple motor responses are particularly sensitive to social facilitation effects" (p. 269). Most studies, with a few exceptions, have been accomplished through the use of adult subjects. The following review of social facilitation and its effects on motor response attempted to elicit the few social facilitation studies involving children along with a representative sample of the numerous studies involving adult subjects.

Travis (1925), utilized college students and studied the effects of an audience on subjects performing a pursuit-rotor task. Travis found clear improvement of performance when his subjects performed in front of a quiet attentive audience as opposed to working alone.

Chevrette, (1968) investigated the effect of peer presence or peer nonpresence on 59 fourth graders performing three motor tests, the vertical hang, grip strength, and the shuttle run. He found no significant differences in peer presence or nonpresence conditions for the vertical hang or grip strength in boys' or girls' performance, but did find a significant difference in the boys' shuttle run performed in the presence of an audience. Chevrette suggested more extensive study was needed to determine if a "...true difference due to the conditions of measurement on this test item really exists" (p. 117).

Martens (1969), using college students and a coincident timing apparatus, concluded that when acquiring a new response, subjects in the presence of a passive audience executed more errors, had less within-subject consistency, and typically required more trials to learn the task than subjects learning alone. However, once the task was well learned, subjects in the presence of an audience performed better and were more consistent in the response than individuals performing alone.

The theory that the presence of an adult may affect a child's performance of motor skill was investigated by Meddock, Parsons, and Hill (1971). They studied the individual effects of praise from an adult and the mere presence of that adult on preschool children's performance or a simple task. Sixty-four, 4-5 year old children, with gender evenly distributed, performed a simple task of picking up marbles one at a time and dropping them through one of five holes. An event recorder was used to measure the rate at which marbles were dropped. The children's performances were under conditions of adult present with praise, adult present with no praise, and adult absence. Results indicated a performance increase when the adult was present and an additive effect when the adult delivered praise. The weakest performance, actually a rate decrease, occurred when the adult was absent. This study supported Steinman's (1970a, 1970b) conclusion that an adult's presence and instruction from that adult controlled performance of children, rather than contingent praise from the adult. This research in social reinforcement and imitation literature suggests that the adult's presence can facilitate performance.

In 1972, Martens and Landers manipulated three experimental treatments to determine what motor behavior components produce the social facilitation phenomenon.

Their subjects were male undergraduate students performing a modified version of a "roll-up" game which required skilled performance for success. The results revealed that when individuals could be observed and evaluated directly, they performed significantly worse than those who could be evaluated indirectly or not evaluated at all.

Haas and Roberts (1975) conducted two experiments to assess the effects of evaluation potential upon learning and performing a complex motor task. They tested subjects, 90 female undergraduate students, tracing a six-pointed star looking through a mirror. Forty-five of the subjects were allowed to master the motor task to a criterion level before performance in the presence of an audience. The remaining forty-five subjects were not exposed to the task before performance, but performed the task in the "initial learning" stage. Both groups of subjects performed in the presence of one of three kinds of audiences, alone (experimenter present), blindfolded audience, or an evaluative audience. The results of these two experiments seemed to support Cottrell et al.'s (1968) position, that an audience allegedly given strong evaluative potential produces the facilitating effects. The greater the degree of perceived evaluation potential possessed by present others, increases the inhibition or facilitation of motor performance of subjects who are mastering or have mastered a motor task.

Bowman (1979) investigated the effects of peer presence and peer absence on three physical fitness tests of 30 educable mentally retarded (EMR) children aged eight to twelve years. She found the influence of a passive audience or coactors on performance to be dependent on the nature of the task. Bowman concluded that if the task required a simple motor response, (i.e. sit-up or shuttle run) the presence of a group or coactors seemed to motivate the EMR child to give a more maximal performance. The standing long jump required a complex motor response and was not influenced by the presence of a passive audience.

Hollifield (1982) conducted a study to determine if children's prior performance experience was a factor in their performance of a dominant or novel task in the presence or absence of an audience. Her subjects totaled 80-nine year old boys, half of which had prior experience performing before a formal audience, (i.e. participating in at least two seasons on youth league sport teams). The 80 subjects were divided into two groups, one group was termed dominant-task subjects and the other novel-task subjects. The dominant-task subjects were allowed to learn the correct response on a photoelectric pursuit-rotor task before performance in the presence of an audience. The novel-task subjects were not allowed to view or perform the task until actual performance trials were begun.

Subjects performed the task in the presence of an evaluative audience and a passive audience. Following the performance each subject responded to a questionnaire to ascertain his perception of the audience and the effect of the audience on his performance. Hollifield's (1982) findings suggested that the performance of subjects with no prior experience performing before an audience, was not significantly different than the performance of subjects with experience performing before audiences. This failed to support Cottrell et al.'s (1968) theory about experience-based differences in performances. Hollifield conjectured this may have been due to the extensive practice of the pursuit-rotor task which may have intensified the significance of the task performance to the dominant task group.

Worringham and Messick (1983), conducted an unobtrusive study of 36 runners. The purpose of the study was to examine the speed of the adult runners in a true alone condition, a mere presence condition, and in the presence of an evaluative audience. Data were taken by inconspicuously filming runners on a footpath at the University of California, Santa Barbara. Only the group of runners encountering a evaluative audience showed significant acceleration. This would seem to support that an evaluation apprehension or a learned drive mechanism enhances performance.

Social Facilitation and Social Learning Theories

As is evidenced in this review of literature, very few studies have examined the effect of social facilitation on children's performance. This fact provokes consideration of the relationship between audience effects and age. The determination of social facilitation effects as a function of age is particularly important because social learning theories of social and moral development (e.g., Bandura, 1969; Bandura & Walters, 1963) are based primarily on social facilitation and observational learning literature (Newman, Dickstein, & Gargan, 1978).

Since empirical evidence of social facilitation as a function of age is scant, there is some basis for support from several developmental theories. For example, Sullivan (1953) suggested the juvenile era is characterized by the beginnings of social accommodation which develops, in the preadolescent era, into a strong need for interpersonal interaction. Peer influence increases in strength from childhood through the juvenile era and peaks during preadolescence. Gallahue (1987) also noted that as more time is spent with peers, school-age children's skill competence is evaluated by school-mates. A child's sense of competence may be enhanced or curtailed by a peer group. Piaget (1962) described the child's movement from the egocentric stage of early childhood to the stage of cooperation of later childhood. He noted the development of a child's awareness of other persons, and by the age of 11 or 12 years, the child had reached the stage of genuine cooperation in which information was communicated, rules were followed, and other points of view were considered. Therefore, theoretically, peer presence would have a small effect on a young child's performance because of his or her egocentricism and would reveal a larger effect once the child decentered as a preadolescent.

Incorporating elements from Sullivan and Piagetian theories, Harvey, Hunt, and Schroeder, (1961) revealed that cognitive and social development converge in middle childhood causing social-emotional aspects of self-concept to interact with conceptual (cognitive) systems. Thus, both motivational and cognitive (attentional) mechanisms suggest increase in social facilitation effects from childhood to preadolescence.

<u>Gross Motor Evaluation</u>

Although no test is perfect, evidence of good test construction and relative ease of administration should be apparent. When developing a test, the author should consider cost, amount of special equipment, and administration time. Teachers and professionals in physical education appreciate and utilize assessments that are easily administered. In addition, scoring methods should be clearly stated, and the test's validity and reliability should be reported in the test manual.

Directions for test administration should be clearly stated and easy to follow. Conditions (presence or nonpresence of an audience) which the test supports should be apparent and field test results for validity and reliability reported. Many motor tests are only valid when administered individually. This creates a challenge for the professional when screening or assessing a large number of children.

The Test of Gross Motor Development (TGMD) designed by Ulrich (1985) is a recent, well-designed addition to the repertoire of tests in the psychomotor domain. The TGMD is a popular screening test which assesses gross motor ability of children aged three to ten years. Ulrich (1985) recommends that the test be given individually, but recognizes that "...it may be more economical in terms of time to test two or three students together" (p. 5).

Ulrich (1985) proposed five primary uses for the TGMD. He advocated its use as a screening tool for detection of possible motor deficiencies, to provide instructional and prescriptive programming for gross motor development, to evaluate student progress, to assess gross motor program effectiveness, and to serve as a research tool in gross motor development.

The TGMD consists of twelve gross motor skills commonly taught in preschool and elementary schools. The skills have been divided into two subtests, locomotor (i.e. run, skip, gallop, leap, jump, hop, slide,) and object control (two-hand strike, ball bouncing, catch, kick, overhand throw). Each skill is measured by three or four behavioral criteria. Higher scores indicate mature gross motor control.

Behavioral criteria are dichotomously scored, pass/fail (one or zero). A child receives a raw score for the total number of criteria exhibited for each skill. Raw scores are not comparable, due to the variable number and difficulty of criteria between tasks. Raw scores are used to ascertain standard scores. The TGMD provides standard score norms for the subtests and a composite score, which Ulrich (1985) termed the Gross Motor Development Quotient, (GMDQ). The GMDQ is a composite score of the 12 subtest standard scores, converted to a quotient through the utilization of tabled values. Percentile rank scores are available and useful to compare a student's performance between subtests and other tests.

Validity of the TGMD

Content-related evidence for validity refers to "the degree to which the sample of items, tasks, or questions on a test are representative of some defined universe or domain of content" (American Psychological Association, 1985). For motor skill tests, content-related evidence for validity is termed logical validity (Safrit, 1981). Content-related evidence for validity was established using Safrit's (1981) protocol for determining logical validity. Following Safrit's (1981) protocol, Ulrich

(1985) sought the opinion of three content expert judges. The judges unanimously agreed that the skills accurately represented the gross motor domain.

Construct-related evidence for validity is the degree to which the test measures the construct and/or underlying traits it is designed to measure (Safrit & Wood, 1989). A construct is defined as "...some postulated attribute of people, assumed to be reflected in test performance" (Cronbach, & Meehl, 1955, p. 283) and further "...defined implicitly by a network of associations or propositions in which it occurs" (Cronbach & Meehl, 1955, p. 299-300).

The TGMD has as its construct, fundamental gross motor development. Testing three hypotheses Ulrich (1985) provided evidence of construct validity. The hypotheses were: (a) "...the principle underlying structure of the test would reflect gross motor development...", (b) "...the gross motor development would improve significantly across age levels", and (c) "mentally retarded children would score significantly lower than nonhandicapped children of similar chronological age" (p. 31). Seventy-five percent of the common variance is shared by all 12 skills. Therefore, the skills are highly related. A correlation of subtest scores and composite raw scores with chronological age disclosed a close relationship between test performance and chronological age. A multivariate analysis of variance (MANOVA) was conducted and results indicated nonhandicapped groups scored consistently higher those with mentally handicapping conditions. With these results, Ulrich (1985) contends that gross motor development is the only construct of the TGMD.

