AN ABSTRACT OF THE DISSERTATION OF

Lauren Joy Lieberman for the degree of Doctor of Philosophy in Human Performance presented on August 14, 1995. Title: The Effect of Trained Hearing Peer Tutors on the Physical Activity Levels of Deaf Students in Inclusive Elementary Physical Education Classes

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The purpose of this study was to investigate the effect of trained hearing peer tutors on the physical activity levels of deaf students in integrated elementary physical education classes. This study utilized a single subject multiple baseline design across subjects.

Eight deaf 4th and 5th grade students and eight hearing 4th and 5th grade peer tutors participated in the study. The students were observed during their physical education class and data were analyzed on physical activity levels and peer tutor behavior. The deaf students and peer tutors were first observed during a baseline period of 4-6 classes with no intervention. The peer tutors were trained toward the latter part of the baseline period. The peer tutor intervention lasted from 11-13 classes. During the intervention, the peer tutor and deaf student participated in pairs for the fitness portion of the class. The results of the intervention demonstrated that the implementation of trained hearing peer tutors improved the physical activity levels of both the deaf students and peer tutors.

The training of the peer tutors consisted of signs pertaining to: instruction, physical fitness, and teaching techniques in the areas of: cueing, feedback and

reinforcement. The cueing approach followed the system of least prompts and included verbal cueing, modeling, and physical assistance. Feedback consisted of positive general and positive specific reinforcement. Peer tutors were trained over four to five 30 minutes sessions. Pre-established criteria required the peer tutors to implement the teaching behaviors with the researcher a minimum of 4 out of 5 times, and receive a score of 90% or better on the peer tutor quiz. All peers were successful at meeting this criteria. Data were collected on the peer tutors tutoring behavior throughout the study by systematic observation. The results of the peer tutor data revealed that the tutors were able to implement the tutor training program.

The results of this study demonstrate that elementary aged deaf students and their hearing peers can improve their physical activity levels upon intervention of trained hearing peer tutors. It was also shown that elementary aged peer tutors can be trained to provide assistance to deaf students in integrated physical education classes. Recommendations for future research are provided based on the results of the study.

The Effect of Trained Hearing Peer Tutors on the Physical Activity Levels of Deaf Students in Inclusive Elementary School Physical Education Classes

by

Lauren J. Lieberman

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I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

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Lauren J. Lieberman, Author

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CHAPTER 1

INTRODUCTION

Throughout history, philosophers, physicians, and religious leaders have equated exercise with morals, ethics, and intellectual endeavors in the "total" human existence (Ryan, 1984). Adults who exercise regularly have decreased risk of suffering from coronary heart disease (Rigotti & Thomas, & Leaf, 1983), diminished prevalence of hypertension (Tipton, 1983), less chance of being obese (Epstein, & Wing, 1980), slower functional aging (Buskirk, 1990), and increased likelihood of emotional well being.

Individuals involved in the health care of children are interested in promoting exercise in the pediatric age group. Experts argue that: "if a modifiable factor (physical exercise) can ameliorate a disease state (e.g., coronary heart disease) that begins early in life (although clinically silent), the best hope for an effective prevention strategy would be to promote that factor during the childhood years" (Rowland & Freedson, 1994 p. 669). Blaire, Clark, Cureton, and Powell (1989) outline three possibilities on how childhood fitness can lead to improved health. The first is that exercise (physical activity/fitness) might directly improve the health of children. Secondly, exercise during childhood could produce changes that will have a beneficial effect on adult health later in life. The last possibility is that exercise habits in childhood might persist into adult years and a lifetime of regular activity/fitness would then positively effect adult outcomes. There is evidence that active children do become active adults

(Saul, 1994). The possibilities proposed by Blair et al. (1989) are critical in the future of our children's health.

The concept of promoting children's physical activity/fitness is not new. Currently, the status of American children's fitness is being questioned. All signs suggest that most children are not active enough to form the kind of exercise habit that could protect them from ill health later in life (Saul, 1994). In a review of research by Kuntzleman and Reiff (1992), it was noted that over the past 50 years, skinfolds and weight of American boys and girls have increased, and in the past 10 years distance run times for both boys and girls appear to have worsened. This has led health educators, physical educators and parents to seek new strategies to improve the fitness and activity levels of children and, in turn, to ensure active and healthy adults in the future.

Fitness Levels of Deaf Children

Several studies have reported that students with hearing impairments and deafness are inferior to "normal" children on static and dynamic balance, locomotor coordination (Brunt & Broadhead, 1982; Lindsey & O'Neal, 1976), and speed (Boyd, 1967). Studies of physical fitness have reported conflicting results when deaf students are compared to their hearing peers. Levels of fitness of deaf students were found to be equal or higher than those reported for those who hear (Cummings, Goulding & Bagley, 1971; Hattin, Fraser, Ward, & Shephard, 1986; Winnick and Short, 1986), or below, as concluded by Dunn and Fait (1989) and Butterfield (1993). Schmidt (1985) and Winnick and Short (1985) compared the motor performance of deaf students in a residential setting with deaf students attending public schools. In both studies deaf students scored significantly lower on the reported fitness items than those who attended

special schools. Winnick (1990) speculated that students who are deaf and attend regular schools are not provided physical activity appropriate for reaching their maximum potential. Dunn and Ponticelli (1988) determined that the mode of communication utilized in the testing situation directly reflects the outcome of the fitness scores. Similarly, Auxter, Pyfer, and Heuttig (1989) concluded that it is the mainstreamed environment that limits the development of the child who is deaf, due to unnecessary limits set by the teacher and the focus on the disability rather than the child's ability. The child is enrolled into the school, yet inadequate measures are taken to ensure an appropriate education.

Introduction of students with hearing impairments into a regular class without adequate support can be frustrating for both students and staff. Auxter et al. (1989) speculated on the importance of providing trained hearing peer tutors for guidance and assistance with communication. Trained peer tutors can be utilized in physical and motor fitness programs to ensure appropriate understanding and to help improve fitness levels, whether the child is performing above or below his/her hearing peers.

Many teachers in regular schools are not prepared to teach students with disabilities, especially students who are deaf. Students who are deaf have been shown to have lower motor ability and fitness scores than hearing students (Butterfield, 1993). Currently there is a need to find strategies that will promote physical activity by all deaf children. To date little is known about the impact of peer teaching on the fitness levels of the peers themselves (Houston-Wilson, 1993).

Inclusion of Deaf Children

PL-101-476, the Individuals with Disabilities Education Act, and its predecessor PL 94-142, the Education for All Handicapped Children Act (Federal Register, 1977; IDEA, 1990) includes 13 disability areas, one of which is "deafness". Deafness is defined as "a hearing impairment that is so severe that the child is impaired in processing linguistic information through hearing, with or without amplification, that adversely affects a child's educational performance" (NICHCY, 1993 p. 2). Until recently, many deaf students were placed in residential deaf schools with deaf peers. With the trend towards inclusion, more deaf students are being placed into the local schools with their hearing peers (Dubow, 1989). This trend has had mixed reviews, but many advocates argue this is the best placement for deaf students.

Ladd, Munson, and Miller (1984) conducted a study on opinions of hearing children in the mainstream and their attitude toward peers who are deaf. It was concluded that deaf children placed in the mainstream were not perceived as different by their classmates. In addition, parents of deaf students tended to view their children as adjusting easily to life in a hearing world with positive attitudes toward themselves and their schoolwork. Roberta Thomas, Executive Director of the American Society for Deaf Children, asserted: "If we recognize that deaf children are capable of the same educational achievements as their hearing peers, their education can equally reflect the goals of knowledge, training and literacy." There is no need for a double standard, only for another mode and language in teaching deaf children" (Davilla, Deninger, Thomas, & McChord, 1989, p. 4). Kasen, Oulette, and Cohen (1990) found that hearing-impaired students, with increased levels of mainstreaming in elementary and

secondary schools, are more likely to attend post-secondary institutions, and for longer periods.

When integrating students who are deaf into school programs, difficulties are frequently reported in communication and feelings of isolation from teachers (Butterfield, 1993; Dolnick, 1993), hearing peers (Ladd, Munson, & Miller, 1984), and from society as a whole (Dubow, 1989). To confront these issues of isolation and communication, many schools have set up peer training programs. Lederberg, Ryan, and Robbins (1986) conducted a study on peer interactions and reported that familiarity among deaf and hearing peers played a large role in improving interaction and communication. Antia, Kreimeyer, and Eldridge (1994) conducted a study on the effects of social skills intervention on the positive peer interaction of four children with hearing impairments. It was determined that high levels of peer interaction were maintained when the intervention was sequentially withdrawn. Various other studies analyzing the effect of integration on peers (Chin-Perez, Hartman, Parks, Sacks, Wershing, & Gaylord-Ross, 1986; Condon, York, Heal, & Fortschneider, 1986; Haring, Breen, Pitts-Conway, Lee & Gaylord-Ross, 1988; Kisabeth, & Richardson, 1985; Stewart, 1988; Voeltz, 1980, 1982) inferred an increase in positive peer interactions, and increased communication resulting from integration of students with various disabilities.

In summary, little research has been conducted on the effectiveness of peer tutors in physical education for students who are deaf. In addition, the impact of peer teaching on the peer has yet to be examined.

Statement of the Problem

There is a need to examine the physical activity level of deaf students in integrated physical education classes and the effect of peer tutors on increasing the physical activity levels of deaf students in integrated physical education classes.

Purpose of the Study

The purpose of this study was to investigate the effect of peer tutoring on the physical activity levels of deaf students in integrated physical education classes. The peer tutoring was conducted during the fitness instruction portion of the class. The study examined : (a) the impact of trained hearing peer tutors on the physical activity levels of students who are deaf, and (b) the effect of peer tutoring on the physical activity levels of the hearing peers.

Research Questions

In this study two research questions were posed:

1) Can the implementation of trained hearing peer tutors in a peer teaching situation increase the physical activity levels of students who are deaf in integrated physical education class?

2) Will physical activity levels of the hearing peer tutors change as a result of peer tutoring in integrated physical education class?

Operational Definitions

The following operational definitions were used in this study:

Level of Physical Activity: Activity level estimates, as measured by the System for Observing Fitness Instruction Time, provides an estimate of the level of intensity of the students physical activity (McKenzie, Sallis, Nader, 1991).

System for Observing Fitness Instructional Time: An observational instrument designed to assess variables associated with students' activity levels and opportunities to become physically active in physical education (McKenzie, Sallis, & Nader, 1991).

Deaf Students : Individuals who have a hearing loss severe enough to utilize sign language as their primary means of communication .

Trained Peer Tutors: Hearing peers who, as a result of instruction, passed the competency tests appropriate on sign language, teaching techniques, and feedback techniques. Teaching techniques learned by tutors included cueing and modeling.

Cueing: "signal, request, or condition that does or can be made to influence the occurrences of a behavior" (Dunn, Morehouse, and Fredericks, 1986, p. 169).

Modeling: "observing the teacher, volunteer, or aide perform a skill prior to being cued" (Dunn, Morehouse, and Fredericks, 1986, p.170).

Physical Activity: The amount of movement an individual engages in on a daily basis. It is measured in terms of calories expended and decreases steadily (relative to body weight) during the childhood years (Saris, Elvers, van't Hof, & Bankhurst, 1986).

Positive Feedback: A supportive statement about the student's motor skill response (Houston-Wilson, 1993).

Positive Specific Feedback: A supportive statement that includes exact information about what is good about the motor skill response (Houston-Wilson, 1993).

Assumptions

In conducting this study the following assumptions were made: (a) the subjects were motivated to try their best, (b) the training program enabled the hearing and deaf peer tutors to communicate and interact with each other, (c) the fitness activities covered during data collection are typical of activities for the grade level, (d) no outside interference affected students' activity levels during class, (e) the students in the study were representative of other deaf students, (f) the teacher in the study is representative of other elementary physical education teachers, and (g) the presence of the investigator did not alter the actions of the students or teacher in the study.

Delimitations

The study was delimited by the following:

1) The subjects were 8 students who are deaf and 8 peers with normal hearing.

2) The subjects ranged in age from 10-12 years of age.

3) The subjects were enrolled in integrated physical education classes.

4) The subjects were from one elementary school.

5) The observations were made of activity levels of the student.

6) The deaf students were paired with peers of the same gender.

Limitations/Uncontrolled Variables

The following limitations may have affected this study:

1) The health and physical fitness of the deaf students may have varied widely due to etiology and secondary effects of deafness.

2) Previous and current motor experiences of the subjects were not known.

3) Students may have had different skill levels of oral and manual communication.

4) Students had been involved in regular physical education for different amounts of time.

5) There is no evidence of whether, or to what degree, deaf students understood the sign communication of their trained hearing peers.

CHAPTER 2

REVIEW OF LITERATURE

A review of the literature in the area of peer tutoring for students who are deaf is presented in this chapter. The initial section deals with inclusion of students who are deaf, followed by a section describing physical fitness of hearing and deaf children. The measurement section focuses on measures of physical activity. The peer tutoring section includes information on peer tutors in special education, physical education, deaf education, and the benefits of peer tutoring to the peers.

Inclusion

PL-101-476, the Individuals with Disabilities Education Act (IDEA) the "least restrictive environment" (LRE) describes the cascade of educational placements that should be available within a school system (IDEA, 1990). The placement options consist of instruction in regular classrooms, special schools, home instruction, and instruction in hospitals and institutions. Schools are responsible for offering a continuum of alternative placements to meet the needs of children for special education and related services. One of the main purposes of IDEA is to assess and ensure the effectiveness of efforts to educate children with disabilities. Unless otherwise stated in the individualized education program (IEP), the child is to be educated in his/her home school. The "least restrictive environment" ensures that children with disabilities will be educated with

children without disabilities to the maximum extent possible (National Information Clearinghouse for Handicapped Children and Youth, 1993).

Inclusion of Students Who are Deaf

For centuries, deafness was considered a catastrophic loss with few options to lessen the impact of life without sound. Isolation and social separation were deemed inevitable. A deaf person, even in the midst of urban life, was considered unable to communicate. Attempts to educate deaf children did not begin until the 16th century. As late as 1749 the French Academy of Sciences appointed a commission to determine whether deaf people were "capable of reasoning" (Dolnick, 1993). Since then, deaf individuals have contributed significantly to society as evident by the talents of I. King Jordan, Marlee Matlin, Kenneth Walker, and Heather Whitestone. Few would ignore the deaf or exclude them from full participation in every day life. Yet even today deafness is seen as a dreadful fate (Dolnick, 1993).

In the United States, the first schools for the deaf were residential schools. Thomas Gallaudet established the first school The American School for the Deaf in Hartford, Connecticut in 1817. Schools for deaf children were predominantly residential well into the 20th century because of the low incidence of deafness as a disability (Dubow, 1989). Since the passage of the Education for All Handicapped Act in 1975, more deaf children are being educated in regular schools with children who are non-disabled (Dubow, 1989). Enrollment of these students in public schools has increased steadily according to the Annual Survey of Hearing Impaired Children and Youth (Schildroth, 1988).

For many students, the local school environment is the least restrictive educational setting, yet there are still many struggles each day. Often, when deaf children are placed in regular classrooms, communication is a daily hardship, with the responsibility for communication placed on the deaf child (Butterfield, 1993). Foster (1989) examined the experiences which led deaf people to seek interaction with each other, and the difficulties they have encountered with the "hearing world". She interviewed 25 adults, half of whom went to public schools. For mainstreamed students, school was a continuation -- and in many cases an exacerbation -- of social isolation felt in other settings. Most agreed they had been lonely in the public school and wished they could make friends more easily with hearing peers. Generally, deaf students continued to experience social rejection and isolation from interactions with hearing peers. Many schools admit deaf children but provide less than adequate services (Auxter, Pyfer & Heuttig, 1993). In many cases, school personnel do not understand the extent of services needed to ensure positive academic performance and social interactions. In many cases the teacher does not know the deaf students' potential and sets unnecessary limits on them.

There are many questions about whether schools that adhere to mainstreamed principles can meet the needs of students with other disabilities, in addition to those with deafness. It is continually questionable whether schools can provide the educational resources and special services to accommodate students with severe and profound hearing losses, or students with multiple handicaps (Schildroth, 1988).

Normalization means making available to persons with disabilities opportunities which are as close as possible to the norms of able-bodied society in living, educational, and vocational experiences (Sherrill, 1993). This "Normalization Theory" was introduced to the United States from Sweden by

Bengt Nirje in the late 1960's and is recognized as an important factor in integrating individuals with disabilities into society (Nirje, 1969, 1980). In 1988 Schildroth determined that there were over 4,412 schools in the United States with only one deaf child in each. Today, six years later, the numbers will be even higher. In most cases the child has only the deaf education consultant and the interpreter with whom to socialize independently. This lack of communication opportunity is not normal. Clearly these students should be given the same opportunities as their hearing peers for socialization.

Current Physical Fitness Levels of Children

Physical fitness and engaging in physical activity are important in producing children who are physically educated. This is viewed as a primary goal for physical educators (Pangrazi & Corbin, 1993).

American children are fatter, less fit, and less healthy than they were 10 years ago (Thomas, 1990). According to Giel (1988), 15% to 25% of today's children are obese with at least 30% overweight. The President's Council on Physical Fitness reports that in 1980, 43% of 6 to 17-year-olds passed the Presidential Physical Fitness Test; today only 32% of American children can pass.

Additional studies show that American children are in a fitness crisis. Sallis (1993) conducted a review of physical activity which showed that with each passing year school-age youth become less and less active. Kutzleman and Reiff (1992) reviewed published research from the past 50 years. Their summary revealed that the skinfolds and weight of American boys and girls have increased, and in the past 10 years distance run times for both boys and girls have increased.

This decline in American children's fitness is evident in the numerous studies of minimal fitness scores on standardized tests. The question remains, what can teachers do about this current condition for both hearing and deaf children?

Physical Fitness of Students Who are Deaf

The studies of deaf children's fitness levels offer mixed results. Many studies have determined that children who are deaf have lower levels of fitness than their hearing peers. Pender and Patterson (1982) conducted a study comparing selected motor fitness test items among 60 children who were congenitally deaf and 60 hearing children. All of the children were between the ages of 6-11. The selected motor fitness components included speed (45 yard sprint); power (standing broad jump); agility (modified step test); cardiorespiratory endurance (Harvard step test); kinesthesis (weight shift); abdominal strength, endurance and speed (sit-up); arm and shoulder strength and endurance (push-up); balance (static, Bass stick test; dynamic, beam test). Results showed that hearing children scored better than deaf children on power, kinesthesis, arm and shoulder girdle strength, and static and dynamic balance. Deaf children scored higher in agility, speed and cardiorespiratory endurance.

Minter and Wolk (1987) tested physical fitness and knowledge of fitness of deaf college freshmen entering Gallaudet University. They concluded that the students' fitness levels were equal to that of their hearing peers. The assessment of students' knowledge about physical fitness reflected significantly lower scores than their hearing peers.

Hattin, Fraser, Ward, & Shephard (1986) conducted a comparison of the fitness levels between students who were blind and students who were deaf.

Within this study, the researchers discovered that the maximum oxygen consumption of the students who were deaf was below those of the general population. The authors argued that these results could have been attributed to the students' deafness. They surmised that low scores could be caused by difficulty in motivating the students to maximal efforts.

Campbell (1983) studied the psychomotor performance of hearing, hearing impaired and deaf students from the Jackson-Mann School, a public school in Massachusetts. The hearing subjects were randomly selected and matched with the hearing impaired and deaf subjects. Results showed that the hearing students performed better than the deaf subjects on eight of the nine fitness items. Among the nine fitness items, the 9-minute and 300-yard run significantly favored hearing children, and the flexed arm hang showed no significant difference between groups.

Wiegersma and Van Der Velde (1983) conducted a study in the Netherlands on the physical fitness levels of 32 deaf children and 25 hearing children (6-8 years of age). The fitness assessments utilized were the sit and reach, squat thrust and sit-ups. Results from all age groups indicated that deaf children were delayed in dynamic coordination and physical fitness compared to hearing children. The one exception was in the older group in which no difference was found in the area of flexibility.

Winnick and Short (1986) conducted a comprehensive study of physical fitness of school aged students with physical and sensory disabilities. They tested 686 hearing subjects, 153 subjects who were hard of hearing, and 892 subjects who were deaf. Of the students who were hearing impaired or deaf, 917 were from residential schools, and 127 were from nonresidential schools. Test items measured included skinfold, grip strength (right and left), power and strength, flexibility, power and speed, and cardiorespiratory endurance. The

performances of the hearing, hearing impaired, and deaf groups were similar with few exceptions. In power and strength (sit-ups) the hearing subjects performed better than the hearing impaired and deaf subjects. Also, the hearing females had smaller skinfold measures and were more flexible than the hearing impaired and deaf females.

In contrast to the previous study, Shephard, Ward and Lee (1987) conducted a Canadian based study of 15 male and 14 female deaf subjects ranging from 12-15 years of age. They measured body fat, maximal oxygen uptake, physical work capacity, and a 12 minute run. Hearing impaired students had higher than desirable levels of body fat. Only 12 of the 29 subjects achieved true maximal oxygen uptake. Most significantly, the physical work capacity of the deaf was below the level of other hearing Canadian students of the same age.

Goodman and Hopper (1992), synthesized findings of 10 studies in which physical fitness levels of deaf, hearing impaired, and hearing students were compared. In six students it was found there was a significant difference favoring hearing subjects; three determined no significant difference between the hearing children and children who were deaf and hard of hearing, and one discovered significant differences favoring deaf and hard of hearing subjects.

Although the previous studies reflect partially conflicting results, the majority of the studies indicate deficits in fitness in students who are hard of hearing or deaf. One difficulty in analyzing the results relates to the environment in which the students were educated. It is not known if the students with the low scores were educated in residential schools or local schools. Therefore, the effect of communication and socialization on fitness levels is not known. In either case there is evidence that deaf students fitness levels may be below those of hearing students. Researchers speculate the reasons for this include motivation (Hattin, Fraser, Ward, & Shephard, 1986), or communication during

the testing situation (Dunn & Ponticelli, 1988). Although it is not known exactly why deaf students have lower fitness scores, it is known that children's fitness levels can be increased by increasing their level of physical activity.

Fitness Testing

Throughout the 20th century, measurement of physical fitness has been common in physical education and in public health surveys (Ross & Gilbert, 1985; Ross & Pate, 1987). The current terminology for physical fitness, which has been more commonly used since the late 70's, is health-related physical fitness (Pate, 1991). Health-related physical fitness has been used to denote a narrower concept than physical fitness and has been defined as "a state characterized by the ability to perform activities with vigor, and the demonstration of traits and capacities that are associated with low risk of premature development of the hypokinetic diseases" (Casperson, Powell, & Christianson, 1985; Pate, 1988) .

Throughout the years, there have been many tests developed to assess physical fitness and health-related physical fitness. Some of the most common tests are the President's Physical Fitness Test, The AAHPERD Youth Fitness Test, The Physical Best, and The Fitnessgram. These tests were designed for children without disabilities. The earlier tests such as the President's Physical Fitness Test, and The AAHPERD Youth Fitness Test, assessed children on physical fitness items and then compared the scores to national norms. The students were given a percentile score, depending upon where they fell within the norms.

The more current health-related physical fitness tests, The Physical Best and the Fitnessgram, assess children on health-related fitness items, and compare them to a health reference standard. These programs also emphasize self-testing and self-motivation as contrasted with testing and extrinsic feedback by the teacher.

The only physical fitness test to date developed specifically for deaf children is Project UNIQUE (Winnick & Short, 1985). It is a physical fitness test with norms reflecting percentile scores for deaf children from 10-17.

Fitness testing has been used for a long time. The concept and philosophy of fitness has recently embraced a long term approach. Despite all these developments, fitness tests for deaf children are limited.

When discussing fitness, the information derived describes the outcome or product of some physical activity such as the time for a mile, or number of sit-ups in a minute. In physical activity, the discussion emphasizes the process involving activity and participation rather than reaching fitness standards (Pangrazi & Corbin, 1993). Pangrazi and Corbin (1993) believe that physical activity is only one of the factors which affect fitness levels.

Physical Activity

Physical activity can be defined as the amount of movement an individual engages in on a daily basis. It is measured in terms of calories expended and decreases steadily (relative to body weight) during the childhood years (Saris, 1986). There is some consensus among professionals on a health-related standard for aerobic power, but no consensus has been reached on a standard for youth physical activity (Sallis, 1993).

Health-related fitness is defined as "the optimal functioning of the heart, lungs and muscles, characteristics which are believed to offer some protection against such degenerative conditions as coronary heart disease, obesity, and various musculoskeletal disorders" (Gabbard, 1993, p.15). Goals for the nation for the year 2000 are aimed at increasing daily levels of physical activity. These positive changes in physical activity levels are designed to improve participants health-related fitness (Simons-Morton, Parcel, O'Hara, Blair, & Pate, 1988).

Inactivity has been identified as an important risk factor. For example, Saul (1994) states alarmingly, that physical inactivity is estimated to cause 250,000 deaths a year. According to McGlynn (1990), coronary heart disease affects over 5 million people and accounts for 1.5 million heart attacks each year. In addition, Freedson (1986) documented that the yearly medical costs associated with heart disease in America amounts to over $26 billion.

Some researchers believe that risks of coronary heart disease and obesity starts in childhood for some children. According to Vogel (1991), 40% of today's children already show early signs of coronary heart disease. In addition, there is an alarming prevalence of obesity (at least 30% overweight). Giel (1988), asserts that 15% of today's children are obese.

Current research has determined the many benefits of increased physical activity. Rowland and Freedson (1994) determined that physical activity can ameliorate the disease state of coronary heart disease. They also note that the best prevention strategy would be to promote a physically active lifestyle during the childhood years. In addition, increasing physical activity has been effective in reducing obesity (Eisenman, 1986), increasing bone density (Haymes, 1986), and reduces anxiety, stress and depression (Rowland & Freedson, 1994).

In summary, physical activity is very important in the maintenance of a healthy life. Increasingly, evidence points to active children having a leaner

body mass, stronger bones, decreased chances of developing coronary heart disease, and a more positive outlook on life. Stimulating sedentary children to become more physically active and lead active lives during adulthood should be a central goal.

Measurements of Physical Activity

Physical activity refers directly to the amount of body movement (McKenzie, 1991). Sallis and McKenzie (1991) provided a rationale for promoting physical activity in children. Increased physical activity for both children and adults is formally addressed in the "Healthy People 2000" Objectives for the Nation (Public Health Service, 1991). The goal in these objectives is for youth and adults to increase physical activity across the intensity continuum and to decrease sedentary behavior (Sallis, et al., 1992). In addition, the Public Health Service (1991) concluded that engagement in either light, moderate, and vigorous activity has substantial health benefits. Physical activity is now being promoted as a national objective for disease prevention. According to Pate, Dowda, and Ross (1991) there is a relationship between physical activity engagement and physical fitness. As a result of these factors, the Public Health Service (1991) promotes opportunities for students to become more active during physical education class.

Traditionally, children in public schools have been assessed with physical fitness tests. In the past few years the Public Health Service (1991) concluded that the amount of physical activity in which children engage is just as important as physical fitness. There are many different ways to measure physical activity. According to Noland, Danner, Dewalt, McFadden, and Kotchen (1990) the most commonly used methods for assessing physical activity are diaries, activity

recalls, electronic motion sensors, and heart rate monitoring. Each of these methods has limitations (Noland et al., 1990). Noland further suggests that some form of direct observation is necessary to validate physical activity measures, especially if they are to be used with children.

Noland et al. (1990) tested two methods for assessing physical activity in children from 3-5 years of age. The first method was a series of questionnaires to the parent, teacher, child (interview), combined with videotaping and a home observation. The parent and teacher observations were highly variable across times and situations. Parents consistently rated their children as being more active than perceived by teachers.

The second method evaluated by Noland et al. (1990) was the use of the Caltrac monitor to determine intensity of physical activity levels. Fifty-one boys and girls from 2.6 to 5.5 years of age were monitored and videotaped in a one-hour play period. The Caltrac readings were recorded after the conclusion of the period. The higher scores reflected greater activity and intensity of movement. These scores were compared to the activity seen on videotapes of the same play period. The correlation between intensity levels and Caltrac readings were all significant beyond the .0001 level, and indicated the Caltrac monitor displayed a high degree of sensitivity to variations in intensity. These findings suggest that motion sensors may provide an excellent source of information about children's normal levels of physical activity.

McKenzie (1991) reviewed eight instruments to observe children's physical activity, yet only two were designed to use in the physical education setting. One method was the Children's Physical Activity Form (CPAF) (O'Hara, Baranowski, Simons-Morton, Wilson, & Parcel, 1989). The CPAF was designed to be used with children from 3rd-5th grade in a physical education setting. The instrument was validated using heart rates.

The System for Observing Fitness Instruction Time (SOFIT) (McKenzie, Sallis & Nader, 1991) is an observational instrument designed to be used with children from 3rd to 5th grade. The SOFIT was validated against heart rates and estimated energy costs.

SOFIT is an observational instrument which assesses variables associated with student activity levels in physical education. SOFIT is broken into three dimensions. The first dimension is the physical activity portion of the SOFIT consisting of a scale from 1 to 5 designed to rate students' physical activity levels. The second dimension describes the context of the lesson, in terms of the type of activity in which student's are involved. The last dimension of evaluation is teacher involvement consisting of 6 categories. The SOFIT was validated using heart rates and estimated energy costs of children 4 to 9 years old. Both heart rates and energy costs went up with each category, supporting the validity of the SOFIT activity level categories.

In this review, several methods of assessing children's physical activity were discussed. The Caltrac monitor, questionnaires, interviews, Children's Physical Activity Form (CPAF), and the System for Observing Fitness Instruction Time (SOFIT), have all been tested and determined to be useful in assessing children's physical activity levels.

Peer Tutors

The use of peers as tutors in educational settings was originated in 1789 by Andrew Bell (Toppings, 1991). He developed a systematic tutoring program for the peer tutors to assist teachers in implementing their new teaching techniques. Bell's system was modified in 1801 by Joseph Lancaster. Lancaster focused more on structured curriculum materials and not

achievement levels. The system then known as the Bell-Lancaster system gradually faded, but in the 1960's peer tutoring programs were again utilized (Toppings, 1991). The many benefits of these tutoring programs could be seen in "Homework Helpers", "Youth Tutoring Youth", and the "Tutorial Community".

A program for disadvantaged youth called Homework Helpers was started in 1963 in New York City. Elementary school children in disadvantaged areas were assisted with homework, study skills, and work habits by high school and college students. In a similar program 14 and 15 year old underachievers served as paid cross-age peer tutors for elementary school children from disadvantaged areas. The program started in 1967 called Youth Tutoring Youth, was developed in Newark, New Jersey, and Philadelphia, Pennsylvania. The Youth Tutoring Youth Program resulted in an increase in reading achievement in the tutors and tutees. In addition, the tutors developed more confidence, and attended school more regularly. Improvements in confidence and classroom behavior were also displayed by the tutees (Toppings, 1991). A large scale project involving the entire school district was started in 1968 by Melaragno and Newmark called Tutorial Community. In the Tutorial Community Project young children were tutored by older children, from either the same school or the middle school. Eventually, all classes were either providing, or receiving tutors. Peers served as mediators of instruction, and teachers rather than directors of instruction, served as managers of instruction.

Peer Tutors in Special Education

Peer tutors have been used in many different situations with many different types of children. This section will focus on different programs which have been implemented in special education settings. At this point it should be noted that peer interactions and peer tutoring are two different things. In many studies in which there was no formal training of the peers, the term peer interactions is used. Studies in which there was some type of peer tutor training the term peer tutoring used.

Maheady and Harper (1987) studied the use of peer tutors to improve the spelling of low income 3rd and 4th grade students. Their program consisted of: (a) active student responding, (b) daily point earnings, (c) systematic tutoring formats, (d) weekly competing teams, and (e) public posting of individual and team points. Results showed that individual scores on weekly tests increased by an average of 12 points and that performance decreased when peer tutoring was discontinued.

Beirne-Smith (1991) conducted a study examining the effects of learning simple math problems in elementary-aged students with learning disabilities and their cross aged tutors. The design consisted of two groups exploring two different mathematic methods, and a control group. The two groups exploring math methods had peer tutors. Results strongly support the use of peer tutors for students with learning disabilities.

The previous studies examined the use of peers to enhance academic and vocational involvement of students with disabilities. The use of peer tutors in developing community skills such as independence and socialization were examined in a study by Blew, Schwartz, and Luce (1985). The researchers paired two children with autism with non-disabled peers who were trained to

teach community skills to children with autism. Data were collected during baseline, modeling, and peer tutoring. Baseline and modeling showed that no skills were acquired during this phase of the study. Direct instruction of each child by a peer tutor resulted in the learning and maintenance of functional community skills.

In a secondary program for students with severe disabilities, developed by Chin-Perez, Hartman, Parks, Sacks, Wershing, and Gaylor-Ross (1986), social contact between children with and without disabilities was maximized as a result of the intervention. Non-disabled peers were used as tutors. Following the intervention, a questionnaire was completed by "important" others (parents, teachers, related service personnel, etc.) to determine if the people surveyed had observed an improvement in behavior. The results indicated substantial improvement in the behavioral repertoires of the students with severe disabilities particularly in the area of social skills.