Reliability of the TGMD

The norm-referenced reliability of the TGMD was determined by analyzing several estimates for reliability. The stability of the test suggests that only a small percent of the total variance was associated with either test-retest or interrater variability. Internal consistency based on split-half reliability coefficients for the subtests (adjusted with the Spearman-Brown formula), was statistically significant with the locomotor skill subtest $r = 0.85$ and the object control subtest $r = .078$. The standard error of measurement (SEM) ranged from 0.29 to 0.82, depending on the age and subtest.

Reliability for a criterion-referenced test "...can be defined as the consistency with which individuals are assigned to mastery categories on two different occasions" (Safrit, 1981). Two studies have been conducted to estimate the reliability of mastery decisions. In the first study (Ulrich, 1984) examined the predictability of classifying nonhandicapped children and children with handicapping conditions. The second study, (Chapman, 1984, as cited in Ulrich, 1985) assessed preschoolers at three different cut-off scores, 45%, 50%, and 60%. High proportions of agreement and Kappa statistics were achieved (K = .62 to .84) relative to mastery decisions.

Klesius (1981) described a good test as standardized, economical, with efficient use of administration time. It should require little or no specialized equipment and possess the capacity to discriminate between ability levels. The TGMD contains many of these components. It is a norm-referenced and a criterion-referenced test. The normative data may be used for screening and placement information, while the criterion-referenced data may be utilized in the education plan and class activities. Administration time for the TGMD is minimal, 15-30 minutes. Although it is intended as an individually administered test, Ulrich allows an option of administering the test in small groups. This may or may not enhance individual performances. No purchase of special equipment is required to administer the test. Equipment items are common to most school programs. Due to Ulrich's efforts to conform with and surpass the most current test construction procedures (Safrit, 1981), the 12 test items discriminate between high and low abilities on the subtests.

TGMD Review

Langendorfer (1986) contends that the TGMD represents a new significant addition to the current inventory of psychomotor tests. But, although the TGMD appears to be well constructed, he criticizes the test's construct validity on the basis of the developmental validity of the instrument. Langendorfer (1986) takes issue with Ulrich's omission of the word "change", which the reviewer believes must be present within any current definition of gross motor development. He suggests that with this omission "...the content area of the test radically alters the validity of the instrument related to its purported purpose" (Langendorfer, 1986, p. 187). Langendorfer suggests perhaps Ulrich used Williams' (1983) definition of gross motor control rather than gross motor development and that the test's construct actually is the former rather than the latter.

Langendorfer (1986) also criticizes Ulrich's use of the term "mature" motor pattern, as some of the behavioral criteria for the skills may indeed not be mature patterns, but represent some intermediate developmental status (e.g. throwing, striking, and hopping). This would raise some concern about mastery decisions despite the above average reliability reported.

Another issue raised by Langendorfer (1986), was the apparent lack of standard scores for each gender. He questioned Ulrich's result of no significant mean differences between boys' and girls' performances at the 0.01 level, especially in performance of throwing, striking, hopping, and jumping. Langendorfer pointed out that lack of gender differences is inconsistent with the literature and perhaps the 0.01 significance level was too high or perhaps there "...were some measurement problems inherent with the test..." that left it "...insensitive to previously detected gender differences" (p. 189). Additional research is needed to investigate Langendorfer's claims.

Summary

The review of literature suggests performance of a motor task may be enhanced or inhibited by the presence of a passive audience. Researchers have attempted to predict effects of social facilitation through a number of theories (i.e. Hull-Spence generalized drive, (Zajonc, 1965); evaluation-apprehension, (Cottrell, 1972); self-awareness, (Duval & Wicklund, 1972); distraction-conflict; (Baron, Moore & Sanders, 1978); self-representational, (Bond, 1982); and Carver & Scheier's (1982) control theory). None of these theories provide a definitive explanation of the social facilitation phenomenon.

There has been a concentration of studies evaluating the effects of audience presence or nonpresence during the learning of simple or complex tasks, (Haas & Roberts, 1975; Hollifield, 1982; Landers, Bauer, & Feltz, 1978; Sanders & Baron, 1975; Zajonc, 1965). Thus, there is an apparent need for investigation of testing simple or complex tasks under different audience (presence or absence) conditions. The effects may or may not be synonymous with equivocal learning results.

There are few studies examining children's sensitivity to social stimulation or social facilitation when performing motor skills. The results are paradoxical and reveal the need to further explore the effect of passive audience presence on children's motor skill performance.

The TGMD is a popular screening assessment tool. It is economical, requires no special equipment, and administration time is relatively minimal. Ulrich (1985) suggests the TGMD may be administered in small groups. Utilization of the TGMD would be enhanced if results were available to substantiate this statement.

The study will provide educators additional information concerning the effect of test conditions (peer presence or peer absence) on the motor performance of children during the TGMD. Administration of the TGMD to children will utilize gross motor performances in measuring any significant difference of performance between the presence and nonpresence of an audience.

CHAPTER III

METHODS AND PROCEDURES

The purpose of this study was to determine if passive peer group presence had a significant effect on the performance of students on the Test of Gross Motor Development (TGMD). The data for this study were collected during May, 1989 from students enrolled in an elementary and a preschool in Crook County, Oregon.

Subjects

All subjects included in the study were nonhandicapped children, aged 5-, 8-, and 10-years. The subjects were free from obvious physical or mental disabilities. The 8- and 10-year-old subjects were volunteers from Crooked River Grade School in Prineville, Oregon. The 5-year-old-subjects were from a pre-school classroom located in the same city. Subjects were required to return a signed parental permission slip for participation in the study. The use of human subjects (Appendix A), as well as, the informed consent letter (Appendix B) were approved by the Oregon State University Committee for the Protection of Human Subjects.

Test Instrument

The Test of Gross Motor Development (TGMD) (Appendix C), was utilized to assess the motor skill performance of the subjects. The administration time of the test ranged from 12-20 minutes, with all tests conducted during the regular school day. The TGMD was administered following protocol established by Ulrich (1985).

The TGMD consists of 12 motor skill items. The items are divided into two subtests, locomotor and object control. The locomotor subtest consists of the hop, skip, jump, run, gallop, slide and leap. The object control subtest consists of the strike, kick, overhand throw, catch, and stationary bounce. Prior to evaluating the student, the skill to be assessed was demonstrated by the experimenter. The subject was then allowed three trials for each skill.

The skills were scored using the test protocol of a dichotomous scale, pass/fail. To be scored a "pass", behavioral criteria needed to be exhibited in two out of the three performance trials (Ulrich, 1985). For a skill to be classified as mastered, all behavioral criteria included in a skill needed to be scored as "pass".

<u>Procedure</u>

Nonhandicapped children aged 5-, 8-, and 10-years from a preschool and Crooked River Grade School (CRGS) in Prineville, Oregon were given the opportunity to participate in the study. One week prior to actual assessment, the experimenter, following an introduction to the children in their home room, briefly discussed the study with them. There was familiarity between most of the students aged 8 and 10 as the investigator had served the previous year as their elementary physical education instructor at Crooked River Grade School. There was no experimenter familiarity with students aged 5. Informed consent letters were left with each home room teacher and sent home with the children.

All 5-year-old subjects (N = 18) from the preschool classroom returned signed informed consent letters, 12 were boys and six were girls. The 18 subjects were randomly assigned to a testing condition (peer presence or peer nonpresence).

Forty-one children, aged 8 years, returned signed informed consent letters. Of these, 26 (60%) were boys and 15 (40%) were girls. Twenty subjects (12 boys and 8 girls) were randomly selected and randomly assigned to an initial testing condition (peer presence or peer nonpresence).

Thirty-two children aged 10 years, returned signed informed consent letters, 12 (37%) were boys and 20 (63%) were girls. Twenty subjects (6 boys and 14 girls) were randomly selected and assigned to a testing condition (peer presence or peer nonpresence).

Subjects were tested in a room free of distractions and large enough to adequately test the skills involved. The subjects aged 8 and 10 years were tested in the same room at Crooked River Grade School, while the subjects aged 5 years were tested in another room near their classroom. Efforts were made to maintain the test environment constant (except for the presence or nonpresence of an audience). The same equipment was used for each test session.

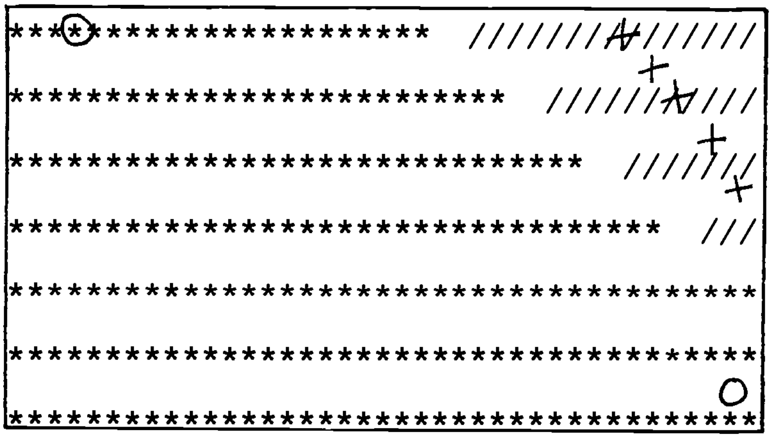
<u>Condition</u>

Subjects were randomly assigned to an initial testing condition to counterbalance any effect of one condition over the other. All subjects were tested under both conditions during a two week period.

<u>Presence</u>

Prior to the arrival of subjects, the four peers forming an audience and an adult observer were seated in chairs 8-10 feet away from the testing area (see Figure 1).

<u>Figure 1.</u> Testing Area.



*Performance area　　　　O Cones

/Audience area　　　　　X Chairs

The audience was instructed to be quiet and not to cheer, clap, or react to the subject's performance during or following the testing session. The audience participants were requested to not discuss what they saw or did until after a certain date (i.e. after all testing was completed). The children were told by the experimenter to model the adult observer and follow her example.

In testing sessions for the 5-year-olds, instead of an equal distribution of gender, three boys and one girl comprised the peer audience due to the unavailability of female peers. The audience for the testing sessions of the 8-and 10-year-olds included two boys and two girls. To decrease observational learning, the peers present during the subject's performance were children whose motor skills had previously been tested or children who were not subjects in the study (see Appendix Table D-1 and D-2).