Maheady, Sacca, and Harper (1988) investigated a program called Classwide Peer Tutoring (CWPT). The study analyzed the effect of CWPT on the academic performance of 14 mildly handicapped and 36 students without disabilities in three 10th grade social studies classrooms. Analysis of results indicated that the implementation of CWPT produced an average increase of 21 points on weekly tests. A review article on CWPT by Delquadri, Greenwood, Whorton, Carta, and Hall (1986) found that students increased their performance by 20-70% in areas such as math, spelling, vocabulary, reading and comprehension. Maheady, Sacca, and Harper (1987) also conducted a similar program to CWPT called Classwide Student Tutoring Teams (CSTT). Classwide Student Tutoring Team's were implemented in three 9th and 10th grade math classes. Examinations of performance of 28 children with mental retardation and 63 children without disabilities, were done using multiple

baseline-across settings. The implementation of the tutoring teams resulted in average increases of 20 points on weekly math exams.

A program with a similar philosophy to CWPT, and CSTT is the Peer Education Partners program or PEP (Fulton, LeRoy, Pinckney, & Weekley, 1994). Children of all abilities were paired together to work in teams. The PEP program is a model program for increasing peer interaction. In addition to increased peer interaction, gains were also seen in social, academic, and career vocational skills.

In the studies reviewed, children with disabilities ranging from learning disabilities, to autism, to severe multiple disabilities improved in academics, social skills, behavior, functional community skills, and interactions with the use of peers. Although these studies had different training levels, and different expectations of the peers, the main interest of the study was to discover the effect of peer interactions on students with disabilities. Overall, from the current studies, peer tutoring was reported to be positive in these situations.

Effects of Tutoring on the Peer Tutors

The previous studies looked at peer tutoring and effect on the child with a disability. The following are descriptions of the few studies conducted on peer tutoring which also describe the effect of interaction of a person with a disability on peer tutors.

Several studies (Fulton, LeRoy, Pinckney, & Weekley, 1994; Maheady, Sacca, & Harper, 1987,1988) concluded that the intervention of peers working with children with disabilities improved the performance of the peers as well as the students with disabilities.

Beirne-Smith (1991) examined the effects of cross aged peer tutors on math skills in children with learning disabilities. The study focused on the improvement of math skills utilizing two different methods of teaching. The results indicated that peer tutoring teams were successful in improving math skills for children with learning disabilities, and peer tutors improved their math skills more than children not involved in peer tutoring.

The studies which focused on one tutor and one tutee tended to report the effects on the children with disabilities and rarely reported the effects of tutoring on the peers. In some situations the researchers utilized Classwide Peer Tutoring where the entire class was set up into tutoring teams and the tutoring was reciprocal. These studies regularly reported the effects of the program on the peers. Maheady, Sacca, and Harper (1988) analyzed the effects of Classwide Peer Tutoring on the academic performance of 14 children who were mildly handicapped and 36 students without disabilities in three 10th grade social studies classrooms. Each student had the opportunity to peer tutor social studies questions for 15 minutes, then the tutor became the tutee and the questions continued. The students received points for each correct answer and totaled their points. Analysis of the results indicated that the implementation of Classwide Peer Tutoring produced an average increase of 21 points on weekly tests.

In a similar study conducted by Maheady, Sacca, and Harper (1987) Classwide Student Tutoring Teams were implemented in three 9th and 10th grade math classes. Examination of performance of 28 students with multiple handicaps and 63 students with no disabilities was conducted using multiple baseline design across settings. Analysis of group and individual results indicated that the use of Classwide Student Tutoring Teams resulted in average increases of 20 points on weekly math exams.

Maheady and Harper (1987) examined the effects of a peer tutoring program to improve spelling performance of children from low income families in 3rd and 4th grade. The peer tutoring program consisted of active student responding, daily point earnings, systematic tutoring formats, weekly competing teams, and public posting of individual and team points. Results showed that the students' scores on weekly tests increased by an average of 12 points.

There have been various other studies utilizing Classwide Peer Tutoring to improve performance of children with learning disabilities (Greenwood, Delquadri & Hall, 1984), slow learners (Greenwood, Dinwiddle, Terry, Wade, Stanley, Thibadeau, & Delquadri, 1984), autism, behavior disabilities and children with mental retardation (Delquadri, Greenwood, Whorton, Carta, & Hall, 1986).

There have been various other studies which have examined the attitude of children without disabilities with integration of children with disabilities. Voeltz (1982) conducted a study in which regular education children in grades 4-6 participated in structured social interactions with children with severe handicaps. An attitude survey was administered to measure the effects of this intensive contact upon them and their classroom peer group. The groups included; (a) the experimental school (b) a school with no children with disabilities, and (c) a school with children with disabilities but no interaction program. Results support the use of structured social interactions between regular education children and children with severe disabilities as a process to increase acceptance of child variance by upper elementary-aged children. The interaction during recess at the experimental school was associated with the highest acceptance scores due to increased interactions with children with disabilities. Voeltz (1980) also conducted an attitude survey of 2,392 children which revealed four underlying attitudes towards peers. Upper elementary-age

females and children in schools with the most contact with peers with severe disabilities expressed the most accepting attitudes. Results indicate the adaptability of children's (non-disabled peers) attitudes, and the necessity to facilitate social interactions as one way to increase social acceptance of individual differences.

Condon, York, Heal, and Fortschneider (1986) administered an acceptance scale to 507 non-handicapped students grades 2-6 in two schools. One of the schools included children with disabilities. Results indicated that girls were more accepting of individuals with disabilities than boys, and children in the same school with students with disabilities were more accepting than students in schools where there were no children with disabilities. Older children were more accepting of children with disabilities than younger children especially in the integrated schools. Acceptance decreased when contact with students with disabilities stopped.

Kisabeth and Richardson (1985) and Stewart (1988) conducted studies with undergraduate students. In each study an individual with a disability was integrated into a college physical activity course (racquetball and weight training) and attitude surveys were conducted on the students' feelings toward students with disabilities. In both instances, integration of individuals with disabilities positively influenced the attitudes of college students within a physical activity setting.

The effect of integration, peer tutoring and Classwide Peer Tutoring has resulted in positive effects on the peer tutors, and children with disabilities.

Peer Tutors in Physical Education

One of the most widely known models of peer teaching in physical education is the PEOPEL (Physical Education Opportunities for Exceptional Learners) Program. As an aspect of this program, Long, Irmer, Burkett, Glasenapp, and Odenkirk (1980) placed 12 students with disabilities with 12 students without disabilities under the supervision of an adult instructor. The children without disabilities worked closely with the children with disabilities on fitness activities. The results from this program indicated that the peer program significantly increased the fitness levels of students with disabilities as well as their attitudes toward physical education.

Houston-Wilson (1993) analyzed the effects of trained and untrained peer tutors on the motor performance of six elementary aged students with developmental disabilities. The trained peer tutors learned cueing, feedback, and reinforcement techniques. This study revealed that trained peer tutors were effective at assisting students with developmental disabilities improve their motor performance, while untrained peer tutors were not.

Webster (1987) conducted a study in which the purpose was to determine the influence of trained and untrained peer tutors on the Academic Learning Time (ALT-PE) of students with severe and moderate mental retardation in physical education. The presence of peer tutors had a positive effect on the ALT-PE of students with mental retardation. No differences were evident between the students taught by untrained and trained tutors with respect to ALT-PE.

DePaepe (1985) investigated which of three least restrictive physical education environments generated the greatest opportunity for students with moderate mental retardation to practice on-task motor skill behavior. The

environments included peer tutor (P-T), self-contained (S-C), and specific mainstreamed (S-M). A total of 30 students with moderate mental retardation were divided into four classes, with three subjects in two of the classes and two subjects in the other two classes. The peer tutors were matched 1:1 and assisted the subjects to move through a student paced balance task. On-task behavior was defined as the amount of time the subject engaged in motor appropriate activity. The results of this study revealed that the on-task behavior of the P-T group was significantly superior to the S-C or S-M groups. In addition, the S-C group, had greater on-task behavior than the S-M group, suggesting that students who are mainstreamed and the students in the self contained class could benefit from the use of peer tutors.

In a study conducted by Halle, Gabler-Halle, and Bembren (1989), physical fitness levels of children with moderate and severe mental retardation were examined. The authors conducted a school-based aerobic conditioning program with students with mental retardation and their non-disabled peers. The peers motivated and encouraged the students with mental retardation. The fitness measures taken during the study were skin-fold tests and submaximal graded exercise tests on a motorized treadmill. The results demonstrated that children with disabilities who participated in the school based peer mediated aerobic conditioning program improved their fitness levels more than the children not involved in the program.

Karper and Martinek (1983) conducted a study with elementary-aged children with and without disabilities. The Body Coordination Test (BCT) was used as the pre-test and post-test. The intervention consisted of integration into a physical education program. The results of this study showed that students with disabilities scored lower than their non-disabled peers on the pre-test but not on the post-test. The scores for students with disabilities increased to equal

those of their non-disabled peers and surpassed them on balance, lateral jumping, and lateral movement.

Peer Tutors in Deaf Education

In addition to the previous studies examining the effect of peers on children with disabilities, and the effect of peer tutoring children with disabilities on the peers, few studies examined the effect of peer tutors on children who are deaf. Most of the studies examined the effect of social interaction when deaf children were integrated as opposed to peer tutoring. The results of these studies are valuable as it relates to the current study.

One study which systematically assessed the effects of a hearing peer tutor with a deaf student was conducted by Burley, Gutkin, and Naumann (1994). The deaf student was a 13 year old sixth grade girl, and the hearing peer was a 12 year old hearing sixth grade girl. The peer tutor had three consecutive days of instruction for ten minutes each day in which she learned 20 basic signs. Two days of baseline covered ten written math problems for the tutee. The deaf student missed over 60% of the items on the test. During intervention the tutor worked on ten math problems at a time with the passing criteria increasing as the students skills increased. A changing criterion design demonstrated that the deaf student was successfully taught math problems by the hearing peer tutor with math performance increasing to 80%-100% correct.

Instruction of students with deaf-blindness on prevocational tasks was examined by Romer, Busse, Fewell, and Vadasy (1985). Four students who were deaf-blind and mentally retarded were instructed on prevocational skills by their teachers and a peer tutor. The results indicate that student performance under peer tutors was similar to that under teachers. Students performed tasks

faster under instruction from tutors, but required more assistance to complete tasks than under teachers. Teachers were found to be more efficient instructors and to present more trials to students per unit of instructional time than tutors.

Antia, Kreimeyer, and Eldridge (1993) examined the effects of two interventions on 105 young children with and without hearing impairments. Although this was not peer tutoring there was a positive outcome as a result of integration. One intervention was a social skills intervention in which hearing peers learned sign language during the intervention. The second intervention was an integrated-activity intervention to give both hearing and non-hearing children an opportunity to work or play together in physical circumstances. Total positive peer interaction of peers with different hearing status increased from preintervention to postintervention but decreased after the intervention was withdrawn. Both interventions took place in a work and play environment. In one intervention at each setting the teacher modeled social skills and peer interaction but not in the other setting.

Positive results were also found in a study by Antia and Kreimeyer (1988) with four students with moderate hearing impairments. The intervention consisted of teacher modeling of sharing, cooperation, and complimenting behavior. The results of this positive modeling were that positive peer interaction increased during the intervention phase and was maintained when the intervention was withdrawn slowly.

Attitudes toward peers wearing hearing aids were analyzed by Dengerink and Porter (1984). In their study, 150 fifth and sixth grade students were shown slides of males their same age wearing glasses, hearing aids or no assistive devices. The children gave poorer acceptance ratings to peers wearing hearing aids. Results suggest that hearing peers may need to be educated or trained prior to students with hearing impairments entering their classrooms.

Lederberg, Ryan, and Robbins (1986) discovered that when hearing children are with familiar deaf playmates, they are more responsive and use more visual communication devices, whereas when the same hearing child interacts with an unfamiliar deaf child they are no more responsive than hearing children with no experiences with deaf children.

Communication modes were analyzed by Raimando and Maxwell (1987). The subjects were junior and senior high school deaf students. The majority of the subjects communicated through oral and gestural modes. The interesting finding in this study was that the students with hearing impairments demonstrated only minimal self-initiated interpersonal interaction with their hearing peers. Similar findings were suggested in the study by Foster (1989). Through in-depth interviews of 25 deaf adults, most expressed that previous experiences with hearing peers were frustrating and unsuccessful.

The results of these studies indicate that involvement of deaf students with hearing peers may foster increased awareness, a better understanding, and social acceptance.

Summary

Inclusion is a very important part of the continuum of the educational placement alternatives. For many deaf students, inclusion is a positive experience, yet there are often challenges these students face, including lack of adequate communication and isolation (Foster, 1989). One way to foster communication and change attitudes towards students with disabilities is through peer tutors (Lederberg, Ryan, & Robbins, 1986). Peer tutors have been shown to be useful in special education, deaf education, and physical

education. The effects of peer tutoring has shown positive effects on students with disabilities as well as the peers themselves (Maheady,& Harper, 1987).

There are many ways to measure the changes in physical activity due to peer tutors. One way which is valid and reliable is the SOFIT (McKenzie, Sallis, & Nader, 1991).

There are many well documented studies on the use of peers in special education. However, the use of peers in physical education for students who are deaf is an area which has been neglected. The importance of inclusion points to an immediate need for research in this area. The previous literature review gives us a sample of what we know. What is not known is the impact of the trained hearing peer on the physical activity levels of deaf student or on the peers themselves. This study is an attempt to add to the existing literature and to broaden the understanding of how to increase physical activity levels and promote interaction between deaf and hearing children.

CHAPTER 3

METHODS AND PROCEDURES

Within this chapter information regarding the methods and procedures used in this study will be presented. The chapter is divided into the following sections: (a) selection of subjects, (b) setting, (c) informed consent, (d) independent variable/intervention, (e) dependent variable, (f) procedures, (g) pilot study, (h) peer training/intervention, (i) experimental design, and (j) data collection.

Selection of Subjects

The research took place in an elementary school in Oregon. The school was chosen because of its large number of mainstreamed deaf students. The subjects were eight deaf students who were in either the fourth or fifth grade. The deaf students, four female and four male deaf students, were matched with four female and four male peer tutors. The deaf students were chosen by age, gender and fitness level. Students with lower fitness levels were chosen when possible because they had the potential to benefit most from participation in the study. The two 4th grade classes had two deaf students in each class. The 5th grade class contained nine deaf students. Four children were selected from the 5th grade class because they signed, were low in fitness, and had the potential to benefit most from involvement in the study. All eight deaf students had a hearing loss of 55-decibels or greater, no secondary disabilities, and used sign language as their primary means of communication.

Eight hearing students, chosen collectively by the researcher, the primary teacher, and the physical education teacher, were selected to participate in the study. The tutors were chosen according to the following specific criteria: enrolled in the same physical education class as the deaf student, good behavior, high fitness levels, and no close friendship with the students with hearing impairments. A close friendship between the deaf student and the peer tutor prior to the study would have involved an additional uncontrolled variable. Peer tutors were matched to deaf students according to gender and physical activity levels. The deaf students were paired with peer tutors with similar physical activity levels. The students in the study received physical education twice a week at a regularly scheduled time with changes as needed.

The deaf students and peer tutors volunteered to participate in the study, and to be a partner with the designated peer. It was also understood that the deaf and hearing students could choose to discontinue participation at any time.

Setting

The school used in this study was the Salem Heights Elementary School located in south Salem, Oregon, which is a school of approximately 300 students. The students are from lower middle class to upper middle class families and represent a wide variety of ethnic backgrounds such as Indian, Asian, African American, and Caucasian.

The study took place over five months in 1995. Due to the fact that the study took place in the Winter and Spring, the classes were conducted inside and outside. The gymnasium was the size of a large basketball gym (40' by 50'). The outside field was the size of a soccer field surrounded by a 1/8 mile track. There were approximately 30 - 33 students in each of the three classes

observed. All classes consisted of (a) 15 minutes of fitness at the beginning, (b) a skill development period of 20-25 minutes which included content aimed at improving fundamental motor skills such as kicking and throwing, and (c) a 5-minute cool down.

Observations were conducted on both the peers and deaf students during the 10-15 minute fitness portion of the class. The fitness portion consisted of locomotor skills and fitness activities such as: sit-ups, push-ups, pull-ups, toe raises, jumping jacks, stretches, and low organized fitness games to ensure potentially high physical activity levels for the 15-minute period. The fitness portion of the class had the same structure for both the baseline and intervention phases to allow for a comparable evaluation of physical activity levels (see Appendix A).

Informed Consent

The first step in the informed consent process was to obtain the approval of the Oregon State University Institutional Review Board. This was obtained before initiating the study (Appendix B).

The next step consisted of obtaining consent of the principal of the Elementary School. He was sent an abstract of the study, a timeline, and a list of all the benefits and potential risks of the study for the school, teachers, the hearing and deaf children and other deaf children who may ultimately benefit from the results of the study.

Following consent from the school, parents of the participants were contacted to obtain informed consent. Finally, the children were given a simple outline of the study and told what the study would entail. They were told they would be missing some of their recess time if they agreed to participate in the

study. They also were told that they could discontinue participation in the study at any time without penalty.

The informed consent forms are found in Appendices B, C, D and E.

Pilot Study

A pilot study was conducted eight weeks before the formal study to determine the needed length of the peer training program. Two students, one hearing and one deaf were chosen for this pilot project. The hearing student was involved in the entire training program with the deaf student participating only for the last two classes.

After the peer tutor successfully passed the training program, he was observed in the deaf student's physical education class working with the deaf student to determine if the training worked.

If the student experienced difficulty communicating with the deaf peer, i.e., did not exhibit sufficient expressive and receptive language abilities, the training program was extended until the student felt comfortable and exhibited desired interactions in their physical education class.

The results of the pilot study indicated that the training program needed to be between two to three hours in length. In the study itself, there were four to five sessions for 30 minutes each. The peer training program utilized in the study produced understanding and retention of the signs and instructional techniques.

Independent Variable/Intervention

Training of Tutors

All peer tutors were trained individually by the researcher using the same training program. The training consisted of teaching signs relevant to physical fitness and providing information about various teaching techniques. For the first three sessions of the training program, the peer tutors were trained without the deaf students. During the last one-two training sessions, the deaf peers participated and aided the investigator in the teaching of the signs. The deaf children reviewed the signs and helped the peer tutors with receptive and expressive signing skills. The training enabled tutors to incorporate various instructional techniques including cueing, modeling, physical assistance, and feedback techniques into their sign language. The cueing techniques follow the system of least prompts, including verbal cueing and modeling (Snell, 1987). Feedback consisted of positive general reinforcement and positive specific reinforcement. The importance of physical fitness and physical activity was stressed during the training period. Peer tutors were provided handouts of appropriate signs as well as examples of different behaviors and consequences which utilize these techniques. Copies of the handouts are included in Appendix F.

Peer tutors completed four to five 30-minute training sessions during recess period or after school. The peer tutor had to demonstrate mastery of the appropriate signs and techniques with the researcher a minimum of 5 out of 5 times for each physical activity scenario presented. Some examples of scenarios are: "What would you sign if the teacher tells the students to line up

on the black line?", "What would you sign if the teacher tells all the students to skip around the cones?", "What would you sign if the deaf student you were working with needed encouragement during sit-ups?"

To determine the effectiveness of the training program, the peer tutors were given a written and practical exam covering the cueing, modeling, feedback, and signs (Appendix F). The peer tutors had to score 90% or better on the knowledge exam. The peer tutors also had to score 100% on their receptive and expressive signs. If the peer tutors received less than 90% on the written or less than 100% on the signs, then additional training sessions were added until this standard was met.

Block (1995, p.13) stated that "Once teachers have trained students to be peer tutors, they will still need ongoing training" and suggested review sessions 5-10 minutes before class. The peer tutors were asked to meet 5-10 minutes before one physical education class each week to review signs, discuss questions, and talk about the current status of the program.

Dependent Variable

The main dependent variable utilized in this study was the physical activity level of the children. The previous emphasis for exercise was on health-related physical fitness (Pate, 1991). For many years the majority of fitness tests given by the teacher were product oriented and norm referenced. More recent emphasis has been placed on physical activity as a process of activity participation rather than fitness scores (Pangrazi & Corbin, 1993). The philosophy of emphasizing physical activity has been embraced for its long term effectiveness and substantial health benefits (Public Health Service, 1991). Many experts believe that increasing the level of physical activity directly relates

to fitness (Pate, Dowda, & Ross, 1991; Sallis & McKenzie, 1991). The "Healthy People 2000" objectives for the nation emphasize increased physical activity for both children and adults (Public Health Service, 1991). Physical activity is defined as body movement which emphasizes the process of active participation (McKenzie, 1991). The peer tutors' and deaf students' physical activity scores were collected during the fitness portion of the physical education classes.

The instrument utilized to measure the dependent variable of physical activity was the System for Observing Fitness Instruction Time (SOFIT) (McKenzie, Sallis, & Nader, 1991). The SOFIT is an observational instrument validated on children from the 3rd-5th grades. Sofit utilizes three phases. Phase one is the physical activity portion, phase two is the context level, and phase three is teacher involvement. SOFIT utilizes interval recording, specifically momentary time sampling and whole interval recording. Momentary time sampling is when the behavior observed at the very end of an interval is what is recorded. Whole interval recording takes into account the behavior during the entire interval and the behavior exhibited most is recorded.

For the purpose of this study, two phases of the SOFIT were used. The physical activity portion, and the teacher involvement phase using the peer in the role of the teacher. The physical activity levels were recorded using momentary time sampling, and the teaching behavior by the peer was recorded for the entire interval.

Fitness scores were collected before the start of the study utilizing the Salem school districts fitness test . This was done for two reasons. First, to see if there were any differences in the fitness scores between the hearing and the deaf children. And second, to determine who could benefit most from participation in

the study (See Appendix H). The fitness items utilized were the sit and reach, sit-up scores, mile run, and the shuttle run.

Procedures

Peer tutors who met the criteria were chosen collectively by the researcher, the classroom teacher, and the physical education teacher. The peer tutors selected were asked if they would participate in a study with their deaf peers. The peers tutors were told that they would be trained, and then paired as partners with one deaf student during physical education class. The peer tutors and their parents signed an informed consent form. The peer tutors physical activity levels were evaluated during each class for both baseline and intervention.

The deaf students were already integrated into the regular physical education class. All the students participating in the study were tested for current fitness levels. This gave an initial fitness score for all deaf students and peer tutors.

The design employed in this study was the delayed multiple baseline across subjects (Heward, 1987). The peer tutors and deaf students were observed for two to three weeks, two times per week, for baseline before the first peer tutor was trained and paired with the deaf student. The fitness activities were developed by the researcher cooperatively with the physical education teacher from the school. Generally, the fitness part included the following: muscular strength activities such as push-up activities, sit-up activities, and plyometric activities; flexibility exercises consisting of stretching, partner activities; and endurance activities consisting of locomotor skills, movement activities, and other physical activities requiring continuous movement. The data were

collected by the researcher on the peer and deaf student throughout the class period.

Experimental Design

In sport pedagogy research, one must document the effects of newly developed instructional systems on the acquisition of motor skills, increased fitness or improved motivation. Watkinson and Wasson (1984) reported two problems often encountered by researchers and clinicians in field settings that make group design research studies with special populations difficult. First, the large heterogeneity among students with disabilities makes it imperative that programs be individualized for each student. The second problem is that the population has recently been more widely dispersed into integrated settings, so that large homogeneous groups are difficult to find. To conduct studies under natural conditions, small groups of three or four students are normally required. Another factor which hinders group design research is that individuals with disabilities often display highly variable performance. Hence utilization of one pre-test and one post-test may not depict true performance. The use of a single subject design avoids the limitations associated with group design and offers some important advantages. The single subject design uses each student as his/her own control. In addition, single subject designs can be used with a small number of subjects across settings or conditions; the behavior of the individual is recorded throughout the entire study. Finally, the treatment does not have to be withdrawn to determine its effectiveness. These facts suggests that the single subject research design is the most appropriate design for the purpose of this study.

Researchers learn about the effects of treatments across behaviors, settings, or subjects through systematic replication and, thus, establish it's degree of generalizability. If researchers ignore differences among individuals and simply average them into a group mean it will be more difficult to estimate the effects on the next individual (Barlow & Hersen, 1984). Adapted physical educators can utilize single subject designs to examine the effectiveness of individualized programs or instructional strategies on the motor skill acquisition, physical activity level, or other behaviors of students in physical education programs.

The single-subject design chosen for this study was the delayed multiple baseline design. According to Heward (1987), the multiple baseline design technique has become the most widely used design in applied behavior analysis. The major advantage of using the multiple baseline design in this study is that the effects of the independent variable across multiple subjects can be analyzed without the need to withdraw the treatment variable, the peer tutor. Another advantage is that the intervention of the peer tutor need not happen at the same time and can be implemented in one or two subjects at a time. A final advantage is that the effects of intervention of the peer tutor can be observed across time and subjects exactly at the time of intervention.

The three basic components of baseline logic are prediction, verification, and replication (Heward, 1987). Baer, Wolf, and Risley (1968) recommended that baseline be maintained until stability is reached. Prediction refers to the assumption that the baseline remains unchanged if the conditions had remained the same. In using the multiple baseline design, prediction can be verified if the baseline remains unchanged while the independent variable is being implemented on other students (Heward, 1987). Verification of a predicted level of responding for one behavior is made by observing little or no change in the ongoing data patterns of the other behaviors still exposed to the

conditions under which the prediction was made (Heward, 1987). Replication is accomplished when the previously observed change is repeated with further manipulation of the implementation of peer tutors (Heward, 1987). Replication of the experiment serves two purposes. First, it reduces the possibility that a variable other than the independent variable was responsible for the change in the dependent variable, and second, it suggests that the target behavior (dependent variable) is changeable. If the baseline remains stable until the intervention is implemented, and change occurs upon intervention, then an experimental effect is assumed to have occurred (Kadzin, 1978).

With the delayed multiple baseline across subjects, the initial baseline and intervention are begun; after that, the remaining baselines and interventions are observed in delayed fashion. By implementing the intervention on each group at a different time, the prediction, verification, and replication could be observed. If the behavior changes in the desired direction upon intervention for each subject, there is a strong possibility that the independent variable was responsible for the change in behavior.

This study employed a delayed multiple baseline design across subjects. There were eight different subjects in three different classes. The eight deaf students experienced two conditions. Condition A (baseline) examined the deaf students' and peer tutors' physical activity levels while working separately. Condition B (intervention) consisted of the peer tutoring intervention.

The intervention was implemented after approximately two weeks with the subjects in the 4th grade who had the most stable baseline. The deaf students in the other 4th grade class were paired with a trained peer after approximately four sessions after the first peer tutors started their tutoring. The students with the most stable baselines in 5th and 6th grade were paired next; the last two

students in the 5th and 6th grade were paired last. The baselines varied in length to ensure validity.

The results of the study were analyzed visually to determine the effects of the intervention. Within each phase the researcher analyzed the change in trends, variability, and mean values. Change in level, means and degree of overlap between phases were analyzed. The change in level is the difference between the last data point of the baseline and the first data point of intervention. Overlap was measured by taking the number of data points which overlapped in intervention and dividing them by the total number of data points in intervention.

Data Collection

Instruments

The instrumentation used in this study to determine the changes in the dependent variable (physical activity levels) was the System for Observing Fitness Instruction Time (SOFIT) developed by McKenzie, Sallis and Nader (1991) to quantify health-related physical activity. SOFIT is a direct observation instrument designed to measure activity levels and opportunities to be physically active in a physical education setting for elementary-aged children.

SOFIT is based on both momentary time sampling and interval recording tactics. The instrument uses a three-phase decision system including the areas of activity level of students, the allocation of class time to various tasks and goals, and the teacher behavior.

The two components of this instrument used for this study were (1) determining the level of physical activity, and (2) peer tutors' teaching behavior. The physical activity level is determined by activity codes from a previously

validated system (McKenzie, Sallis, & Nader, 1991) and provides an estimate of the intensity of the students' physical activity. The codes are one through five, which describe the following five body positions of students: code 1 for lying down, code 2 for sitting, code 3 for standing, code 4 for walking, and code 5 for very active. Very active identifies when the student is expending more energy than he or she would during ordinary walking. Very active activities (e.g., running, jumping jacks, crab walk) included anything which was more active than walking. These student activity levels were recorded every twelve seconds using momentary time sampling. The level four's (walking) and five's (very active) were combined to give a total for moderate to vigorous physical activity (MVPA). An MVPA score reflects a heart rate of 140 beats or more for children. Coding was based on the observed activity of the target student at the end of the observation interval (12 seconds). SOFIT has been validated using energy expenditure values and heart rates (Bar-Or, 1983).

The peer tutor teaching behaviors were recorded each interval. This system was also taken from the SOFIT teacher behavior scale. Analyzing the peer tutor behaviors was necessary in order to determine if and how often the tutoring took place and to identify the type of tutoring used. The following categories from the SOFIT Training Guide (McKenzie, 1991) were used. A "P" was given when the peer tutor promoted fitness. The peer tutor could promote fitness by prompting or encouraging fitness activity. For example, the peer tutor attempting to initiate or increase student engagement in physical activity prompted, praised or reinforced the fitness activity (e.g., made a statement or gesture during or following a student fitness activity engagement clearly designed to show appreciation and/or to increase or maintain such responses in the future).

Demonstrating fitness "D" was coded when the peer tutor modeled fitness engagement (e.g., demonstrating how to do a fitness task or participating with deaf students in physical activity). An "I" was coded when the peer tutor instructed generally (by way of lectures, describes, prompts or feedback) to the deaf student any physical education content (e.g., topography, skill development, technique, strategy, rules) except physical fitness engagement. Both positive and corrective feedback for skill attempts were coded as "I". This category also was coded when the peer tutor modeled physical skills or lectured about physiological responses without promoting fitness engagement.

An "M" was given when the peer tutor monitored the deaf student by watching, evaluating, or counting fitness skills such as sit-ups.

An "O" was given if the peer tutor was off task in class or off task within the peer tutoring situation. In this case there were no interactions. If the peer tutor was off task in the class, the teacher managed the behavior, and if the peer tutor was off task within the peer tutoring situation, the researcher intervened to assist the tutor.

The tutoring during physical education class was monitored in baseline as well as in the intervention stage by calculating the frequency of interactions. The frequency of interactions was observed and totaled to ensure the training program was implemented.

Operational definitions of each tutoring behavior and physical activity level can be found in Appendix G.

The forms were designed to evaluate the peer tutors' physical activity scores, the deaf students' physical activity scores, and the tutoring behavior. The form is designed to be used for two pairs of students at a time and for 30 minutes of each physical education class. The equipment used were tape recorders, earphones and batteries. The observer arrived before the beginning

of class and sat quietly in a corner. The last two groups overlapped for five weeks. During those five weeks, a second observer was added to code one of the two groups.

Training of Observers

Observers were recruited from Oregon State University's Department of Exercise and Sport Science graduate program. The observers were informed about the project and asked if they were interested in participating. They attended training sessions to learn the observation system. The observers first learned the physical activity coding system and practiced observing and coding physical activities of children in a physical education class. The second part of the physical activity coding was coding for consistency and reliability among the observers. Once the observers learned the physical activity coding portion, they were then taught the tutor behavior categories. The observers practiced together to ensure consistency in understanding the definitions. They then observed activity scenarios with peer tutors and observed for reliability among the observers. Once the observers understood both parts they observed the entire SOFIT for reliability.

The inter-observer reliability scores were determined using one of the graduate students who was proficient in the SOFIT recording. The interobserver agreement scores ranged from 75% to 100% (see Table 2). The other observers were used to observe class number three in which groups three and four were observed at the same time.

Reliability of Observers

Reliability checks were conducted to ensure that the primary observer did not exhibit any bias, observer drift, observer reactivity, or observer cheating, during the course of the study. The reliability checks ensure that the observers are consistent in their observations.

For the purpose of this study, a second observer was chosen by the primary researcher to aid in the collection of reliability data. The second observer came to observe approximately every two weeks and randomly chose classes in which to collect data for inter-rater reliability. Eight classes were chosen randomly by the second observer who rated the physical activity levels of the students alongside the primary observer. The second observer was trained by the researcher and the results were compared to the researcher's. The reliability index was computed using the Scored Interval Method (Hawkins & Dotson, 1975).

Each interval was marked if the chosen behavior occurred. When both observers recorded the same behavior, the interval was scored as an agreement. If the observers were not in agreement that the behavior had occurred, the interval was scored as not agreeing. The scores for agreement were divided by agreement plus disagreement then multiplied by 100 for the inter-observer agreement score. No less than 75% agreement between observers was accepted. In one inter-observer agreement check there was less than 75% agreement due to the low incidence of occurrences of 4's and 5's. This session was recalculated using the Total Interval Scoring method (Hawkins & Dotson, 1975), which is less stringent and is appropriate for lower occurrences of behavior.

In order to determine if the peer tutoring program had any long term effects on the children's physical activity levels and/or tutoring levels, periodic maintenance checks after the cessation of the program were necessary.

Maintenance was determined by observing the peer tutor and deaf student in the physical education class after the cessation of peer tutoring. For the first two groups the observations were made at intervals of two weeks, four weeks, and eight weeks following intervention. Due to time constraints, the observations were made twice for two weeks for the third group, and once after one week for the last group. The researcher documented the physical activity levels as well as types and frequencies of interactions with other students to determine whether physical activity levels and interactions between the peer tutor and deaf student were maintained after peer tutoring.

Analysis of Data

In applied behavior analysis, one must determine the effects of the treatment or intervention on the behavior and demonstrate that those effects can be reliably produced. Successful analysis of a behavior has occurred when a reliable functional relationship between the desired behavior and the treatment/intervention has been demonstrated with certainty (Heward, 1987).