Each child was escorted by an adult from the child's classroom to the test site, with no specific discussion about what the child was to do upon arrival. At the test site the experimenter welcomed the child and provided a general introduction to the activity. "Hi, how are you today? (waited for an answer). I am going to ask you to do some things. Watch how I do it each time, and then it will be your turn. The first thing will be running, watch..." The test items were presented in the same order as in the test protocol. Each skill was introduced and demonstrated prior to the subject's performance. The experimenter made no mention or acknowledgement of the audience. If the subject asked the purpose of the audience (i.e. "why are they here?"), the experimenter answered "they are here to watch and help me". After the testing session, subjects were asked to not discuss with others the skills they performed or describe who was there. Following the testing session, the child was accompanied back to his or her classroom with no discussion of what transpired during the testing session.

The adult observer's duties were outlined and discussed with the observer by the experimenter prior to testing the children. The main concern of the adult observer was to keep the children quiet and attentive during the testing session. The adult observer sat in the middle of the audience. If a child whispered or talked during the test, the adult observer patted the student on the back or leg to remind him or her to remain quiet. As with the peer audience, the adult observer was advised to avoid smiling or interacting with the subject during his or her performance. The observer was to appear interested, but remain reserved during the performance of each subject.

Four female adult observers were utilized during the experiment. One observer was constant during the peer presence testing of the subjects aged five. The remaining three observers were employed during the peer presence testing of the 8-and 10-year-old subjects.

The adult observers' behaviors were consistent throughout the testing sessions. The passive audiences were attentive and performed as expected, with one exception. One audience member "got the giggles" during one test. The adult observer had the audience member exchange seats with another child which resolved the problem.

During the test, the experimenter marked scores on the score sheet. These scores were not shared or discussed with anyone during or subsequent to testing.

The experimenter provided mild verbal encouragement to all subjects. General feedback comments were given by the experimenter to each child after performance of each skill. Typical comments were, "nice job", "you are working hard", "good trying". The experimenter's voice inflection was sincere, but not excited. An effort was made to maintain a consistent voice inflection throughout the experiment. Verbal encouragement was necessary as young children are accustomed to receiving feedback after a performance. Giving no feedback could have been viewed by the subject as a negative response from the experimenter.

Nonpresence

The same introduction and directions were given the subjects randomly assigned to the nonpresence condition as to the subjects in the presence condition. The feedback and reinforcement procedures used in the nonpresence condition coincided with those given in the presence condition. The only difference in this condition was the nonpresence of an audience.

The same equipment was used for each testing session. Equipment included: student scoresheet(s), two traffic cones, six 6 inch light-weight (whiffle) balls, two plastic bats, three 8 inch playground balls, six 8 inch sponge balls, and six tennis balls.

<u>Analysis of Data</u>

The following hypotheses were tested:

1. Under the conditions of passive peer presence and peer nonpresence, the performance scores of the subjects will be equal among age groups.

2. Performance scores under conditions of passive peer presence and peer nonpresence for mastered skills will be equal among age groups.

Several analyses of the data were performed. A paired-t-test was used to determine if there was a significant difference between independent variables on student's composite standard score (Gross Motor Development Quotient). A 3 x 2 (age x condition) between and within analysis of variance (ANOVA) with repeated measures on two factors (presence and nonpresence), with a counterbalance of the second factor, was utilized for analyzing the locomotor and object control standard scores and for each of the 12 skills included in the TGMD (Thomas & Nelson, 1985).

The ANOVA permitted the evaluation of the effect of the two independent variables (age and condition) on each subtest and each dependent variable (12 skills of the

TGMD). An ANOVA was conducted on each subtest and each skill to measure the magnitude of difference between age and condition.

An analysis of variance was also employed on each skill to determine if mastery of a skill was influenced significantly by the presence or nonpresence of peers. A score of "1" was assigned to those scores showing mastery (performance of 100 percent of the behavioral criteria). A score of "0" was assigned to those skills not performed at a mastery level.

To determine the statistical significance of the hypotheses, the null hypothesis was. The null hypothesis was evaluated and rejected at greater than the alpha .05 level of significance. The alpha .05 level of significance was selected due to the nature of the study.

CHAPTER IV

RESULTS AND DISCUSSION

The purpose of this study was to determine if passive peer group presence had a significant effect on the performance of students when assessed with the Test of Gross Motor Development (TGMD). Within this chapter the statistical analyses and pertinent findings from the results of the data are presented.

Description of Subjects' Performance

The subjects for the study were nonhandicapped children, aged 5 (N = 18), 8(N = 20), and 10 (N = 20) years. The mean age, for the youngest group was 5.3 years (SD = 2.2 months), for 8-year-olds, 8.3 years (SD = 2.1 months), and for the oldest group, 10.3 years (SD = 3.4 months).

The study compared the effect of two conditions, passive peer presence and peer nonpresence during the performance of the 12 skills of the TGMD. The mean and standard deviation for each of the 12 skills under the two conditions (N = 58) are presented in Table 1 and Table 2. The maximum score in the mean column is 4, unless otherwise noted.

Table 1.

Locomotor Skill Descriptive Statistics

	Presence		Nonpresence	
Skill	Mean	SD	Mean	SD
RUN	3.41	.70	3.69	.59
GALLOP	3.04	.98	3.40	.85
HOP	3.33	1.01	3.53	.86
LEAP[a]	2.62	.64	2.69	.53
JUMP	2.91	1.06	3.03	1.03
SKIP[a]	2.09	.97	2.12	1.04
SLIDE	3.16	1.03	3.24	1.02

[a]Maximum score = 3.0.

Table 2.

Object Control Skill Descriptive Statistics

	Presence		Nonpresence	
Skill	Mean	SD	Mean	SD
STRIKE	2.74	1.01	2.84	1.08
BOUNCE[a]	2.03	1.16	2.12	1.10
CATCH	2.48	.88	2.53	.89
KICK	3.36	1.00	3.43	1.04
THROW	2.71	1.27	2.81	1.20

[a]Maximum score = 3.0.

All skill means obtained from the nonpresence condition were higher than those from the passive peer presence condition. The standard deviations of the nonpresence condition scores were within plus or minus .15 of the standard deviation of the passive peer presence condition scores.

As shown in Table 1 and Table 2, the TGMD separates the 12 skills into two subtests, locomotor and object control. A standard score for each subtest was obtained from raw scores through a conversion table. The subtest standard scores were summed and converted to a quotient score to yield a Gross Motor Development Quotient (GMDQ). Table 3 lists the comparison of the mean and standard deviation of the GMDQ and standard scores of the locomotor and object control subtests.

Table 3.

Standard Score and GMDQ Descriptive Statistics

	Presence		Nonpresence	
Score	Mean	SD	Mean	SD
GMDQ	92.56	17.35	97.31	14.80
Locomotor	8.66	2.87	9.84	2.59
Object Control	8.86	3.68	9.26	3.20

Table 3 shows higher standard mean scores in the nonpresence condition than passive peer presence condition. The standard deviations are, without exception, smaller in the nonpresence condition than the peer presence condition.

The 58 subjects in the study demonstrated a wide range of ability. The Gross Motor Development Quotients ranged from 67 to 121 in the nonpresence condition and 58 to 124 in the presence condition, with the quotient of 90-110 being average, 35-69 very poor, and 121-130 superior (Ulrich, 1985, p. 14).

Hypothesis Testing

The Number Cruncher Statistical System (Hintze, 1984) was utilized with an IBM PC/AT at the Oregon State University College of Health and Human Performance Computer Laboratory to analyze the data. Data were input through a keyboard.

TGMD Skill Results

An analysis of variance (ANOVA) was performed on each of the skills included in the TGMD to determine if significant differences existed in performance scores by age and condition. The following paragraphs summarize the results (see Appendix E for Tabled ANOVA results). Tukey's honestly significant difference test (HSD) was used for comparisons among the age group means.

The results for the skill of running showed significant difference by condition, $F(1, 55) = 11.34$, $p < .002$, but no significant differences in performance by age, $F(2, 55) = .04$ and no significant interaction, $F(2, 55) = .22$.

The results for the skill of galloping showed significant difference by condition, $F(1, 55) = 6.15$, $p < .262$. There was a significant difference in performance by age, $F(2, 55) = 8.28$, $p < .001$, with 8- and 10-year-olds performing significantly better than 5-year-olds, ($p < .05$). There was no significant interaction $F(2, 55) = 1.37$.

The results for the skill of hopping showed significant difference by age, $F(2, 55) = 10.71$, $p < .001$, with 8- and 10-year-olds performing significantly better than 5-year-olds, ($p < .05$). There was no significant difference in performance by condition, $F(1, 55) = 3.17$ and no significant interaction, $F(2, 55) = .27$.

The results for the skill of leaping showed no significant difference in performance by age, $F(2, 55) = 2.8$, or condition $F(1, 55) = .59$, and no significant interaction $F(2, 55) = .13$.

The results for the skill of jumping showed significant difference by age, $F(2, 55) = 2.8$, $p < .019$, with the 10-year-olds performing significantly better than the 5-year-olds, ($p < .05$). There was no significant difference in performance by condition, $F(1, 55) = .98$ and no significant interaction, $F(2, 55) = 2.62$.

The results for the skill of skipping showed significant difference by age, $F(2, 55) = 14.15$, $p < .001$, with the 10-year-olds performing significantly better than the 5- and 8-year-olds, ($p < .01$ and $p < .05$ respectively), and the 8-year-olds performing significantly better than the 5-year-olds. There was no significant difference in performance by condition, $F(1, 55) = .11$ and no significant interaction, $F(2, 55) = 1.35$.

The results for the skill of sliding showed significant difference by age, $F(2, 55) = 12.65$, $p < .001$, with the 10- and 8-year-olds performing significantly better than the 5-year-olds, ($p < .01$, and $p < .05$, respectively). There was no significant difference in performance by condition, $F(1, 55) = .53$ and no significant interaction, $F(2, 55) = 1.00$.

The results for the skill of the two-hand strike showed a significant difference by age, $F(2, 55) = 11.08$, $p < .001$, with the 10- and 8-year-olds performing significantly better than the 5-year-olds, ($p < .05$). There was no significant difference in performance by condition, $F(1, 55) = .63$ and no significant interaction, $F(2, 55) = .61$.

The results for the skill of the stationary bounce showed a significant difference by age, $F(2, 55) = 34.42$, $p < .001$, with the 10- and 8-year-olds performing significantly better than the 5-year-olds, ($p < .01$). There was no significant difference in performance by condition, $F(1, 55) = .64$, and no significant interaction, $F(2, 55) = 1.32$.

The results for the skill of catching showed significant difference by age, $F(2, 55) = 26.11$, $p < .001$, with the 10- and 8-year-olds performing significantly better than the 5-year-olds, ($p < .01$). There was no significant difference in performance by condition, $F(1, 55) = .32$, and no significant interaction, $F(2, 55) = .56$.

The results for the skill of kicking showed significant difference by age, $F(2, 55) = 12.65$, $p < .001$, with the 8-year-olds performing significantly better than the 5-year-olds, ($p < .01$). There was no significant difference in performance by condition, $F(1, 55) = .12$ and no significant interaction, $F(2, 55) = .51$.

The results of the skill of overhand throwing showed a significant difference by age, $F(2, 55) = 5.26$, $p < .008$, with the 8-year-olds performing significantly better than the 5-year-olds, ($p < .05$). There was no significant difference in performance by condition, $F(1, 55) = .37$ and no significant interaction, $F(2, 55) = .83$.

GMDQ Results

Since the GMDQ is adjusted for age, the paired-t-statistic was used to reveal if the GMDQ scores were significantly different under the two conditions (peer presence and peer nonpresence). A paired-t-test requires that only two sets of data be compared at one time. A two-tailed t-test was utilized because the difference between the two GMDQ means could favor either mean. The Gross Motor Development Quotient from each condition was used ($\underline{N}$ = 58). The peer nonpresence group ($M = 97.31$, $s = 14.8$) performed significantly better than the peer presence group ($M = 92.55$, $s = 17.35$), $t(56) = 3.38$, $p < .001$.

Locomotor and Object Control Results

A 3 X 2 (age x condition) analysis of variance (ANOVA) with repeated measures was used to determine if significant differences existed in the TGMD subtest (locomotor and object control) standard scores under the two conditions. The ANOVA of object control scores showed a significant difference in performance by age, $F(2, 55) = 25.45$, $p < .001$. The Tukey's (HSD) test was used for comparisons between the age group means (Wynne, 1982). Significant differences were found with the 8-year-old subjects performing significantly better than five year old subjects ($p < .01$), and subjects aged 10 years performing significantly better than 5 year olds ($p < .01$). There was no significant difference in performance by condition, $F(1, 55) = 1.34$, and no significant interaction, $F(2, 55) = 1.08$.

The findings for the locomotor subtest standard scores between conditions showed significant difference in performance scores by age $F(2, 55) = 7.51$, $p < .002$, and by condition $F(1, 55) = 21.96$, $p < .001$. Tukey's HSD test was used for comparison of the age group means. Significant differences were found with 8- and 10-year-old subjects performing significantly better than 5-year-old subjects ($p < .01$). There was however, no significant interaction, $F(2, 55) = .99$.

Skill Mastery and Nonmastery Significance

A skill was considered mastered if a subject performed 100 percent of the behavioral criteria. Table 4 shows the number of subjects performing at a mastery level under each condition.

All skills performed by subjects aged eight had more scores indicating mastery under the nonpresence condition than the passive peer presence condition. The majority of the skills performed by subjects aged ten showed an increase of the number of performers at a mastery level, while the subjects aged five showing little difference in mastery under both conditions.

Table 4.

Number of Mastery Performances by Skill

	Age Five		Age Eight		Age Ten	
Skill	Pres.	Nonpr.	Pres.	Nonpr.	Pres.	Nonpr.
Run	10	13*	12	15*	9	16*
Gallop	1	6*	9	13*	9	14*
Hop	5	8*	14	17*	15	16*
Leap	10	9	16	17*	15	16*
Jump	3	2	9	12*	9	12*
Skip	5	3	9	11*	10	14*

Table 4 (continued)

Slide	3	4*	11	15*	15	14
Strike	2	1	10	11*	6	10*
Bounce	2	0	12	13*	15	17*
Catch	5	4	14	15*	17	19*
Kick	0	1*	5	6*	4	4
Throw	3	1	11	15*	10	8

*Indicates increased number of subjects at mastery level in nonpresence condition.

A 3 x 2 (age x condition) analysis of variance with repeated measures for each skill was used to determine if mastery of a skill was influenced significantly by the presence of peers. Subject skill scores were converted to a dichotomous scale of mastery or nonmastery, with a "1" indicating a score of mastery and a "0" indicating a score of nonmastery. The following paragraphs summarize the results of each skill (see Appendix F for Tabled results). Tukey's HSD test was used for comparison of the aged group means.

The skill of run showed significant difference in mastery by condition, $F(1, 55)$, = 11.78, $p < .001$, with the nonpresence condition revealing more mastery scores. There was no significant difference in mastery by age $F(2, 55) = .08$ and no significant interaction, $F(2, 55) = .98$.

The skill of gallop showed significant difference by condition $F(1, 55) = 10.01$, $p < .003$ with the nonpresence condition showing more mastery scores. There was significant difference in mastery by age, $F(2, 55) = 6.49$, $p < .003$, with the 10- and 8-year olds showing significantly more mastery than the 5-year-olds, ($p < .01$ and $p < .05$ respectively). There was no significant interaction, $F(2, 55) = .09$.

The skill of hop showed significant difference in mastery by age, $F(2, 55) = 9.17$, $p < .001$, with the 10- and 8-year-olds showing significantly more mastery than the 5-year-olds, ($p < .05$). There was no significant difference in mastery by condition $F(1, 55) = 2.58$ and no significant interaction $F(2, 55) = .24$

The skill of leap showed significant difference in mastery by age, $F(2, 55) = 3.93$, $p < .025$, with the 8-year-olds showing significantly more mastery than the 5-year-olds, ($p < .05$). There was no significant difference of mastery by condition $F(1, 55) = .06$ and no significant interaction, $F(2, 55) = .23$.

The skill of jump showed significant difference in mastery by age, $F(2, 55) = 5.43$, $p < .007$, with the 10- and 8-year-olds showing significantly more mastery than the 5-year-olds, ($p < .05$). There was no significant difference in mastery by condition, $F(1, 55) = 2.36$ and no significant interaction, $F(2, 55) = 1.44$.

The skill of skip showed significant difference in mastery by age, $F(2, 55) = 4.98$, $p < .01$, with the 10-year-olds showing significantly more mastery than the 5-

year-olds, ($p < .05$). There was no significant difference in mastery by condition, $F(1, 55) = .81$ and no significant interaction, $F(2, 55) = 1.39$.

The skill of slide showed significant difference in mastery by age, $F(2, 55) = 10.76$, $p < .001$, with the 10- and 8-year-olds showing significantly more mastery than the 5-year-olds, ($p < .05$). There was no significant difference in mastery by condition, $F(1, 55) = 1.16$ and no significant interaction $F(2, 55) = 1.32$.

The skill of two-hand strike showed significant difference in mastery by age, $F(2, 55) = 6.54$, $p < .003$, with the 8-year-olds showing more mastery than the 5-year-olds, ($p < .05$). There was no significant difference in mastery by condition, $F(1, 55) = 1.37$ and no significant interaction, $F(2, 55) = 1.56$.

The skill of stationary bounce showed significant difference in mastery by age, $F(2, 55) = 27.9$, $p < .001$, with the 10- and 8-year-olds showing more mastery than the 5-year-olds, ($p < .01$). There was no significant difference in mastery by condition, $F(1, 55) = .08$ and no significant interaction, $F(2, 55) = 1.00$

The skill of catch showed significant difference in mastery by age, $F(2, 55) = 24.97$, $p < .001$, with the 10- and 8-year-olds showing more mastery than the 5-year-olds, ($p < .01$). There was no significant difference in mastery by condition, $F(1, 55) = .21$ and no significant interaction, $F(2, 55) = .37$

The skill of kick showed significant difference in mastery by age, $F(2, 55) = 3.2$, $p < .047$, with the 8-year-olds showing more mastery than the 5-year-olds. There was no significant difference in mastery by condition, $F(1, 55) = .38$ and no significant interaction, $F(2, 55) = .1$

The skill of overhand throw showed significant difference in mastery by age $F(2, 55) = 9.27$, $p < .001$, with the 10-year-olds showing more mastery than the 8- and 5-year-olds ($p < .01$) and the 8-year-olds showing more mastery than the 5-year-olds ($p < .01$. There was no significant difference in mastery by condition, $F(1, 55) = .001$ and no significant interaction, $F(2, 55) = 3.12$.

Discussion

A cursory look at the Test of Gross Motor Development (TGMD) individual skill descriptive statistics shows an increase of the mean performance score across all skills under the nonpresence condition. To determine if this difference was significant due to age and/or condition, an analysis of variance was employed for each skill.

Condition and Skill Significance

The results of the ANOVA indicated that only two skill performances, run and gallop, were significantly different between conditions at the .05 alpha level, with the hop approaching significance at $p < .077$. The performance difference may be due to the run and gallop being the first skills performed during the test session.

This would seem to be supported by Zajonc (1980), when he noted differences between physical and social stimuli. He defined physical stimuli as consistent and constant, therefore reliable and predictable, and social stimuli somewhat less systematic or predictable. This suggests there may be different levels of mere presence. The audience at the beginning of the test session may have been perceived by the subjects as unpredictable, hence a distraction. After performance of the first two skills, no audience reaction was detected by the subject, the perceived level of mere presence became more predictable.

The experimenter for the present study, noted that many subjects glanced at the peer audience during the first few minutes of the test session, then appeared to concentrate on performance for the remainder of the session. The division of attention between the peer audience and the task may have inhibited the performance of the initial skills tested (run and gallop).

Age and Skill Significance

An analysis of variance (ANOVA) for each skill of the TGMD, disclosed all skills significantly different for age, except for the run and leap, although the leap was approaching significance, $F(2, 55) = 2.8$, $p < .068$. It would be expected that the skill tests would be significant due to age. Five-, eight- and ten-year-olds commonly perform skills differently, with older children generally having mastered more skills. Ulrich (1985) reported acceptable discrimination power of the TGMD skills by age level.

The run and leap were not significantly different by age. This may be due to the near mastery scores received by the majority of the subjects. A score representing mastery for the run was 4 and the overall mean was 3.55 (N = 116). The score representing mastery for the leap was 3 and the overall mean was 2.66 (N = 116). The difference between the age group means for the run and leap are depicted in Table 5. The mean scores did not differ significantly between ages and therefore, would not exhibit a significant F score.

Table 5.