Visual analysis was used to inspect and interpret MVPA data paths across subjects. Visual analysis was used to determine if: (a) changes in behavior were apparent in the data pattern, and (b) if these changes corresponded with the experimental manipulation of the intervention. If the physical activity scores increased only when the intervention was implemented, then the change could be contributed to experimental manipulation of the intervention. Data paths within and between experimental conditions were analyzed to answer these

questions. The analysis consisted of noting variability and trends within each condition, and changes in level and overlap between conditions. For example, if there was an upward trend in the baseline, then it would be harder to establish experimental control. If there was great variability within the phases and the mean scores between phases overlapped, then the likelihood that there was a change in behavior was reduced. Percentage of overlap was calculated by counting the number of intervention data points which overlapped with baseline data and dividing that number by the total number of data points in intervention.

If there was a large change in levels from baseline phase to intervention with little overlap, then the likelihood that the change was due to the intervention was greater. Through the visual analysis of these factors, the effect of peer tutors on physical activity levels of the deaf students and peers was determined.

Each student was observed during his/her portion of the study. An analysis of the subject's physical activity level during each class was calculated into percentages of the level of moderate to vigorous physical activity for each session. The mean percentage for MVPA was graphed for each subject.

Summary

This chapter reviewed the methods and procedures utilized to carry out the study. The setting was an elementary school in Oregon. Informed consent was obtained from the Oregon State University Institutional Review Board, parents, and the students. The dependent variable was physical activity levels of the peer tutors and deaf students. The independent variable was the utilization of trained peer tutors. Hearing student's were trained to peer tutor deaf students in the fitness portion of their physical education class. A delayed multiple baseline

design across subjects was used. The instrument utilized to collect data was the System for Observing Fitness Instruction Time or SOFIT. Secondary observers were trained to assist in systematic observations, and reliability. Maintenance on physical activity levels and tutoring behavior was collected following cessation of intervention. Lastly, a visual analysis was used to analyze the data.

CHAPTER 4

RESULTS AND DISCUSSION

The purpose of this study was to investigate the effect of peer tutoring on the physical activity levels of students who are deaf in integrated physical education classes. Deaf students have been shown to have lower fitness levels than their hearing peers (Goodman & Hopper, 1992; Hatten, Fraser, Ward, & Shephard, 1986; Minter & Wolk, 1987; Pender & Patterson, 1982; Wiegersma & Van Der Velde, 1983). The fitness scores collected before the study began demonstrated that there was in fact a difference in fitness between the hearing and deaf students. The results of the fitness test also identified deaf children with low fitness levels who may benefit from participation in this study (see Appendix H).

This study was an attempt to investigate the use of peer tutors to increase current physical activity levels of deaf students in inclusive elementary physical education settings. Eight deaf students were chosen from the 4th and 5th grade classes in a public elementary school. Eight hearing peers were also chosen to serve as peer tutors based on their physical activity levels, attendance record, and willingness to participate.

A delayed multiple baseline design was utilized for this study. The delayed multiple baseline design employs a staggered implementation of the intervention to ensure that the variable under investigation is solely responsible for the change in behavior (Heward, 1987).

Chapter 4 presents the results of the intervention. The findings pertain to the effect of the trained hearing peer tutors on the physical activity levels of deaf

students in inclusive elementary physical education classes. The following sections are included in this chapter: (a) fidelity of peer tutor intervention, (b) observer reliability, (c) functional relationship between peer tutoring and deaf students' physical activity levels, (d) maintenance checks, (e) physical activity levels of hearing peer tutors, (f) discussion of results, and (g) summary.

Fidelity of the Intervention

The training program for the peer tutors focused on training in cueing, modeling, physical assistance, and instructional feedback techniques, including positive specific and positive general feedback. Also included in the training was information on the different components of health-related fitness and their importance. The peer tutor training program was held across four to five sessions, each 30 minutes in length. The hearing peer tutors were the only students in the peer tutor program until the last two to three days of the training, when the deaf students were brought in to facilitate interactions and ensure ease of communication. In a study of this nature, the fidelity of the intervention, in this case peer tutoring, must be analyzed to ensure that it was implemented. If it can be established, and there is a change in behavior upon intervention, it is likely that it was the intervention (peer tutoring) which changed the behavior.

During intervention the primary researcher met with the hearing peer tutors, and the deaf students once a week for 10 minutes to review signs, provide reinforcement, discuss current issues or upcoming events, and to answer questions. This review provided additional signs for the peer tutors, and helped to ensure that the desired communication was effective.

To determine if the peer tutor program was implemented successfully, all peer tutoring behavior during the course of all lessons was documented. Both verbal and signed interactions between the hearing student and deaf student were observed and recorded.

The percentages reported in Figure 1 are the percentage of intervals in which peer tutoring did occur. As can be seen in Figure 1, in all eight cases, peer tutor behaviors occurred during the baseline condition. When the intervention was implemented across subjects, an increase in tutoring behavior was observed. The researcher observed each pair of students every 12 seconds. As the intervention data indicate, peer tutoring interactions increased gradually. Figure 1 shows that peer tutoring interactions went up for each pair of students, indicating that the intervention occurred.

Observer Reliability

Reliability is particularly important when observing behavior directly. There are many reasons why the observer can drift and record data which do not reflect what is really happening in the particular situation. Examples of observer error are observer bias, observer reactivity, and observer cheating (van der Mars, 1989). To ensure that the observer continues to collect data reflecting what is really occurring in the classes, occasional reliability checks are necessary. These checks ensure that the data are reliable and that what is written down is truly reflective (i.e., valid) of what occurred.

To determine Interobserver Agreement (IOA), three secondary observers were trained to use the SOFIT system and to recognize the tutoring signs used in the intervention. A secondary observer observed a minimum of one class in baseline and one class in intervention per student to ensure there was no

observer bias, no observer drift, or no observer reactivity. The classes selected for Interobserver Agreement (IOA) were chosen randomly by the secondary observer. The scored-interval method of reliability was used to determine the agreement between observers of each SOFIT activity level for each student (Hawkins & Dotson, 1975). This method compares each interval for agreement between observers and is the most stringent method of recording reliability. Table 1 shows the percentages of agreement across students and conditions of time spent in MVPA.

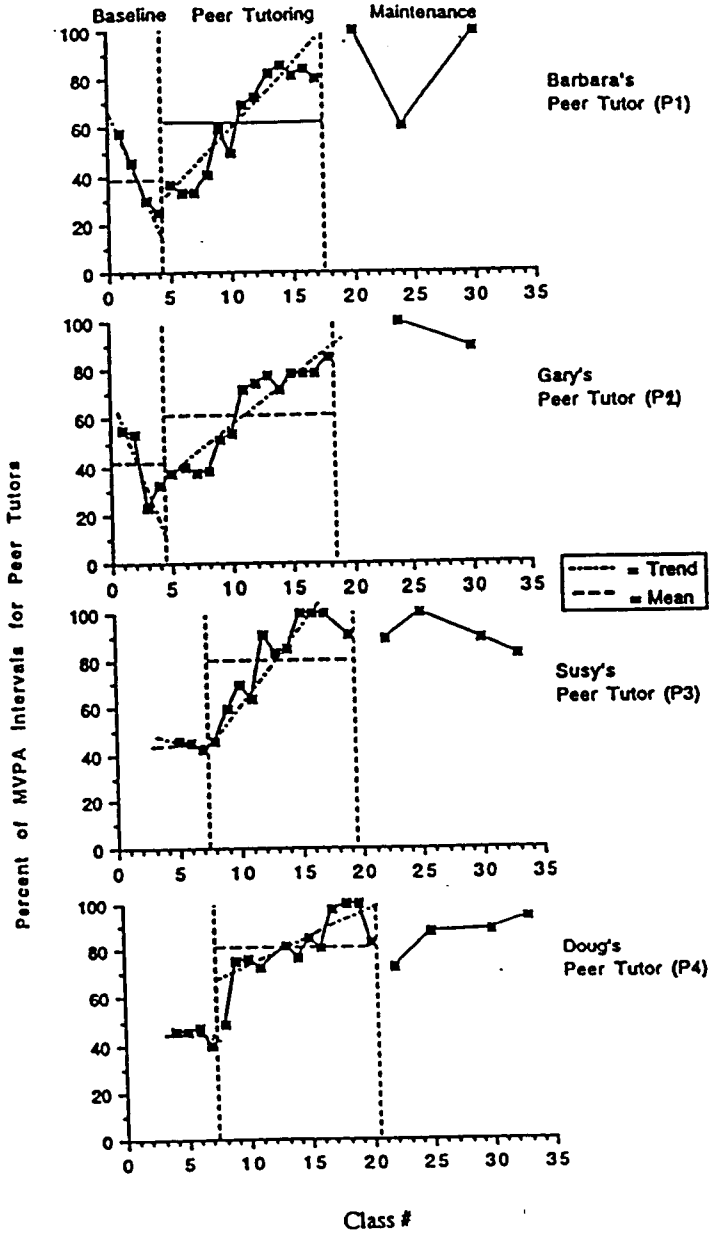

Figure 1

Peer Tutoring: Percent Total Interactions Across Conditions During Fitness

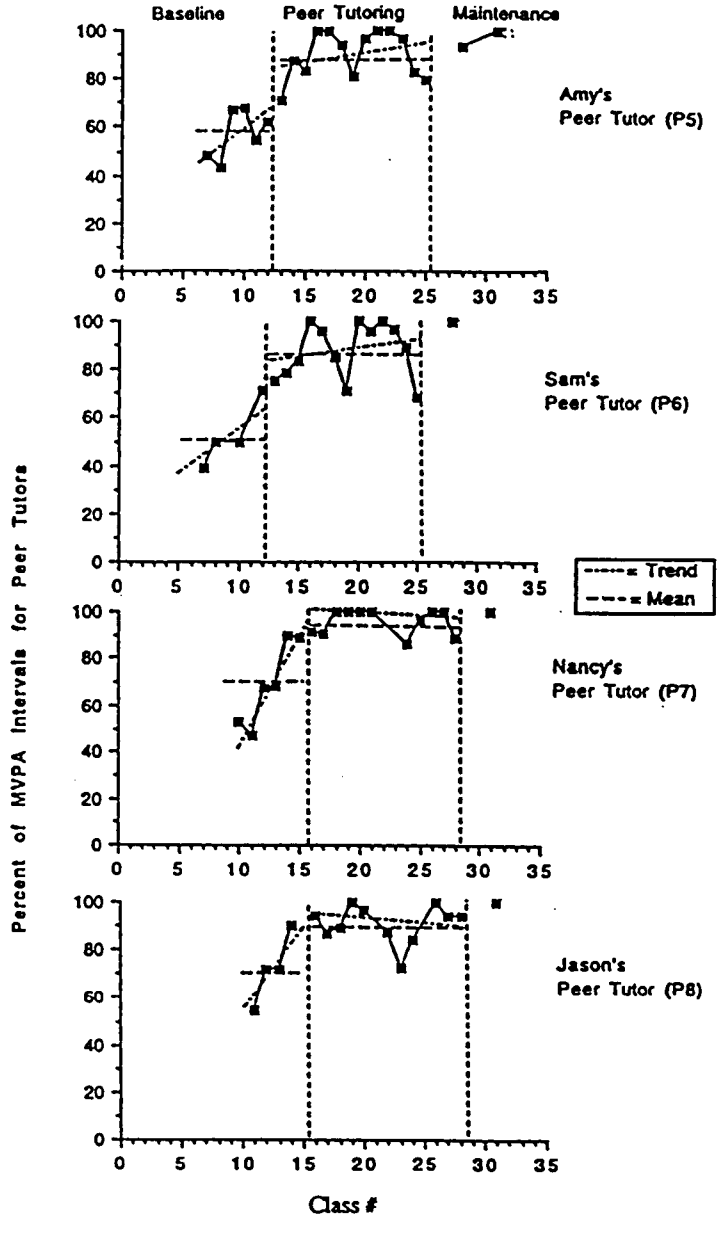

Figure 1 (Continued)

Table 1

Interobserver Agreement Percentages for Baseline and Intervention MVPA Levels for Each Deaf Student

Student #	Baseline (class #)	Intervention (class #)
1) Barbara	100% (1)	75%** (7)
2) Gary	81% (1)	90% (7)
3) Susy	89% (1)	85% (5)
4) Doug	89% (1)	95% (5)
5) Amy	92% (3)	92% (10)
6) Sam	91% (3)	97% (10)
7) Nancy	100% (5)	95% (16)
8) Jason	88% (5)	89% (16)

** Total Interval Scoring Used

The Interobserver agreement percentage ranged from 81%-100% with the exception of student #1 during intervention. This lower interobserver agreement score was due to the low frequency of occurrences of activity codes 4's and 5's. This lower score for Barbara was reanalyzed using Total Interval Scoring and a score of 75% was determined for reliability. The consistency of the high reliability scores ensures that the observations scores were accurate. Therefore, the scores for MVPA are a true reflection of physical activity expenditure.

Functional Relationship Between Peer Tutoring and Deaf Students, Physical Activity Levels

The primary purpose of this study was to determine if trained peer tutors would influence physical activity levels of deaf students during fitness instruction in elementary school physical education classes. The physical activity levels of all students were measured utilizing the SOFIT system (McKenzie, Sallis, & Nader, 1991).

The conditions to be analyzed were baseline and intervention, during which trained hearing peer tutors worked with deaf students. Data were analyzed using visual analysis to assess variability and trends within and across conditions, level change from baseline to intervention and data overlap between conditions (Parsonson & Baer, 1978).

Figure 2 presents the MVPA results for each deaf student. Intervention was implemented across classes. Note that students Barbara (S1) and Gary (S2) were in the same class and were the only two deaf students. Susy (S3) and Doug (S4) were in the same class and also the only two deaf students in the class. Amy (S5), Sam (S6), Nancy (S7) and Jason (S8) were in the same class along with five other deaf students.