Age Group Means for the Run and Leap

		Mean	
Age	n	Run	Leap
Five	36	3.56	2.44
Eight	40	3.58	2.80
Ten	40	3.53	2.70

Interaction and Skill Significance

The results of the analysis of variance performed on each TGMD skill determined that no skill had a significant interaction for age and condition. Passive peer presence did not have a significant effect on the performance of the subjects according to their age. Although all subjects performing in passive peer presence were observed making frequent glances at the audience by both the experimenter and adult observer, the interactions were primarily at the beginning of the testing session. The result, no significant interaction effect, would support Piaget's (1962) and Sullivan's (1953) theory of egocentricism in children.

Locomotor and Object Control Significance

An analysis of variance was conducted using the standard scores of the two subtests (locomotor and object control), and revealed a significant difference in performance by age. As with individual skills, this was expected. Five-, eight- and ten-year-olds commonly perform skills differently, with older children generally having more skills mastered, therefore receiving higher standard scores.

The locomotor standard scores were significantly different for condition. This is probably due to the significance found in the skills of run and gallop with significantly higher scores being received under the nonpresence condition. But, according to Wynne (1982), "comparisons and relations obtained with transformed data may not hold for the measurements in their original form, leading to difficulties in the interpretation of results" (p. 446). Therefore, a significant difference may not actually be present because the locomotor and object control scores are standard scores. A standard score is a transformation of raw scores and may not give a true indication of significance. Neither the locomotor nor object control subtest standard scores had a significant interaction.

Because of the difficulties noted in working with standard scores a 3 x 2 analysis of variance of the locomotor and object control raw score totals was conducted. Results indicated a significant difference by age, locomotor, $F(2, 55) = 20.77$, $p < .001$, object control, $F(2, 55) = 32.24$, $p < .001$. There was no significant difference by condition for either subtest, locomotor $F(1, 55) = 2.82$, object control, $F(1, 55) = .21$. Neither subtest had a significant interaction, locomotor, $F(2, 55) = 1.52$, object control, $F(2, 55) = .94$. These results need to be viewed with caution, as three of the twelve skills have three behavioral criteria, while the remaining nine skills have four behavioral criteria. This would lead to unequal weighting of some skills.

GMDQ Significance

The 58 subjects in the present study demonstrated a wide range of ability. The subjects' GMDQ scores ranged from 67 to 121 in the nonpresence condition, and 58 to 124 in the presence condition. A paired-t-test showed significant difference in performance between the peer presence condition and peer nonpresence condition. This result may be due, in part, to the significant differences by condition found in the run and gallop. The findings of the study may have been influenced as well by the GMDQ scale. It must be kept in mind that the GMDQ is the second transformation of the raw scores (the standard score being the first) and may not give a true indication of significance (Wynne, 1982). Therefore, a significant difference may not actually be present.

A 3 x 2 analysis of variance of the raw score totals indicated a significant difference by age, $F(2, 55) = 33.73$, $p < .001$. There was no significant difference by condition, $F(1, 55) = 1.26$, and no significant interaction, $F(2, 55) = 2.02$. These results also need to be viewed with caution, as three of the twelve skills have three behavioral criteria, while the remaining nine skills have four behavioral criteria. This would lead to unequal weighting of some skills.

Skill Mastery and the Effect of Condition

The mastery of the run and gallop indicated a significant difference by condition at the .05 alpha level. This result does not seem to coincide with the generally accepted rule of simple task performances being enhanced by the presence of an audience. Indeed, performance of the run and gallop was inhibited. The performance difference may be due to an order effect. The run and gallop were the first skills performed during each test session. Apprehension of audience reaction could have inhibited performance of the initial skills of the test session.

Closer examination of the specific behavioral criteria scores of the run during passive peer presence, revealed that subjects tended to score a "0" on performance criterion #4, "nonsupport leg bent approximately 90 degrees" (Ulrich, 1985, p.20) while scoring a "1" during peer nonpresence performance. According to Ulrich, (1985) this is the last of the four performance criteria of the run to develop.

An examination comparing the gallop passive peer presence scores to the peer nonpresence scores, revealed that subjects tended to score a "0" on performance criterion #3, "arms bent at elbows and lifted to waist level" (Ulrich, 1985, p. 20) during passive peer presence, and a "1" during the peer nonpresence performance. Similar to the run, this criterion is also the last mastered of the gallop performance criteria (Ulrich, 1985).

The behavioral criteria of the run and gallop skills may be more sensitive to qualitative analysis than the remaining skills. As discussed above, the lower leg angle during the run, and the arm position during the gallop, were the two behavioral criteria contributing to the significant differences of mastery by condition. The behavioral criteria for these skills may discriminate more than other skill behavioral criteria.

Hypotheses Decision

Based on statistical results, the following decisions are indicated for the hypotheses:

1. Under the conditions of passive peer presence and peer nonpresence the performance scores of the TGMD will be equal among age groups. This hypothesis was accepted for all skills except the run and gallop. Significant differences were found on the run and gallop.

2. Performance scores under conditions of passive peer presence and peer nonpresence for mastered skills will be equal among age groups. This hypothesis was accepted for all skills except the run and gallop. Significant differences were found for the two skills.

Summary

In the present study, the presence of peers during skill testing of the TGMD seemed to effect only the performance of the run and gallop, at a statistically significant level. The finding was partially explained by the two skills being the first performed, and by Zajonc's (1980) refinement of the definition of "mere presence". The changes in performance of the skills between the two conditions, seemed to occur in the behavioral criteria believed to be the last developed (Ulrich, 1985).

The present study revealed more subjects performing at a mastery level in the nonpresence condition than in the presence condition. The only statistically significant differences in condition were in the skills of run and gallop. Subject apprehension of the audience's reaction during the first of the testing session may have contributed to the results. The significant finding may also be related to the sensitivity of the behavioral criteria for the two skills.

The results of the present study do not appear to support any specific theory of social facilitation, but do seem to uphold social learning theories. Theorists (Harvey, Hunt, & Schroeder, 1961; Piaget, 1962; Sullivan, 1953) suggest that peer presence would have a small effect on young children's performance due to egocentricism. A larger effect would be expected when the child became a preadolescent. Most subjects participating in the present study would not be considered preadolescents, therefore, minimal effect of peer presence would be expected.

CHAPTER V

SUMMARY AND RECOMMENDATIONS

Summary

Public Law 94-142 (Education for All Handicapped Children Act, 1975), mandates that students with disabilities be provided an education appropriate to their needs. Determination of the proper setting involves an ongoing process of screening and evaluation. The Test of Gross Motor Development (TGMD) is an instrument used for screening and evaluating students aged three to ten years, and assists in developing program objectives for the proper educational environment.

A review of the literature found little research as to the effect of peer group presence on the performance of children's motor skills. The purpose of the study was to determine if passive peer group presence had a significant effect on children performing the TGMD skills.

Fifty-eight volunteer nonhandicapped children aged five, eight, and ten years were subjects for the study. There were 18 subjects aged five years and 20 subjects in each of the eight and ten year age groups. The subjects were tested on the 12 skill items of the Test of Gross Motor Development (Ulrich, 1985). These items included seven locomotor, and five object control skills.

Each subject was given the opportunity to perform the 12 skills of the TGMD under two conditions. During the nonpresence test session, only experimenter and the child were present. In the other test session, the experimenter administered the test to the subject in front of a passive peer audience and one adult observer. The audience was seated near the testing area and observed the performance of the subject quietly, with no verbal interaction. The adult observer was present to monitor the behavior of the peer subjects, and inhibited any verbal and/or visual distractions of the peer spectators during the subject's performance. To reduce observational learning, the peer audience was comprised of children who were not included in the study or subjects who had completed their testing.

One-half of the subjects in each age group was tested under the peer nonpresence condition before being tested under passive peer presence condition. The remaining one-half of subjects in each age group was tested under passive peer presence condition first, then under peer nonpresence condition. The subjects were randomly assigned to the first testing condition.

A 3 x 2 (age x condition) analysis of variance for the individual skills indicated a statistically significant difference by condition in the run and gallop. No significant difference was noted in the other 10 skills. Ten of the twelve skills were significantly different with respect to age. Only the run and leap were not significantly different. There was no significant interaction of age x condition for any skill.

The standard scores of the subtests (locomotor and object control) were analyzed by an analysis of variance. The results revealed a significant difference by age in the subjects' locomotor and object control skill performance. There was a significant difference in subtest standard scores by condition in the locomotor subtest, but no significant difference by condition in the object control subtest. Neither subtest showed significant interaction. Through further analyses of raw score totals for each subtest, significant differences by age, but not by condition or interaction were found. These results need to viewed with caution as the behavioral criteria are not equal in number, across skills.

A Gross Motor Development Quotient (GMDQ) score was obtained for each subject under each condition and used to determine the effect of passive peer presence on subjects' total motor skill performance through a paired-t-statistic. The results showed a significant difference. Further analyses using raw scores rather than standard scores revealed significant differences by age, but not by condition or interaction. These results need to be viewed with caution as the number of behavioral criteria for each skill is not equal. Table 6 summarizes the findings of all data analyses.

Table 6.

Summary of Findings

Dependent Variable	Age	Condition	Interaction
GMDQ (Std.)	NA[1]	**[2]	NA
Raw Scores Totaled	**	--[3]	--
Locomotor (Std.)	**	**	--
Locmotor (Raw)	**	--	--
Object Control (Std.)	**	--	--
Object Control (Raw)	**	--	--
Run	--	**	--
Gallop	**	**	--
Hop	**	--	--
Leap	--	--	--
Jump	**	--	--
Skip	**	--	--
Slide	**	--	--
Strike	**	--	--
Bounce	**	--	--
Catch	**	--	--
Kick	**	--	--
Throw	**	--	--
Mastery Results			
Run	--	**	--
Gallop	**	**	--
Hop	**	--	--

Table 6 (continued)

Leap	**	--	--
Jump	**	--	--
Skip	**	--	--
Slide	**	--	--
Strike	**	--	--
Bounce	**	--	--
Catch	**	--	--
Kick	**	--	--
Throw	**	--	--

[1]NA Not Applicable.

[2]**Significant at the .05 alpha level.

[3]--Insignificant results.

The influence of an audience on performance of the skills from the Test of Gross Motor Development (TGMD) only seemed apparent at the beginning of a testing session. The skills of run and gallop were the first two skills tested in each testing session, and whether mastered or not, results indicated these skills were influenced by the presence of passive peers.

The results imply that care should be exercised when interpreting TGMD results. Special attention should be given to the skills of run and gallop if testing is conducted in the presence of passive peers. The scores may not be a true indication of the child's ability.

Such a false-positive error would indicate nonmastery when the skill is actually mastered. Further testing would be indicated in this situation, to reduce chances of any misjudgment in programming or eligibility. In a diagnostic assessment, the possible error should be checked through the use of another test or observation, as no single test should be used to determine a child's eligibility for special assistance in physical education.

Recommendations

From the results of this study the following recommendations are forwarded:

1. A study similar to the present study should be conducted using a nonpassive audience.
2. A study similar to the present study should be conducted, with the skills randomly ordered to avoid a possible order effect.
3. A study similar to the present study should be conducted which informs the subjects prior to testing that peers will be watching their performance.
4. A study similar to the present study should be conducted using the TGMD, testing two or three subjects at a time with the skill order randomized.
5. Another study should be conducted using another qualitative physical skill test with adolescent subjects.

REFERENCES

Allport, F. H. (1924). Social psychology. Boston: Houghton Mifflin.

American Psychological Association. (1985). Standards for educational and psychological testing. Washington, DC: APA.

Bandura, A. (1969). Social learning of moral judgements. Journal of Personality and Social Psychology, 11, 273-279.

Bandura, A., & Walters, R. (1963). Social learning and personality development. New York: Holt, Rinehart & Winston.

Baron, R. S., Moore, D., & Sanders, G. S. (1978). Distraction as a source of drive in social facilitation research. Journal of Personality and Social Psychology, 36, 816-824.

Baumgarter, T. A., & Horvat, M. A. (1988). Problems in measuring the physical motor performance of the handicapped. Journal of Physical Education, Recreation and Dance, 1, 48-52.

Beatty, M. J., & Payne, S. K. (1984). Effects of social facilitation on listening comprehension. Communication Quarterly, 32(1), 37-40.

Bond, C. F. (1982) Social facilitation: A self-presentational view. Journal of Personality and Social Psychology, 42, 1042-1050.

Bond, C. F., & Titus, L. J. (1983). Social facilitation: A meta-analysis of 241 studies. Psychological Bulletin, 94, 265-292.

Bowman, R. A. (1979). Effect of peer group presence on selected psychomotor measurements with educable mentally retarded children. Unpublished master's thesis, Oregon State University, Corvallis, OR.

Carver, C. S., & Scheier, M. F. (1981). The self-attention-induced feedback loop and social facilitation. Journal of Experimental Social Psychology, 17, 545-568.

Carver, C. S., & Scheier, M. F. (1982). Control theory: A useful conceptual framework for personality-social, clinical, and health psychology. Psychological Bulletin, 92(1), 111-135.

Chevette, J. M. (1968). The effect of peer observation on selected tests of physical performance. The Journal of Psychology, 70, 113-119.

Cottrell, N. B. (1972). Social facilitation. In C. G. McClintock (Ed.), Experimental social psychology (pp. 185-236). New York: Holt, Rinehart, and Winston.

Cottrell, N. B., Wack, D. L., Sekerak, G. J., & Rittle, R. H. (1968). Social facilitation of dominant responses by the presence of an audience and the mere presence of others. Journal of Personality and Social Psychology, 10, 446-454.

Cronbach, L. J., & Meehl, P. M. (1955). Construct validity in psychological tests. Psychological Bulletin, 52, 281-301.

Dashiell, J. F. (1930). An experimental analysis of some group effects. Journal of Abnormal Psychology, 25, 190-199.

Duval, S., & Wicklund, R. A. (1972). A theory of objective self-awareness. New York: Academic Press.

Dunn, J. M. & Craft, D. H. (1985). Mainstreaming theory & practice. Adapted Physical Activity Quarterly, 2, 273-276.

Federal Register. (1977, August 23,). Education for All Handicapped Children Act, part II, implementation of Part B. Washington, D. C.: Department of Health, Education and Welfare, Office of Education.

Gallahue, D. (1982). Understanding motor development in children. New York: Wiley & Sons.

Gallahue, D. (1987). Developmental physical education for today's elementary school children. New York: Macmillan.

Geen, R. G., & Gange, J. J. (1977). Drive theory of social facilitation: Twelve years of theory and research. Psychological Bulletin, 84, 1267-1288.

Guerin, B. (1986). Mere presence effects in humans: A review. Journal of Experimental Social Psychology, 22, 38-77.

Haas, J., & Roberts, G. C. (1975). Effect of evaluative others upon learning and performance of a complex motor task. Journal of Motor Behavior, 7, 81-90.

Harvey, O. J., Hunt, D. E., & Schoeder, H. M. (1961). Conceptual systems and personality organization. New York: Wiley.

Haywood, K. M. (1986). Life span: Motor development. Champaign, IL: Human Kinetics.

Hintze, J. L. (1984). Number Cruncher Statistical System. [Computer program]. Kaysville, Utah: Number Cruncher Statistical Systems & Dr. Jerry L. Hintze.

Hollifield, N. L. (1982). Effect of prior performance experience before audiences on a dominant and nondominant motor response. Journal of Sport Psychology, 3, 317-323.

Jones, E., & Gerard, H. (1967). Foundation of social psychology. New York: Wiley.

Kirk, R. E., (1982). Experimental design: Procedures for the behavioral sciences. Monterey, CA: Brook/Cole.

Klesius, S. E. (1981). Measurement and evaluation: The neglected element in physical education for the handicapped. The Physical Educator, 38, 15-19.

Knowles, E. S. (1983). Social physics and the effects of others; Tests of the effects of audience size and distance on social judgements and behavior. Journal of Personality and Social Psychology, 45, 1263-1279.

Kushnir, T. & Duncan, K. D. (1978). An analysis of social facilitation effects in terms of signal detection theory. Psychological Record, 28, 535-541.

Landers, D. M., Bauer, G. S., & Feltz, D. L. (1978) Social facilitation during the initial stage of motor learning: A re-examination of Marten's audience study. Journal of Motor Behavior, 10, 325-337.

Landers, D. M., & McCullagh, P. D. (1976). Social facilitation of motor performance, Exercise and Sport Sciences Reviews, 4, 125-162.

Langendorfer, S. (1986). [Review of Test of Gross Motor Development]. Adapted Physical Activity Quarterly, 3, 186-190.

Lavay, B. & DePaepe J. (1987). The harbinger helper. Journal of Physical Education, Recreation and Dance, 7, 98-103.

Martens, R. (1969). Effect of an audience on learning and performance of a complex motor skill. Journal of Personality and Social Psychology, 12, 252-260.

Martens, R., & Landers, D. M. (1969). Coaction effects on a muscular endurance task. Research Quarterly, 40, 733-737.

Martens, R., & Landers, D. M. (1972). Evaluation potential as a determinant of coaction effects. Journal of Experimental Social Psychology, 8, 347-359.

Meddock, T. D., Parsons, J. A., & Hill, K. T. (1971). Effects of an adult's presence and praise on young children's performance. Journal of Experimental Child Psychology, 12, 197-211.

Newman, A., Dickstein, R., & Gargan, M. (1978). Developmental effects in social facilitation and in being a model. The Journal of Psychology, 99, 143-150.

Paulus, P. B., & Murdoch, P. (1971). Anticipated evaluation and audience presence in the enhancement of dominant responses. Journal of Experimental Social Psychology, 7, 280-291.

Pessin, J. (1933). The comparative effects of social and mechanical stimulation on memorizing. American Journal of Psychology, 45, 263-270.

Piaget, J. (1962). The moral judgment of the child. New York: Macmillan.

Safrit, M. J. (1982). Evaluation in physical education (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall.

Sanders, G. S. (1981). Driven by distraction: An integrative review of social facilitation theory and research. Journal of Experimental Social Psychology, 17, 227-251.

Sanders, G. S., & Baron, R. S. (1975). The motivating effects of distraction on task performance. Journal of Personality and Social Psychology, 32, 956-963.

Sanders, G. S., Baron, R. S., & Moore, D. (1978). Distraction and social comparison as mediators of social facilitation effects. Journal of Experimental Social Psychology, 14, 291-303.

Spence, K. W. (1956). Behavior theory and conditioning. New Haven: Yale University Press.

Steinman, W. (1970a). Generalized imitation and the discrimination hypothesis. Journal of Experimental Child Psychology, 10, 79-99.

Steinman, W. (1970b). The social control of generalized imitation. Journal of Applied Behavior Analysis. 3, 159-167.

Sullivan, H. S. (1953). The interpersonal theory of psychiatry. New York: Norton.

Thomas, J. R., & Nelson, J. K. (1985). Introduction to research in health, physical education, recreation, and dance. Champaign, IL: Human Kinetics.

Triplett, M. (1898). The dynamogenic factors in pacemaking and competition. American Journal of Psychology, 9, 507-533.

Ulrich, D. A. (1984). The reliability of classification decisions made with the objectives-based motor skill assessment instrument. Adapted Physical Activity Quarterly, 1, 52-60.

Ulrich, D. A. (1985). Test of gross motor development. Austin, TX: PRO-ED.

Werder, J. K., & Kalakian, L. H. (1985). Assessment in adapted physical education. Minneapolis, MN: Burgess.

Williams, H. G. (1983). Perceptual and motor development. Englewood Cliffs, NJ: Prentiss Hall.

Wood, T. M. (1989). The changing nature of norm-referenced test validity. In M. J. Safrit & T. M. Wood (Eds.), Measurement concepts in physical education and exercise science (pp. 192-199). Champaign, IL: Human Kinetics.

Worringham, C. J., & Messick, D. M. (1983). Social facilitation of running: An unobtrusive study. Journal of Social Psychology, 121, 23-29.

Wynne, J. D. (1982). Learning statistics, A common-sense approach. New York: Macmillan.

Zajonc, R. B. (1980). Compresence. In P.B. Paulus (Ed.), Psychology of group influence (pp.35-66). Hillsdale, NJ: Erlbaum.

Zajonc, R. B. (1965). Social facilitation. Science, 149, 269-274.

APPENDICES

Appendix A

Human Subjects Approval

OREGON STATE UNIVERSITY

Committee for the Protection of Human Subjects

Chairman's Summary of Review

Title: Effect of Peer Group Presence on the Gross Motor Performance of Young Children

Program Director: John M. Dunn

Recommendation:

XX Approval*

____ Provisional Approval

____ Disapproval

____ No action

*The informed consent forms obtained from each subject need to be retained for the long term. Archives Division of the OSU Department of Budgets and Personnel Service is willing to receive and archive these on microfilm. At present at least, this can be done without charge to the research project. Please have the forms retained in archives as well as in your files.