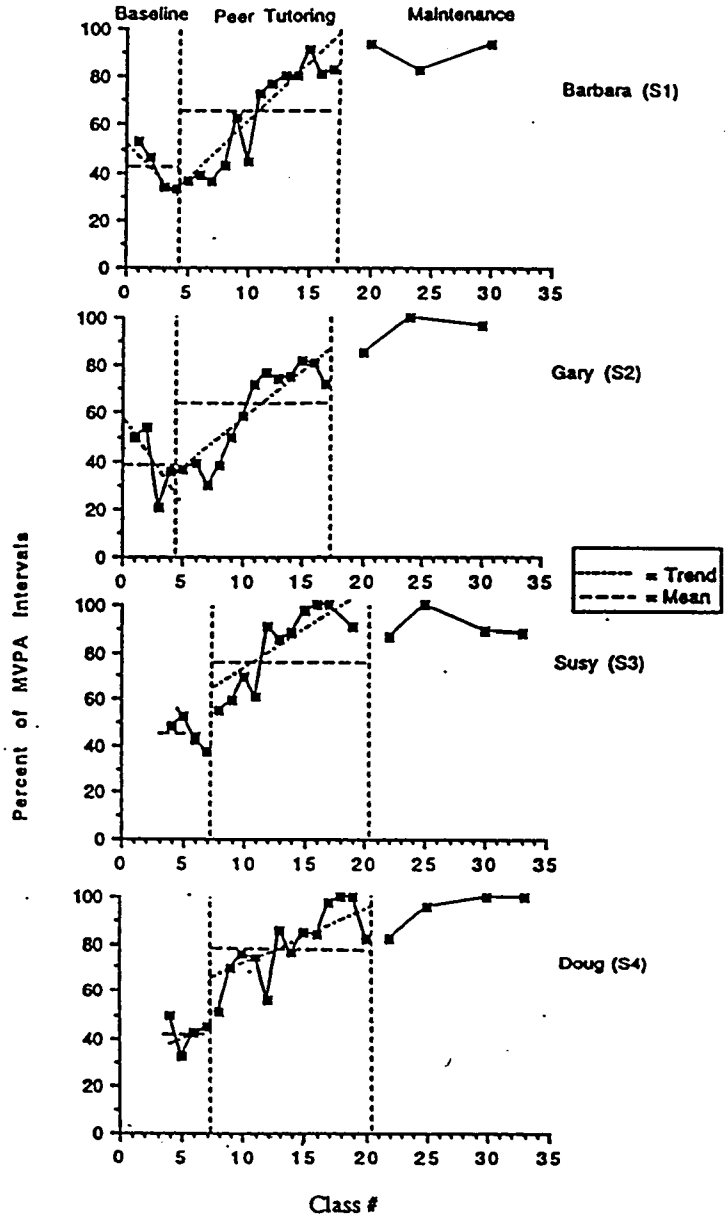

Figure 2

Percent MVPA Across Conditions During Fitness Instruction

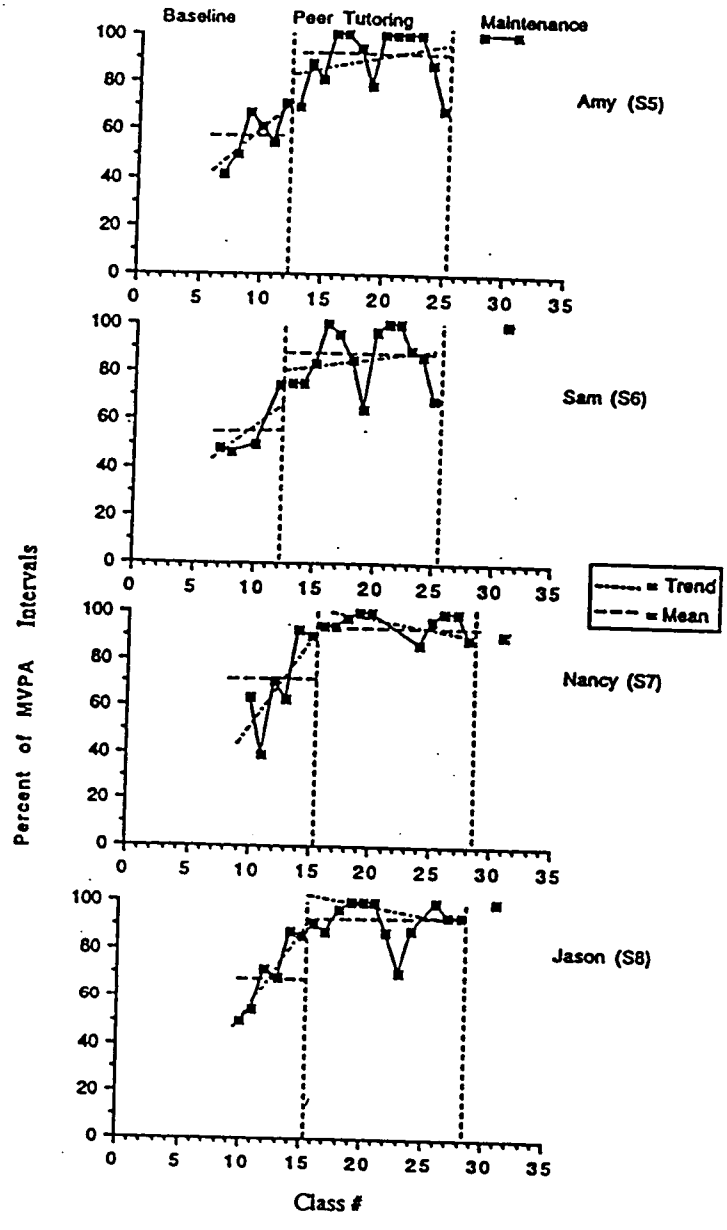

Figure 2 (Continued)

The following students, Barbara and Gary, are from the same class (class 1). They were the only deaf students in the class. Peer tutoring was implemented starting with session five.

Barbara (S1)

Student 1 was a 4th grade deaf girl with limited verbal skills. During physical education classes she was often the last person to find a partner, and rarely interacted with hearing children until the implementation of the peer tutor program.

Barbara's mean MVPA during baseline was 41.5%. The baseline data showed a downward trend, which is opposite of the desired effect. There was minimal variability in the baseline data. The mean MVPA during intervention was 63.5%. In addition, the downward trend observed during baseline was reversed showing an upward trend during intervention with limited variability. The minimal level change from baseline to intervention provided partial data overlap. There was a 33% overlap from baseline to intervention which occurred in the first six sessions. The lack of level change coupled with the initial data overlap coincides with the absence of a level change early on during peer tutoring interaction. This suggests that there was an eventual increase in physical activity level upon intervention of peer tutoring.

Barbara's change in physical activity level coincided with the increase in the peer tutoring behavior. Given such data characteristics, it can be concluded that Barbara's physical activity level changed dramatically. Furthermore, these physical activity levels were maintained after the cessation of peer tutoring.

Gary (S2)

Student 2 was a 4th grade deaf boy named Gary. Although Gary preferred signing he would use his voice to talk with other hearing children in game situations. He was outgoing and would interact with two or three other boys in the class consistently prior to the peer tutor program.

Gary exhibited a variable baseline with a downward trend and a mean MVPA of 40%. The mean MVPA during intervention was 62%. The downward trend during baseline was reversed in intervention showing a steep upward trend. There was also no level change from baseline to intervention which contributed to a 35% overlap from baseline to intervention. However, the overlap was limited to the first five sessions.

Similar to Barbara, there was a lack of level change, coupled with the initial data overlap with the trend in behavior in intervention going in the desired direction, and the continual upward trend in peer tutoring by the peer. Based on the obvious change in data path upon intervention, it can be concluded that Gary's physical activity levels also changed markedly. Gary not only maintained his high levels of physical activity, but increased physical activity above his intervention level after the peer tutor program was finished. This may be related to his peer tutor 's continued tutoring.

Susy and Doug were both in the same class (class 2). They were also the only deaf students in that class. Intervention was implemented in session eight.

Susy (S3)

Susy was a 5th grade girl, who was hard of hearing, and who socialized only with the other deaf student in the class and with the interpreter. When given the chance, Susy would use her voice to communicate with other hearing children but preferred the use of sign language with those who could sign.

Susy's mean MVPA during baseline was 45%. The baseline data path here again showed a downward trend with little variability. This was reversed during intervention showing an upward trend and minimum variability. The peer tutor behavior in this case showed a concomitant increase with the increase in Susy's physical activity levels. The mean MVPA during intervention was 74%. Furthermore, there was a substantial level change of 12% which eliminated any overlap during intervention. The data pattern suggests a dramatic change in physical activity. In addition, Susy maintained her physical activity scores similar to Barbara after the cessation of the peer tutor program, although her peer tutor ceased her tutoring efforts.

Doug (S4)

Doug was a 5th grade deaf boy who rarely communicated with any other students in the class unless it was in a game situation. He would use his voice only when he had to choose teams, such as at the beginning of a basketball or hockey game, although he preferred to sign. He loved sports and was very enthusiastic about participation in physical education.

Doug's mean MVPA during baseline was 42%. The baseline data path was slightly variable. The mean MVPA during intervention was 80%. In addition, there was a steady upward trend during intervention with mild variability. There

was a small level change of 3% from baseline to intervention, and there was no data overlap. The level change, along with the lack of overlap, and the gradual upward trend in tutoring behavior by the peer tutor suggests that Doug increased his physical activity level. During maintenance Doug continued his same level of physical activity from intervention, although tutoring only occurred in one of the four classes observed.

Class number three was a 5th and 6th grade combination class with 9 deaf students and 24 hearing students. The class had one deaf education teacher, and one regular education teacher. Many of the hearing children in the class knew a significant amount of sign language and communication was continuous in the class among the hearing and deaf students. The large number of deaf students along with the ease of communication made this class atypical among the settings provided for most deaf children. The fact that one more student was taught signs specific for physical education was not as unique in this situation as it was for the previous two classes or as unique as it would be in a school with only one or two deaf children.

Peer tutoring in group one of class three was started during session 13. The intervention during the second group commenced during session 16.

Student 5 (Amy)

Amy was a 5th grade deaf girl who very rarely used her voice and when she did it was only used with sign language. She had a best friend in the class who was hearing who signed very well, so Amy was comfortable using signs to communicate with a hearing peer.

Given this context, Amy's baseline mean MVPA during baseline was 57%. The baseline data path showed a variable upward trend. The mean MVPA

during intervention was 90%. Minimal overlap occurred with a 14.2% overlap. In 50% of the data sessions Amy reached the maximum amount of MVPA possible. Amy did exhibit a change in behavior from baseline to intervention given the minimal overlap between conditions. The overlap which occurred did so late in intervention. This gradual decrease in physical activity coincided with a gradual decrease in peer tutor behavior. Similarly, the peer tutor behavior increased dramatically along with the physical activity levels upon intervention.

Although there was an upward trend in physical activity during baseline, there was no overlap, so it is apparent that Amy's physical activity levels showed a change upon intervention. This high level of physical activity continued in the two maintenance sessions although no peer tutoring occurred.

Student 6 (Sam)

Sam was a 6th grade boy who was hard of hearing with very good verbal communication skills, yet rarely interacted with any hearing peers. He used sign to communicate with his deaf peers.

For Sam the mean MVPA for baseline was 54%. The baseline data path did not show any trend nor variability until the last point which increased by 20%. The mean MVPA during intervention was 88%. The increase in physical activity seen in the end of baseline continued at intervention with a highly variable data path. There was no change in level, but due to the increased variability there was 15.3% overlap.

Sam's physical activity levels increased along with the tutoring behavior. The peer tutor behavior went up slowly because Sam's peer tutor was a quiet student who took a while to feel comfortable signing. The one low dip in session 21 of the physical activity data was likely the result of Sam being sick

on that day. The large difference in average level from baseline to intervention along with data overlap would suggest a change in behavior from baseline to intervention. But the significant variability of the data path with delayed overlap suggests a weak experimental effect at best.

The decrease in Amy and Sam's last few days of physical activity was likely due to the physical education teacher's absence and the use of a substitute teacher in his place. The substitute did not set up the environment in the same way as the regular physical education teacher, and there was not as much opportunity for high physical activity levels. When observed after the peer tutor program, Sam maintained a high physical activity level, yet no tutoring occurred.

Student 7 (Nancy)

Nancy was a 5th grade deaf girl who used sign as her main mode of communication and therefore communicated the majority of time with deaf peers, specifically, two deaf friends. Nancy enjoyed running, but, underwent surgery for a cochlear implant five weeks into the study and unfortunately could not run for two weeks of the study. After those two weeks, she could only participate in the fitness part of the class.

Nancy's baseline data were highly variable along with an upward trend, averaging 70%. The baseline had a variable data path and steep upward trend. The final two baseline sessions for Nancy suggest an induction effect (change in behavior occurring when an intervention is introduced to the students). The mean MVPA during intervention was 96% with minimal variability. The trend during intervention was slightly upward. Along with minimal level change, there was little data overlap between phases.

The presence of an induction effect suggests reduced experimental control. However, the same induction effect decreased the opportunity for additional increases in improvement. The one maintenance probe observed with Nancy showed a score of 100% MVPA, although no tutoring occurred on that day. The one low point in session #24 was due to Nancy's caution from recent ear surgery.

Student 8 (Jason)

Jason was a deaf 5th grader who was very proud of being deaf and spoke infrequently, using sign as his main mode of communication. He rarely spoke to his hearing peers until the peer tutor program was implemented. Jason loved to communicate; when given the opportunity, he chose to walk and talk (to deaf peers) rather than run or be very physically active.

Jason's baseline was similar to Nancy's including the presence of an induction effect. His mean MVPA for baseline was 70%. The mean MVPA during intervention was 93%. The slight level change of 3% contributed to the immediate increase in physical activity level which continued until it hit a ceiling at 100%, yet with a downward trend at the middle causing a 16.6% overlap. The overlap in session 23 was due to a disagreement between the peer tutor and the deaf student.

The induction effect reduced the opportunity for further improvement. The higher baseline mean along with the induction effect indicated that Jason and many of these students were highly active from the start. Therefore it is more difficult to establish further increases in activity level. Similar to Nancy, a 100% MVPA during maintenance was noted for Jason. See table 2 for a summary of these results

Table 2

Deaf Students' Mean Percent of MVPA for Baseline, Intervention, and Mean Percentage of Improvement Between Conditions

Student	Baseline Mean (%)	Intervention (%)	(Improvement) (%)
1) Barbara	41.5	63.5	53.0
2) Gary	40.0	62.0	55.4
3) Susy	45.0	74.0	64.9
4) Doug	42.0	80.0	88.4
5) Amy	57.0	90.0	56.2
6) Sam	54.0	88.0	61.0
7) Nancy	70.0	96.0	37.5
8) Jason	70.0	93.0	32.7

Physical Activity Levels of the Hearing Peer Tutors

The second research question raised in this study was to examine the effect of the instruction upon a peer tutor. The benefits and or risks to participation in this study are important to determine. The results can be found in Figure 3.

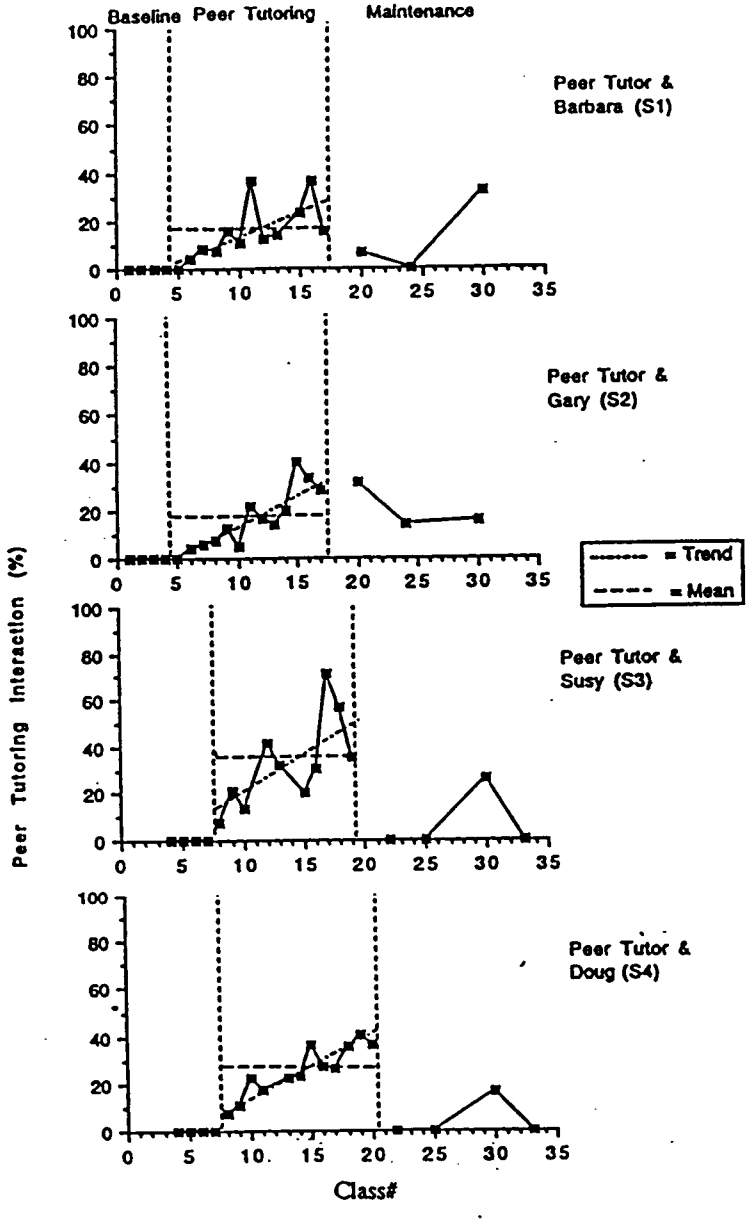

Figure 3

Peer Tutoring Percent MVPA Across Conditions During Fitness Instruction

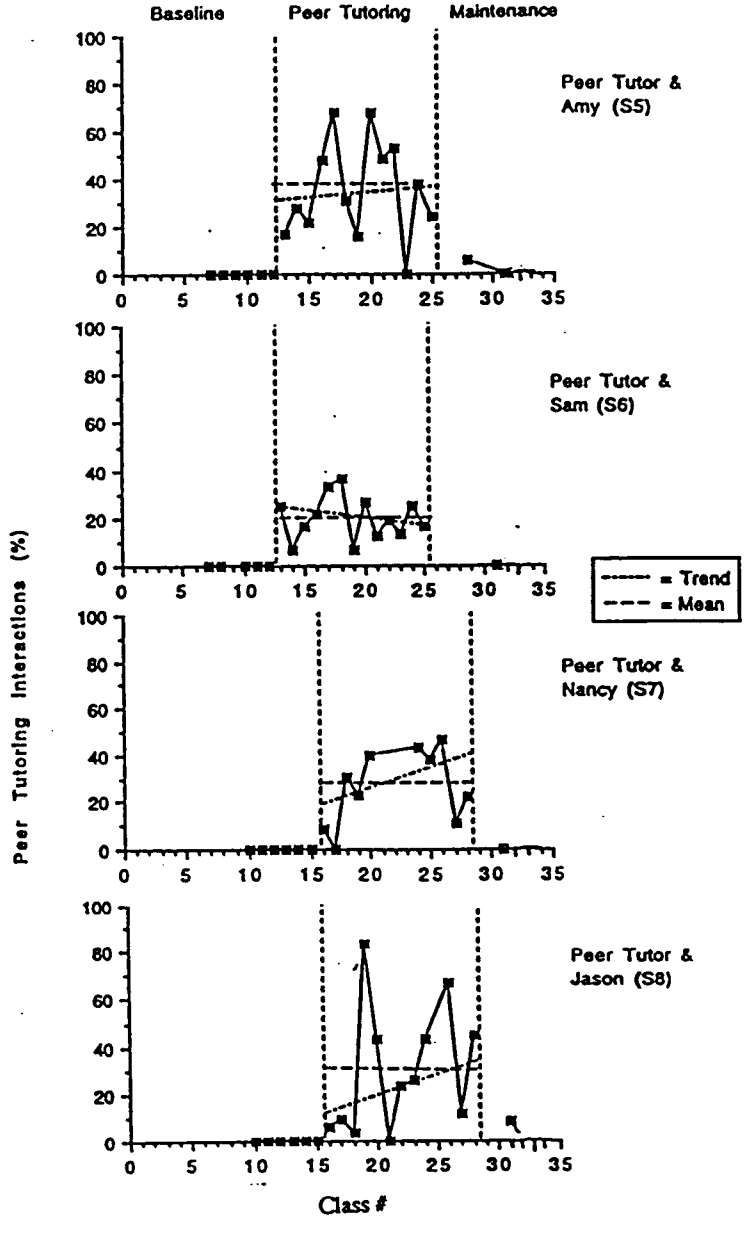

Figure 3 (Continued)

Barbara's Peer Tutor (P1):

Barbara's tutor had a variable baseline with a steep downward trend and a mean of 39.3%. The intervention, in contrast, had a steep upward, slightly variable trend and a mean of 62.3%. The change in level was 14%, and the percent of overlap was 42.8%. The overlap was due to the steep downward trend in baseline and the 3-4 initial classes of peer tutoring.

Following intervention the targeted physical activity level went up dramatically in the desired direction and opposite of the trend in baseline. There was also a large change in level and a meaningful difference in means from baseline to intervention. These factors, despite the large overlap, indicate an increase in the peer tutor's MVPA. Peer tutor one also had a variable maintenance phase, yet it was still above the baseline MVPA levels.

Gary's Peer Tutor (P2):

Gary's peer tutor had a highly variable baseline with a steep downward trend and a mean of 41 %. His MVPA data during intervention phase were similar to peer tutor one. The trend was upward and slightly variable with a mean of 62%. The change in level was 3%, with a 42.8% overlap, again due to the first few sessions of intervention it took for the peers to warm up to tutoring.

Although there was large overlap, the large change in means, and the drastic change in MVPA from baseline to intervention gives an indication that the behavior changed upon intervention. The two maintenance days observed were both higher than the intervention scores.

Susy's Peer Tutor (P3):

Susy's peer tutor's short baseline MVPA was not variable, had a slight downward trend, and a mean of 44%. The intervention phase had a steep upward trend, moderate variability, and a mean of 81%. There was a minor change in level of 1% and no overlap.

The fact that the means were so different and that there was no overlap from baseline to intervention suggests a change in MVPA as a result of peer tutoring. The maintenance phase also remained high, with a slight downward trend, which indicates that the increase in MVPA was maintained even after peer tutoring.

Doug's Peer Tutor (P4):

Doug's peer tutor had a baseline with no variability, a slight downward trend, and a mean of 44.5%. He had an intervention mean of 82% with variable upward trend. The change in level was about 8% with no overlap.

This large change in means, the change in level, and the fact that there was no overlap suggest the behavior changed when the intervention was implemented. The maintenance score decreased during the first observation and increased with each additional observation. All maintenance observations were above the baseline percentages. The data for peer tutor four indicate that not only did the MVPA increase upon intervention, but it was also maintained.

Amy's Peer Tutor (P5):

Amy's peer tutor's MVPA had a variable baseline with an upward trend and a mean of 57%. The peer tutor phase was very variable with a slight upward trend and a mean of 90%. The change in level was 5% with no overlap.

The fact that there was no overlap, a slight change in level, and a large increase in means from baseline to intervention reflect an increase in MVPA during peer tutoring. MVPA levels during maintenance remained at levels similar to those achieved during intervention.

Sam's Peer Tutor (P6):

Sam's peer tutor's data during baseline showed an upward trend, slight variability, and a mean of 52.5%. Intervention MVPA levels were highly variable with a slight upward trend and a mean of 88%. There was a 2% change in level, and a 16.6% overlap due to the variability.

Although there was high variability and overlap, the fact that the means were so different from baseline to intervention suggests that peer six did increase MVPA after taking on the role of peer tutor. This increase in MVPA was maintained when observed after cessation of peer tutoring.

Nancy's Peer Tutor (P7):

Nancy's peer tutor displayed a slightly variable MVPA baseline, with a steep upward trend and a mean of 69%. Due to the high initial physical activity levels of peer tutor seven, the MVPA could not increase as much (i.e., ceiling effect).

The peer tutoring phase had slight variability with a slight downward trend and a mean of 96%. There was no change in level and an overlap of 18.1%.

Similar to Nancy's results, the induction effect produced a baseline with a high MVPA which left little room for improvement. The means did change, with little overlap and less variability in the peer tutor phase. The one maintenance check indicated a 100% MVPA.

Jason's Peer Tutor (P8):

Jason's peer tutor had a situation similar to peer tutor seven. The baseline MVPA showed a steep upward trend with no variability, and a mean of 72%. During peer tutoring, the MVPA was more variable with a slight downward trend and a mean of 91%. There was a slight level change of 2% and a large overlap of 45.4%.

The induction effect can be seen here with the last data point exceeding the first three data points of baseline. This again left little room for improvement. A downward trend in MVPA levels occurred during intervention. The maintenance check was at 100% MVPA.

Table 3

Peer Tutor's Mean Percent of MVPA for Baseline, Intervention, and Mean Percentage of Improvement Between Conditions

Peer Tutor	Baseline	Peer Tutoring	% Improvement
Peer 1) Barbara's peer tutor	39.0	62.0	59.3
Peer 2) Gary's peer tutor	41.0	62.0	51.4
Peer 3) Susy's peer tutor	44.0	81.0	82.3
Peer 4) Doug's peer tutor	44.5	82.4	85.1
Peer 5) Amy's peer tutor	57.0	90.0	58.2
Peer 6) Sam's peer tutor	52.5	88.0	66.8
Peer 7) Nancy's peer tutor	69.0	96.0	38.2
Peer 8) Jason's peer tutor	72.0	91.0	26.1

In summary, it was clear that there were no detrimental effects as would be evident by MVPA levels. In all cases MVPA increased. The role of peer tutoring appeared to have the same positive effects on physical activity levels as the role of tutee.

Discussion

This study sought to determine: (1) the impact of trained hearing peer tutors on physical activity levels of deaf students, and (2) the effect of peer tutoring on the physical activity levels of hearing peer tutors. The following section will provide an overview of the findings and a comparison of the findings with other studies.

This study utilized a delayed multiple baseline design across subjects. The components of baseline logic include prediction, verification, and replication (Heward, 1987). It was predicted that deaf students Barbara and Gary's physical activity levels would remain constant upon intervention of trained hearing peer tutors. This prediction was verified across Susy and Doug. The findings with Barbara, Gary, Susy, and Doug (Students 1-4) were replicated across Amy, Sam, Nancy, and Jason (Students 5-8). These subjects supported the prediction that the physical activity levels would have remained at the baseline level after subjects experienced intervention, had the use of peer tutors not been implemented. Verification of the peer tutor training program was evident in Susy and Doug's intervention physical activity scores. While Amy, Sam, Nancy, and Jason showed an upward trend during baseline, their increase in physical activity levels during intervention was due possibly to the trained hearing peer tutors. The change in physical activity levels shows only a weak change because the physical activity levels of Amy, Sam, Nancy, and Jason were already increasing during baseline. Because the physical activity levels were already increasing in baseline, it can not be concluded that the change was solely due to the intervention.

In all subjects, the physical activity score did not increase initially during intervention (for class meetings 1-4). This was due to the time needed for the

peer tutors to adjust to their roles and to use sign as their primary means of communication with their deaf peer. During the early classes, the interactions were fewer, although the proximity of the tutor to the deaf student was much closer than during baseline. After 2-3 classes the peer tutor became more confident and began to sign, instruct, model and communicate meaningfully with the deaf student. What was interesting was that as the physical activity levels increased similar changes were noted in the peer tutor behavior levels in most cases. In some cases the deaf students and peer tutors were more involved in the fitness activity than they were in their peer tutoring. This can be seen on the few occasions where the physical activity levels were very high and tutoring interactions low.

The maintenance data suggests that the physical activity levels remained high on all occasions, yet the peer tutoring behaviors did not. There are several possible explanations for this. First, at least two of the students appeared to have increased their perceived level of physical activity. They continually performed at one level, then, with the feedback from the peer tutor, the student increased his/her perceived ability. Second, perhaps the length of the intervention was long enough to increase students' fitness levels and the peer tutor was no longer necessary to maintain high levels of physical activity. Third, the students now had a choice of peers who could tutor and knew sign, no tutor, or their same friends who were their partners previously. The students who felt they needed a peer tutor to maintain the same level of physical activity may have chosen to work with that peer tutor. The others who felt confident enough without, or who preferred their own friends, chose not to be partners with the peer tutor. Finally, some of the deaf students in the third class with the large group of deaf students preferred only to socialize with other deaf students when

given the choice. This preference interfered with any opportunity to work with the peer tutor during maintenance.

The two students in the last group exhibited an induction effect, which means that there is an increase in the desired behavior before intervention. The intervention of the peer tutors for the students in the third group (students five and six), had a residual effect on the last two students who were not involved in intervention. There are several explanations for this. First, it could have been attributed to Amy (student 5) and Sam's (student 6) enthusiasm. Second, it could have also been due to the fact that Amy and Sam were no longer available to stand around and talk, so the next alternative (for Nancy and Jason) was to become more involved in the activity. All these explanations are plausible, yet the true reason is not known. The induction effect seen in Nancy, Jason, and their peer tutors indicates that there may be some residual effect of tutoring on others in the class. Typically induction effects are indicative of a failure to establish experimental control. However, from a clinical viewpoint, if increases in MVPA "spill over" then such intervention becomes quite cost effective.

In each case the peer tutor's physical activity went up concomitantly with the implementation of the peer tutor program. The increase in physical activity level was also maintained when observed after cessation of the tutoring. Thus, if anything, the peer tutors benefited greatly.

Several additional factors may have contributed to the increase in physical activity levels of peer tutors. First, the presence of the primary researcher. This presence and periodic reinforcement for higher physical activity from the physical education teacher may have motivated the peer tutors to continue to be physically active themselves. Secondly, in some cases the peer tutors benefited from the encouragement of the deaf student. If the peer tutor

happened to slow down or become distracted, the deaf student would sign "keep going", "hurry up", or "come on and run with me". Thus, although the hearing student was trained to be the peer tutor, the deaf students often played a reciprocal role in encouraging and motivating the hearing student to be active. As a result, the physical activity of both students increased.

Based on visual analysis of the data, it was concluded that trained peer tutors were effective in assisting the deaf students in improving their physical activity levels. Threats to internal validity were addressed by replicating the experiment across subjects. It was clear that changes in physical activity occurred only after the intervention of trained hearing peer tutors had been introduced.

One of the benefits of utilizing a peer tutor program similar to the one used in this study is that it is easy to set up and can benefit everyone involved. Teachers can share this information with parents and other teachers who may want to implement a similar peer tutor program. The fact that there is a benefit to the peer tutor as well as the deaf student makes it an even more desirable program.

The objectives addressed in "Healthy People 2000" (Public Health Service, 1991) established a standard of 50% MVPA during each physical education class. For deaf students 1-4 this would have been difficult prior to intervention because their physical activity levels for even the fitness portion of the class were not consistently above 50%. The implementation of the peer tutor program contributed to increased physical activity levels during physical fitness, resulting in higher physical activity levels for the entire class period. Although deaf students 5-8 had physical activity levels of 50% and above, their physical activity levels still increased to some degree during intervention, therefore increasing their activity levels for the entire class period. These increases as a

result of peer tutoring are one way of increasing physical activity levels to the standards established by "Healthy People 2000".

This study was the first to use peer tutors to increase physical activity levels of deaf students. The results of this study compared favorably with the work of Burley, Gutkin, and Naumann (1994), who found that the use of a hearing peer tutor with a profoundly deaf sixth grade girl improved the deaf student's math skills after a short period of time.

Trained peer tutors were found to compare favorably with teachers in pre-vocational instruction of students who were deaf-blind (Romer, Busse, Fewell, & Vadasy, 1985). Under peer tutor assistance, prompts increased, but time to complete tasks decreased. Teachers promoted more independence, but the peer tutors' instructional techniques on prevocational skills was equal to the teachers.

The current study is in line with the Physical Education Opportunities for Exceptional Learners Program or the PEOPEL Program (Long, Irmer, Burkett, Glasenapp, & Odenkirk, 1980), which used peer tutoring to influence fitness. In this program the children without disabilities worked as peer tutors with the students with disabilities in physical education classes. The results indicated that the peer tutor program significantly increased the fitness levels of the students with disabilities as well as their attitudes towards physical education.

The results of this study also compared favorably to Houston-Wilson (1993), who found that trained peer tutors were more effective in improving Opportunity to Respond in students with mild mental retardation and autism than untrained peer tutors. Webster (1987) reported that peer tutoring improved the Academic Learning Time of subjects with disabilities, but there was no difference in ALT-PE between trained and untrained peer tutors. Lastly, DePaepe (1985) found that subjects matched 1:1 with peer tutors produced significantly more content

motor-ALT than subjects with disabilities in either a self-contained adapted physical education class or a mainstreamed physical education class. These few studies looked at the use of peer tutors to improve Academic Learning Time in Physical Education and determined that peer tutoring improved the motor appropriateness of students with disabilities. The results of the trained peer tutors implemented in the current study demonstrated that elementary aged hearing students could be taught to work with deaf peers to increase physical activity levels, with a short training program and weekly review sessions.

The deaf students in this study, as a whole, had lower fitness levels than their hearing peers (see Appendix H). Unfortunately, hearing children's fitness levels in general have been shown to be lower than previously thought (Giel, 1988; Kutzleman & Reiff, 1992; Sallis, 1993; Thomas, 1990). It was clear that some deaf students needed additional support and motivation to improve their fitness levels. The deaf students for the most part can not hear the teacher when he/she is complimenting, motivating, or instructing them during physical fitness activities. In most cases an interpreter is difficult or impossible to watch and understand during physical fitness activities, especially when there are other deaf students in the class needing assistance in communication.

The tutor training program consisted of teaching the peers how to instruct, give feedback, and motivate the deaf students using sign language. Examples of information taught includes: communication skills to start/stop the activity, corrective feedback, and techniques to motivate. Such tutoring behavior, including modeling, and delivered in close proximity to the deaf student was more meaningful and useful than the use of the teacher and interpreter alone. This type of individual attention cannot be achieved in integrated physical education classes without the assistance of peer tutors or teacher aids. Often teachers must attend to classes of 30 or more students with and without

disabilities. The use of trained hearing peer tutors is a viable option for assisting deaf students to improve their physical activity levels and, eventually, their fitness levels in integrated physical education classes.

Summary

The purpose of this study was to determine if trained hearing peer tutors could increase the physical activity levels of deaf students in integrated physical education classes. It further investigated whether the training program affected the hearing peers' physical activity levels. Eight deaf students were chosen from the 4th and 5th grades of an elementary public school. The hearing peers were chosen according to fitness level, attendance, and willingness to participate. The method employed in this study was the delayed multiple baseline across subjects. The eight students were divided into four groups. The first group was observed for four sessions (two weeks) to establish baseline. The hearing peers were trained during the latter part of the two weeks of baseline. The intervention was implemented for seven to eight weeks. The next three groups went through a similar protocol in a delayed fashion. The first two groups were in separate classes and the last two groups were in the same class. Each group during intervention had a weekly meeting of 10 minutes to review signs and to discuss information necessary for the weekly lesson. The one low reliability finding was due to the low number of observations of levels 4 and 5.

An analysis of each subject's data was presented. The deaf students all increased physical activity levels upon the implementation of the intervention. The hearing peer tutors all increased physical activity levels concomitantly with the deaf students. The increase in MVPA with peer tutoring showed that the

intervention was positive. The level of physical activity from intervention was maintained in all students after cessation of peer tutoring.

One caution was that the last four subjects' baselines showed an upward trend. Although the physical activity levels increased upon intervention, the level of increase of physical activity levels without the intervention is unknown.

As discussed earlier, the results of this study compare favorably to the peer tutor study of a deaf student by Burley, Gutkin, and Naumann (1994), the prevocational study with students who were deaf-blind by Romer et al. (1985), as well as the fitness and peer tutor study by Long et al. (1980). The results were also comparable to studies of Academic Learning Time by Houston-Wilson (1993), Webster (1987), and De Paepe (1985).

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was twofold: (1) to determine whether peer tutors could increase physical activity levels in deaf students in integrated elementary physical education classes, and (2) to determine whether the peer tutor program had an effect on the peer tutors' physical activity levels. This chapter includes: (a) a summary of the procedures, (b) a summary of the findings, (c) implications, and (d) recommendations for further studies.