Remarks:

Date: April 2, 1989 Signature Redacted for Privacy

If the recommendation of the committee is for provisional approval or disapproval, the program director should resubmit the application with the necessary corrections within one month.

Appendix B

Informed Consent Letter

May , 1989

Dear Parents:

I am a graduate student at Oregon State University working on a master of science degree in physical education. To fulfill part of the requirements for this degree, I am conducting a study to see if gross motor test scores obtained in a group situation are different from the test scores obtained in a one-to-one environment. The children who participate in the study will be evaluated by the Test of Gross Motor Development. This test has been given across the nation to children aged three to ten years.

The Test of Gross Motor Development assesses 12 gross motor skills which have been subdivided into two groups, locomotor (i.e. run, skip, gallop, leap, jump, hop, slide,) and object control (two-hand strike, ball bouncing, catch, kick, overhand throw). Your child may be familiar with some or all of these items because they are skills that children learn before or while attending elementary school.

I would like to ask your permission to allow your child to participate in this study. With your consent, your child will be given the test twice, once with four children observing and once individually. The name of your child will not be recorded with test results and confidentiality will be strictly enforced. Also, your child may withdraw from participation at any time he or she chooses.

My past experiences working with children include 9 years teaching elementary physical education at Crooked River Grade School and coaching after school sports. I enjoy teaching children and am looking forward to working with your child.

I will be happy to answer any questions you may have regarding this study. You may contact me at 447-6926 or my advisor, Dr. John M. Dunn, at 754-2176. If you request, I will also be happy to send you a summary of the results of the study.

Sincerely,

Margaret Bates

I give my permission for my child to participate in the Test of Gross Motor Development Study.

I do not give my permission for my child to participate in the Test of Gross Motor Development Study.

I would like more information. Please call me at:__________

Date:________________ Signed:________________________

Appendix C

TGMD Scoresheet

LOCOMOTOR SKILLS

Skill	Equipment	Directions	Performance Criteria	1st	2nd
SKIP	A minimum of 30 feet of clear space, marking device	Mark off two lines 30 feet apart Tell the student to skip from one line to the other three times	1. A rhythmical repetition of the step-hop on alternate feet		
			2. Foot of nonsupport leg carried near surface during hop		
			3. Arms alternately moving in opposition to legs at about waist level		
SLIDE	A minimum of 30 feet of clear space, colored tape or other marking device	Mark off two lines 30 feet apart Tell the student to slide from one line to the other three times facing the same direction	1. Body turned sideways to desired direction of travel		
			2. A step sideways followed by a slide of the trailing foot to a point next to the lead foot		
			3. A short period where both feet are off the floor		
			4. Able to slide to the right and to the left side		
			LOCOMOTOR SKILLS SUBTEST SCORE		

OBJECT CONTROL SKILLS

Skill	Equipment	Directions	Performance Criteria	1st	2nd
TWO-HAND STRIKE	4-6 inch light-weight ball, plastic bat	Toss the ball softly to the student at about waist level Tell the student to hit the ball hard Only count those tosses that are between the student's waist and shoulders	1. Dominate hand grips bat above nondominant hand		
			2. Nondominant side of body faces the tosser (feet parallel)		
			3. Hip and spine rotation		
			4. Weight is transferred by stepping with front foot		
STATIONARY BOUNCE	8-10 inch playground ball, hard, flat surface (floor, pavement)	Tell the student to bounce the ball three times using one hand Make sure the ball is not underinflated Repeat 3 separate trials	1. Contact ball with one hand at about hip height		
			2. Pushes ball with fingers (not a slap)		
			3. Ball contacts floor in front of (or to the outside of) foot on the side of the hand being used		

OBJECT CONTROL SKILLS

Skill	Equipment	Directions	Performance Criteria	1st	2nd
CATCH	6-8 inch sponge ball, 15 feet of clear space, tape or other marking device	Mark off 2 lines 15 feet apart. Student stands on one line and the tosser on the other. Toss the ball underhand directly to student with a slight arc and tell him/her to "catch it with your hands." Only count those tosses that are between student's shoulders and waist.	1. Preparation phase where elbows are flexed and hands are in front of body		
			2. Arms extend in preparation for ball contact		
			3. Ball is caught and controlled by hands only		
			4. Elbows bend to absorb force		
KICK	8-10 inch plastic or slightly deflated playground ball, 30 feet of clear space, tape or other marking device	Mark off one line 30 feet away from a wall and one that is 20 feet from the wall. Place the ball on the line nearest the wall and tell the student to stand on the other line. Tell the student to kick the ball "hard" toward the wall.	1. Rapid continuous approach to the ball		
			2. The truck is inclined backward during ball contact		
			3. Forward swing of the arm opposite kicking leg		
			4. Following-through by hopping on nonkicking foot		
OVERHAND THROW	3 tennis balls, a wall, 25 feet of clear space	Tell student to throw the ball "hard" at the wall	1. A downward arc of the throwing arm initiates the windup		
			2. Rotation of hip and shoulder to a point where the nondominant side faces an imaginary target		
			3. Weight is transferred by stepping with the foot opposite the throwing hand		
			4. Following-through beyond ball release diagonally across body toward side opposite throwing arm		
			OBJECT CONTROL SKILLS SUBTEST SCORE		

LOCOMOTOR SKILLS

Skill	Equipment	Directions	Performance Criteria	1st	2nd
RUN	50 feet of clear space, colored tape, chalk or other marking device	Mark off two lines 50 feet apart Instruct student to "run fast" from one line to the other	1. Brief period where both feet are off the ground		
			2. Arms in opposition to legs, elbows bent		
			3. Foot placement near or on a line (not flat footed)		
			4. Nonsupport leg bent approximately 90 degrees (close to buttocks)		
GALLOP	A minimum of 30 feet of clear space	Mark off two lines 30 feet apart Tell student to gallop from one line to the other three times Tell student to gallop leading with one foot and then the other	1. A step forward with the lead foot followed by a step with the trailing foot to a position adjacent to or behind the lead foot		
			2. Brief period where both feet are off the ground		
			3. Arms bent and lifted to waist level		
			4. Able to lead with the right and left foot		
HOP	A minimum of 15 feet of clear space	Ask student to hop 3 times, first on one foot and then on the other	1. Foot of nonsupport leg is bent and carried in back of the body		
			2. Nonsupport leg swings in pendular fashion to produce force		
			3. Arms bent at elbows and swing forward on take off		
			4. Able to hop on the right and left foot		
LEAP	A minimum of 30 feet of clear space	Ask student to leap Tell him/her to take large steps leaping from one foot to the other	1. Take off on one foot and land on the opposite foot		
			2. A period where both feet are off the ground (longer than running)		
			3. Forward reach with arm opposite the lead foot		
HORIZONTAL JUMP	10 feet of clear space, tape or other marking devices	Mark off a starting line on the floor, mat, or carpet Have the student start behind the line Tell the student to "jump far"	1. Preparatory movement includes flexion of both knees with arms extended behind the body		
			2. Arms extend forcefully forward and upward, reaching full extension above head		
			3. Take off and land on both feet simultaneously		
			4. Arms are brought downward during landing		

Appendix Table D-1

Testing Schedule for 8- & 10-year olds
10 years ± 6 mos.
8 years ± 6 mos.
N = 20

Students A-J Peer Nonpresence	Students A-J Peer Presence	Students 1-10 Peer Presence	Students 1-10 Peer Nonpresence
1 A B C D	8 A 1 B 2 C 3 D 4 OBSERVERS	3 1 2 4 3 4 INDEPENDENT OBSERVERS	6 1 2 3 4
2 E F G H	9 E 5 F 6 G 7 H 8 OBSERVERS	4 5 6 4 7 8 INDEPENDENT OBSERVERS	7 5 6 7 8
5 I J *30 min	10 A I B J C D OBSERVERS *30 min	11 E 9 F 10 G H OBSERVERS *30 min	12 9 10 *30 min

*Each block: 1 hr. unless otherwise noted
Total Test Time: 10 hrs.

Appendix Table D-2

Testing Schedule for 5-year-olds
AGE: 5 years ± 6 mos.
N = 18

Students A-J Peer Nonpresence	Students A-J Peer Presence	Students 1-10 Peer Presence	Students 1-10 Peer Nonpresence
1 A B C	8 A B C 1 2 3 4 OBSERVERS	3 1 2 3 4 INDEPENDENT OBSERVERS	6 1 2 3
2 D E F	9 D E F 5 6 A B OBSERVERS	4 4 5 6 4 INDEPENDENT OBSERVERS	7 4 5 6
5 G H I	11 G H I 7 8 9 1 OBSERVERS	10 7 8 9 C D E F OBSERVERS	12 7 8 9

Each block: 1 hr.
Total Test Time: 12 hrs.

Appendix Table E-1

EFFECT OF AGE AND CONDITION ON THE SKILL OF RUN

Source	df	SS	MS	F	p
Age	2	5.07	2.53	.04	.997
Error (age)	55	37.64	.68		
Condition	1	2.21	2.21	11.34	.002*
Age x Condition	2	8.75	4.38	.22	.77
Error	55	10.71	.19		
Total	115	50.69	.44		

*p<.05

Appendix Table E-2

EFFECT OF AGE AND CONDITION ON THE SKILL OF GALLOP

Source	df	SS	MS	F	p
Age	2	14.37	7.19	8.28	.001*
Error (age)	55	47.74	.87		
Condition	1	3.80	3.80	6.15	.015*
Age x Condition	2	1.69	.85	1.37	.262
Error	55	34.01	.62		
Total	115	101.61	.88		

$*p<.05$

Appendix Table E-3

EFFECT OF AGE AND CONDITION ON THE SKILL OF HOP

Source	df	SS	MS	F	p
Age	2	22.28	11.14	10.71	.001*
Error (age)	55	57.17	1.04		
Condition	1	1.24	1.24	3.17	.077
Age x Condition	2	.21	.10	.27	.704
Error	55	21.55	.39		
Total	115	102.45	.89		

*$p<.05$

Appendix Table E-4

EFFECT OF AGE AND CONDITION ON THE SKILL OF LEAP

Source	df	SS	MS	F	p
Age	2	2.52	1.25	2.8	.068
Error (age)	55	24.69	.45		
Condition	1	.14	.14	.59	.506
Age x Condition	2	6.21	3.10	.13	.909
Error	55	12.80	.23		
Total	115	40.21	.89		

*p<.05

Appendix Table E-5

EFFECT OF AGE AND CONDITION ON THE SKILL OF JUMP

Source	df	SS	MS	F	p
Age	2	13.35	6.67	4.22	.019*
Error (age)	55	87.07	1.58		
Condition	1	.42	.42	.98	.579
Age x Condition	2	2.27	1.14	2.62	.080
Error	55	23.81	.43		
Total	115	126.92	1.10		

*p<.05

Appendix Table E-6

EFFECT OF AGE AND CONDITION ON THE SKILL OF SKIP

Source	df	SS	MS	F	p
Age	2	33.54	16.77	14.15	.001*
Error (age)	55	65.21	1.19		
Condition	1	.03	.03	.11	.660
Age x Condition	2	.84	.42	1.35	.267
Error	55	17.13	.31		
Total	115	116.76	1.02		

*p<.05

Appendix Table E-7

EFFECT OF AGE AND CONDITION ON THE SKILL OF SLIDE

Source	df	SS	MS	F	p
Age	2	31.18	15.59	12.65	.001*
Error (age)	55	67.76	1.23		
Condition	1	.22	.22	.53	.50
Age x Condition	2	.82	.41	1.00	.376
Error	55	22.46	.41		
Total	115	122.44	1.06		

*p<.05

Appendix Table E-8

EFFECT OF AGE AND CONDITION ON THE SKILL OF STRIKE

Source	df	SS	MS	F	p
Age	2	28.45	14.22	11.08	.001*
Error (age)	55	70.59	1.28		
Condition	1	.31	.31	.63	.51
Age x Condition	2	.60	.30	.61	.507
Error	55	27.09	.49		
Total	115	127.03	1.10		

*p<.05

Appendix Table E-9

EFFECT OF AGE AND CONDITION ON THE SKILL OF BOUNCE

Source	df	SS	MS	F	p
Age	2	71.60	35.80	34.42	.001*
Error (age)	55	57.20	1.03		
Condition	1	.22	.22	.64	.51
Age x Condition	2	.88	.44	1.32	.275
Error	55	18.40	.33		
Total	115	148.30	1.29		

$*p<.05$

Appendix Table E-10

EFFECT OF AGE AND CONDITION ON THE SKILL OF CATCH

Source	df	SS	MS	F	p
Age	2	33.00	16.50	26.11	.001*
Error (age)	55	34.76	.63		
Condition	1	.14	.14	.32	.516
Age x Condition	2	.47	.24	.56	.516
Error	55	23.39	.43		
Total	115	91.76	.80		

*$p<.05$

Appendix Table E-11

EFFECT OF AGE AND CONDITION ON THE SKILL OF KICK

Source	df	SS	MS	F	p
Age	2	26.62	13.31	12.65	.001*
Error (age)	55	57.88	1.05		
Condition	1	7.76	7.76	.12	.646
Age x Condition	2	.66	0.33	.51	.53
Error	55	35.76	0.65		
Total	115	120.99	1.05		

*p<.05

Appendix Table E-12

EFFECT OF AGE AND CONDITION ON THE SKILL OF THROW

Source	df	SS	MS	F	p
Age	2	20.74	10.37	5.26	.008*
Error (age)	55	108.50	1.97		
Condition	1	.31	.31	.37	.507
Age x Condition	2	1.40	.70	.83	.508
Error	55	46.29	.84		
Total	115	177.24	1.54		

*p<.05

Appendix Table E-13

EFFECT AGE AND CONDITION ON THE
OBJECT CONTROL STANDARD SCORE

Source	df	SS	MS	F	p
Age	2	571.08	285.54	25.45	.001*
Error (age)	55	617.00	11.21		
Condition	1	4.56	4.56	1.34	.251
Age x Condition	2	7.34	3.67	1.08	.348
Error	55	186.6	3.39		
Total	115	1386.58	12.05		

Appendix Table E-14

EFFECT OF AGE AND CONDITION ON THE
OBJECT CONTROL RAW SCORE TOTAL

Source	df	SS	MS	F	p
Age	2	815.94	407.97	32.24	.001*
Error (age)	55	695.93	12.65		
Condition	1	.86	.86	.21	.561
Age x Condition	2	7.72	3.86	.94	.526
Error	55	226.41	4.12		
Total	115	1746.86	15.19		

Appendix Table E-15

EFFECT OF AGE AND CONDITION ON THE
LOCOMOTOR STANDARD SCORE

Source	df	SS	MS	F	p
Age	2	163.49	81.74	7.51	.002*
Error (age)	55	598.76	10.89		
Condition	1	41.04	41.04	21.96	.001*
Age x Condition	2	3.68	1.84	.99	.537
Error	55	102.78	1.87		
Total	115	909.75	7.91		

Appendix Table E-16

EFFECT OF AGE AND CONDITION ON THE
LOCOMOTOR RAW SCORE TOTAL

Source	df	SS	MS	F	p
Age	2	619.92	309.96	20.77	.001*
Error (age)	55	820.64	14.92		
Condition	1	8.28	8.28	2.82	.095
Age x Condition	2	8.91	4.45	1.52	.226
Error	55	161.31	2.93		
Total	115	1619.061	14.08		

Appendix Table E-17

EFFECT OF AGE AND CONDITION ON THE TOTAL RAW SCORES

Source	df	SS	MS	F	p
Age	2	2934.07	1467.03	33.73	.001*
Error (age)	55	2392.42	43.50		
Condition	1	14.49	14.49	1.26	.266
Age x Condition	2	46.38	23.19	2.02	.14
Error	55	631.63	11.48		
Total	115	6018.992	52.34		

Appendix Table F-1

EFFECTS OF AGE AND CONDITION ON THE MASTERY OF THE SKILL OF RUN

Source	df	SS	MS	F	p
Age	2	5.03	2.65	.08	.974
Error (age)	55	17.96	.32		
Condition	1	1.45	1.45	11.78	.001*
Age x Condition	2	.24	.12	.98	.535
Error	55	6.80	.19		
Total	115	26.51	.23		

*p<.05

Appendix Table F-2

EFFECTS OF AGE AND CONDITION ON THE MASTERY OF THE SKILL OF GALLOP

Source	df	SS	MS	F	p
Age	2	1.69	.84	6.49	.003*
Error (age)	55	7.16	.13		
Condition	1	1.70	1.70	10.01	.003*
Age x Condition	2	2.98	1.49	.09	.964
Error	55	9.28	.17		
Total	115	19.84	.17		

*p<.05

Appendix Table F-3

EFFECTS OF AGE AND CONDITION ON THE MASTERY OF THE SKILL OF HOP

Source	df	SS	MS	F	p
Age	2	4.25	2.13	9.17	.001*
Error (age)	55	12.76	.23		
Condition	1	.42	.42	2.58	.110
Age x Condition	2	.07	.03	.24	.742
Error	55	9.00	.16		
Total	115	26.50	.23		

*p<.05

Appendix Table F-4

EFFECTS OF AGE AND CONDITION ON THE MASTERY OF THE SKILL OF LEAP

Source	df	SS	MS	F	p
Age	2	1.88	.94	3.93	.025
Error (age)	55	13.22	.24		
Condition	1	.01	.01	.06	.760
Age x Condition	2	.06	.03	.23	.756
Error	55	8.42	.15		
Total	115	23.61	.21		

*p<.05

Appendix Table F-5

EFFECTS OF AGE AND CONDITION ON THE MASTERY OF THE SKILL OF JUMP

Source	df	SS	MS	F	p
Age	2	3.70	1.85	5.43	.007*
Error (age)	55	87.07	.34		
Condition	1	.42	.21	2.36	.126
Age x Condition	2	2.27	.13	1.44	.245
Error	55	5.02	.09		
Total	115	27.96	.24		

*$p < .05$

Appendix Table F-6

EFFECTS OF AGE AND CONDITION ON THE MASTERY OF THE SKILL OF SKIP

Source	df	SS	MS	F	p
Age	2	2.87	1.43	4.98	.01*
Error (age)	55	15.82	.29		
Condition	1	.14	.14	.18	.54
Age x Condition	2	.47	.24	1.39	.257
Error	55	9.39	.17		
Total	115	28.69	.25		

*p<.05

Appendix Table F-7

EFFECTS OF AGE AND CONDITION ON THE MASTERY OF THE SKILL OF SLIDE

Source	df	SS	MS	F	p
Age	2	6.14	3.07	10.76	.001*
Error (age)	55	15.71	.29		
Condition	1	.14	.14	1.16	.286
Age x Condition	2	.31	.16	1.32	.275
Error	55	6.55	.12		
Total	115	28.86	.25		

*p<.05

Appendix Table F-8

EFFECTS OF AGE AND CONDITION ON THE MASTERY OF THE SKILL OF STRIKE

Source	df	SS	MS	F	p
Age	2	3.88	1.94	6.54	.003*
Error (age)	55	16.32	.30		
Condition	1	.14	.14	1.37	.245
Age x Condition	2	.32	.16	1.56	.218
Error	55	5.55	.10		
Total	115	26.21	.23		

*p<.05

Appendix Table F-9

EFFECTS OF AGE AND CONDITION ON THE MASTERY OF THE SKILL OF BOUNCE

Source	df	SS	MS	F	p
Age	2	11.33	5.66	27.90	.001*
Error (age)	55	11.17	.20		
Condition	1	.01	.01	.08	.713
Age x Condition	2	.23	.11	1.00	.376
Error	55	6.26	.11		
Total	115	28.99	.25		

*p<.05

Appendix Table F-10

EFFECTS OF AGE AND CONDITION ON THE MASTERY OF THE SKILL OF CATCH

Source	df	SS	MS	F	p
Age	2	8.47	4.23	24.97	.001*
Error (age)	55	34.76	.63		
Condition	1	3.45	3.45	.21	.561
Age x Condition	2	.12	.05	.37	.516
Error	55	8.84	.16		
Total	115	21.79	.23		

*p<.05

Appendix Table F-11

EFFECTS OF AGE AND CONDITION ON THE MASTERY OF THE SKILL OF KICK

Source	df	SS	MS	F	p
Age	2	1.2	.60	3.20	.047*
Error (age)	55	10.35	.19		
Condition	1	.03	.03	.38	.506
Age x Condition	2	.02	0.01	.10	.952
Error	55	4.95	0.09		
Total	115	16.55	.14		

*p<.05

Appendix Table F-12

EFFECTS OF AGE AND CONDITION ON THE MASTERY OF THE SKILL OF THROW

Source	df	SS	MS	F	p
Age	2	5.58	2.79	9.27	.001*
Error (age)	55	16.56	.30		
Condition	1	.00	.00	.00	1.00
Age x Condition	2	.61	.31	3.12	.051
Error	55	5.39	9.80		
Total	115	28.14	.24		

*p<.05