Summary of Procedures

Eight deaf students (four male and four female), volunteered to participate in the study. Eight hearing students were chosen as peer tutors. The peer tutors, four males and four females, were matched by gender and age with the deaf students.

The research design was a delayed multiple baseline design across subjects (Heward, 1987). The baseline and intervention were implemented across the four groups. The delay in baseline and intervention was determined during the course of the study. This was due to the unpredictability of working in an elementary school with schedules that change constantly.

The intervention was the tutoring of the deaf students in physical education class conducted by trained hearing peer tutors. The training consisted of signs, teaching strategies, and feedback techniques. The peers were trained at the end of baseline and prior to intervention for 4-5 30 minute sessions.

The intervention was applied to two deaf students simultaneously. There were four groups in the study. Group one was comprised of one female deaf student with a female hearing peer, and one male deaf student and a male hearing peer, all from the same class. Group two was comprised of the same gender and auditory ability as group one, yet from a different class. Groups three and four each had one deaf and one hearing female, and one deaf and one hearing male, all from the same class. The deaf students and peer tutors participated in both phases of the study although the intervention was introduced to groups one through four in staggered fashion. Phase one was baseline with no peer tutoring. The subjects' physical activity levels were observed with no intervention. Phase two was intervention, where the peer tutors working directly with the deaf students facilitated their participation in the fitness portion of the class.

The deaf students and peer tutors' behaviors were observed and recorded live. The data were collected during the fitness portion of the class. The fitness portion of the class was devoted to promotion of physical activity. The peer tutors were trained over a 7-10 day period, meeting 4-5 times for 30 minutes each time. Peers were trained to predetermined criteria, including signs, peer tutor behavior and feedback techniques. All peers successfully met the preset criteria of the peer tutor program. Data were collected on a modified SOFIT form with the researcher recording the peer tutor behavior and the physical activity levels of the deaf student and peer tutor. The physical activity behavior consisted of a score from 1-5, depending upon the physical activity level of the student. The system produces a frequency count of each physical activity level by student for each class period. The 4's and 5's were combined to give a score for Moderate to Vigorous Physical Activity (MVPA). This score was divided by the total number of observations for the class, giving a total percentage of

time the students spent in moderate to vigorous physical activity. This was the score analyzed and utilized in the graphs comparing baseline to intervention.

The peer tutor behavior consisted of P-promoting fitness, D- demonstrating fitness, I- instructing generally, M- monitoring, and O- off task. Each time the student interacted verbally (signed), the interaction was recorded in addition to the peer tutor physical activity behavior. Data were collected on all subjects over a five month period, using a delayed multiple baseline design (Heward, 1987). Data were graphed and then analyzed using visual inspection of the graphs, which included examination of means, variability and trends within/across conditions, level change and data overlap between conditions.

Summary of Findings

This study examined the physical activity levels of deaf students in integrated physical education classes. While some studies have examined the ALT-PE of students with disabilities (DePaepe, 1985; Houston-Wilson, 1993; Webster, 1987) one has examined peer tutoring of deaf students in math class (Burley, Gutkin, & Naumann, 1994). This study reported here is the first to examine the physical activity levels of deaf students in integrated physical education classes. Earlier studies examining motor performance utilized Academic Learning Time-Physical Education. ALT-PE can provide information about a students' motor performance; it does not give information about physical activity levels. SOFIT provided a method to systematically observe the level of physical activity of each student.

Data collected on the tutor's interactions allowed for verification of treatment implementation. It was determined by the graph of the interactions that the peer tutor program was implemented successfully. It should be noted that the tutors

used promoting, demonstrating, and instructing appropriately, and these were recorded as the tutoring behaviors. Each deaf student and peer tutor increased peer tutor interactions upon intervention.

In viewing the physical activity levels, the mean percentage of time the students were engaged in moderate to vigorous physical activity in baseline ranged from 39.9% to 69.6%. In intervention the mean scores increased, ranging from 62.0% to 95.7%. The means from baseline to intervention showed a 32.7% to 88.4% improvement.

Before the initiation of this study, the fitness scores of the deaf students were compared to the scores of the hearing students. The deaf students scores were below those of the hearing students in every item except one (see Appendix H). These findings are similar to those of Goodman and Hopper (1992), Hatten, Ward, Fraser, and Shephard (1986), Minter and Wolk (1987), Pender and Patterson (1982) and Wiegersma and Van Der Velde (1983). Based on these findings, it is obvious that deaf students need additional support in integrated physical education. A major finding in this study was that hearing peer tutors, properly trained, could be effective at assisting deaf students in increasing their physical activity levels.

One of the questions asked in this study was whether the peer tutor program affected the peers' physical activity levels. The graphs clearly demonstrate that the peers physical activity levels were positively affected by participation in the peer tutor program. It was also shown that the deaf students maintained the high level of physical activity after cessation of the intervention.

The results of this study demonstrate that trained peer tutors were effective in assisting deaf students to increase their physical activity levels. In addition, the peer tutor training program appeared to be successful because of the increase

in tutoring behavior upon implementation of the intervention and because of the increase in physical activity of the deaf student and the peer tutor.

Implications

Over 4,452 schools in the United States have only one deaf child enrolled (Schildroth, 1988). The lack of deaf peers can lead to isolation and communication problems (Foster, 1989). In addition, it has been documented that deaf children are below their hearing peers in physical fitness.

It is important to note that the elementary school used in this study is not a typical setting for deaf students in local schools (Schildroth, 1988). Most schools, as stated above, have only one or two deaf students, as opposed to the school used in this study, which had two or more in each class and 45 in total in the school. The results of this study would most likely be more marked if conducted in a typical school. Although the interpreter may then have the opportunity to give the one or two children more attention, the interpreter is difficult to follow when students are involved in moderate to vigorous physical activity. In typical or hearing schools, deaf students often experience isolation. The training of a hearing student to sign and serve as a peer tutor would be more novel and would likely elicit a greater effect on the deaf students if replicated at a more typical setting.

The implementation of trained hearing peer tutors is a natural, cost effective, and appropriate way to increase socialization and physical activity levels in the physical education setting. Physical education teachers must understand that peer tutors are not a substitute for the interpreter or teacher. In addition, teachers must develop a system for monitoring the peer tutors' teaching behavior as well as the physical activity levels of the deaf students. The peer's

role is to demonstrate, motivate, and assist the deaf student. The physical education specialist must ensure that the peer tutors are trained with sufficient and appropriate signs, teaching protocol, and feedback techniques to promote success in both the deaf student and the peer tutor.

An alternative to the system used to train and involve peers in this study would be to provide group training for the peer tutors. This would allow the teacher to involve more students in the tutoring program and each deaf student could have more than one peer tutor. In addition, a class rotation of peer tutors would be an effective way to allow the peers to work on their own fitness and give more students exposure to socializing with deaf students. Rotating the peer tutors would expose the deaf students to more hearing students and generalize the instruction across tutors. A second alternative would be Classwide Peer Tutoring, where all the students learn in pairs so the deaf students are not singled out as the only students with partners. A third alternative would be reciprocal peer tutoring, where the deaf student and hearing peer tutor each other equally. Both are involved in the tutor training and tutoring is shared between the pair. Lastly, the deaf students could peer tutor each other. Deaf students prefer to socialize with other deaf students, so the peer tutoring of deaf students to deaf students would be a natural and desired partnership.

Utilizing a peer tutor program may be one way to assist deaf students to increase their physical activity levels and integrate more smoothly into inclusive settings. A peer tutoring program may require additional time to develop and implement. However, the outcomes, especially increased physical activity levels and increased interactions with peers, may justify the effort and extra time spent.

Recommendations

The results of this study provide valuable information on the effect of trained hearing peer tutors on the physical activity levels of deaf students in integrated physical education classes. However, this study was limited in scope. The study utilized a single subject design; thus, the number of subjects was relatively small. In addition, the subjects in this study were deaf elementary-aged students in an atypical setting. Finally, the study focused on physical activity levels during the fitness portion of the class. The following recommendations are made for future studies:

1. This study should be replicated with other deaf students to confirm the effects of the peer tutor training program.
2. The peer tutor training program should be replicated using a group of 3-4 peer tutors per deaf student rather than training only one peer per deaf student. By doing so, the deaf student will always have a partner available thereby increasing the number of hearing peers with whom he/she can communicate.
3. The peer tutor program should be replicated using a continuous training program throughout the intervention to determine the effect of an increased vocabulary.
4. The peer tutor training program should be replicated utilizing reciprocal teaching.
5. The peer tutor training program should be replicated using classwide peer tutoring where all the students in the class work as partners.

6. Additional studies should examine deaf students of different age groups.
7. Analysis should be made on peer tutoring during the skill development or game portion of the class utilizing Opportunity To Respond, or Academic Learning Time in Physical Education as the dependent measure. In this case additional signs would be required including those used in pre-game and sport.
8. An analysis should be made of the students' self esteem and self perception during the implementation of the peer tutor program.
9. Another variable which should be evaluated is the actual fitness improvement as a result of the intervention.

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Appendices

Appendix A
(Activity Descriptions)

Appendix A
Activity Descriptions for Baseline, Intervention, and Maintenance

Group	Day	Activity Description
Group 1 Baseline	1	Running around four cones, fitness activities
	2	Stations, locomotor and fitness activities, stretching
	3	Running around four cones, fitness activities
	4	Locomotor skills around four cones, fitness activities, stretch
Group 1 Intervention	5	Relays of locomotor skills, fitness activities, stretching
	6	Relays of locomotor skills, fitness activities, stretch
	7	Running around cones, fitness activities, stretch
	8	Basketball relays, fitness activities
	9	Basketball relays, fitness activities, basketball defensive drill
	10	Basketball relays, fitness activities, stretch
	11	Locomotor drill to music with partner, fitness activities, stretch
	12	Basketball relays, fitness activities, stretch
	13	Basketball relays, fitness activities, basketball defensive drill
	15	Run and touch all four walls, fitness activities
	16	Run and touch all four walls, fitness activities
	17	Locomotor drill to music with partner, fitness activities
Group 1 Mainten.	18	*Run around track, stretch
	19	*Run around track
Group 2 Baseline	4	Locomotor drill to music with partner, fitness activities
	5	Locomotor drill to music with partner, fitness activities, stretch
	6	Basketball relays, fitness activities
	7	Basketball relays, fitness activities, basketball defensive drill
Group 2 Intervention	8	Basketball relays, fitness activities, stretch
	9	Basketball relays, fitness activities, basketball defensive drill
	10	Locomotor skills around four cones, fitness activities, stretch
	11	Run around gym, fitness activities
	12	Run and touch all four walls, fitness activities

Appendix A (Continued)
Activity Descriptions for Baseline, Intervention, and Maintenance

	13	Run and touch all four walls, fitness activities
	14	*Running for time around track, stretch
	15	*Running for time around track, stretch
	16	*Running for time around track
	17	Locomotor skills to music with partner, fitness activities
	18	*Running for time around track
Group 2	19	*Running for time around track
Mainten.	20	*Running for time around track
	21	Run around gym and touch all four walls, fitness activities
	22	*Run around track
Group 3 Baseline	7	Run around gym and touch all four walls, fitness activities
	8	Basketball relays, fitness activities, basketball defensive drill
	9	Basketball relays, fitness activities, basketball defensive drill
	10	Basketball relays, fitness activities, basketball defensive drill
	11	Run around four cones, fitness activities, stretch
	12	Locomotor drill to music with partner, fitness activities
Group 3	13	*Running around track
Intervention	14	Run and touch all four walls, fitness activities, stretch
	15	Run and touch all four walls, fitness activities
	16	*Run around track
	17	*Run around track
	18	Run and touch all four walls to music, fitness activities, stretch
	19	Run and touch all four walls to music, fitness activities, stretch
	20	*Run for time around track
	21	*Run for time around track
	22	*Run for time around track
	23	Locomotor skills around gym, fitness activities, stretch
	24	Locomotor skills around gym, fitness activities
	25	*Run for time around track, stretch
	26	Run around four cones, fitness activities, stretch
Group 3	27	*Run for time around track
Mainten.	28	*Run for time around track

Appendix A (Continued)
Activity Descriptions for Baseline, Intervention, and Maintenance

Group 4 Baseline	9	Basketball relays, fitness activities, basketball defensive drill
	10	Basketball relays, fitness activities, basketball defensive drill
	11	Run around four cones, fitness activities, stretch
	12	Locomotor drill to music with partner, fitness activities
	13	*Running around track
	14	Run and touch all four walls, fitness activities, stretch
Group 4 Intervention	15	Run and touch all four walls, fitness activities
	16	*Run around track
	17	*Run around track
	18	Run and touch all four walls to music, fitness activities, stretch
	19	Run and touch all four walls to music, fitness activities, stretch
	20	*Run for time around track
	21	*Run for time around track
	22	*Run for time around track
	23	Locomotor skills around gym, fitness activities, stretch
	24	Locomotor skills around gym, fitness activities
	25	*Run for time around track, stretch
	26	Run around four cones, fitness activities, stretch
	27	*Run for time around track
Mainten.	28	*Run for time around track

* Class held outside on track

Appendix B
(Institutional Review Board)

Institutional Review Board

The purpose of this study is to investigate the effect of peer teaching on the physical activity levels of students who are deaf in integrated physical education classes. The study will examine: a) The impact of trained hearing peer tutors on the physical activity levels of students who are deaf, and b) the effect of peer tutoring on the physical activity levels of the hearing peers.

The hearing and deaf children chosen for the study will be observed for a period of two to three weeks to determine baseline physical activity levels. After baseline is determined the hearing peers will be involved in a two to three hour training program which includes signs, teaching skills, and feedback techniques. The last session of the training program will include the deaf children to ensure communication ease, and a common understanding of what will happen in the following physical education classes. The children will then work in pairs for the remaining three to four weeks of physical education classes. During the intervention phase the children will also be observed to determine any change in physical activity levels from baseline to the intervention phase. Maintenance will be determined by probing after the cessation of the peer tutors. Generalization will be determined on the playground. Reliability will be determined by a secondary researcher a minimum of three times during each phase of the study.

The peer tutor study has three areas of significance. The first area is a potential effect on the hearing peers. There is a potential for the hearing peers to learn sign and become more interactive with the students who are deaf (Antia, Kreimeyer, & Eldridge, 1993). There is also the potential that the hearing peers increase physical activity levels. The second area of significance is the area of the deaf students. The students have the potential to increase physical activity levels as well as gain friendship and understanding with a hearing peer (Lederberg, Ryan, Robbins, 1986). The third area of significance is the potential for a training program which can be implemented in the future to hearing peers of students who are deaf.

There are four major components of this project. The elementary school selected for this study has students in 4th and 5th grade who are deaf. The first component of the project will be a pilot study utilizing one hearing peer and one deaf student to determine the length of the training program. The second component of the project will be the selection of the eight deaf students that fit the predetermined criteria, and a peer to be matched with each deaf student. The third component will be the beginning of the collection of data on both the peers and the students who are deaf without intervention which will be the baseline during the fitness unit. The data collection instrument used is the System for Observing Fitness Instruction Time or SOFIT. The fourth component, the intervention phase, will be the training of the peers and pairing of the trained peers with the deaf students.

The research design is a delayed multiple baseline design across subjects. Generalization will be documented by observing the children in the focus portion of the class as well as during the fitness portion. The physical activity levels during the focus of the class will be compared by visual analysis against the physical activity levels during the fitness portion of the class. Maintenance

will be determined by observing the classes twice in the first month after the completion of the intervention, and once in the second month after the completion of the intervention.

There are four major potential benefits to this project. The first benefit would be the potential for the discovery of a way to improve physical activity levels in both peers and deaf students in elementary mainstreamed classrooms. The second benefit is the potential for the discovery of a useful training program for training hearing peers. The third benefit is the valuable use of sign language and understanding of deafness gained by the hearing peers. Due to the move toward inclusion the last benefit is very valuable. The last benefit is a means for facilitating interaction and motivation in physical education for students who are deaf and hearing. The students will be participating in their regular physical education classes with no change in curriculum. The fitness curriculum will consist of locomotor skills, fitness activities in stations such as crab walk, sit-ups, push-ups, squat thrusts, stretches, and low organized fitness games to enhance high physical activity levels for the 15 minute period. There will be no additional risk to students as a result of participation in this study.

The subjects will be chosen from two groups. The deaf students must be in 4th or 5th grade and be classified as deaf, and use sign language as their major means of communication. Eight subjects of either gender will be chosen from this group. The researcher, teacher, and physical education teacher will be responsible for selection of these students. The strict criteria for this group will limit the amount of randomness utilized in choosing subjects. The second group will be eight hearing peers. The selection criteria for this group is: they must be in the same class and same gender as the deaf peer, exhibit good behavior, maintain a high level of fitness, and not currently friends with the deaf student. These students will be chosen by the researcher, teacher, and physical education teacher.

The parent's and students informed consent forms can be found in Appendix B, C, & D.

The informed consent will be sent home to the parents, and any questions will be answered as they arise. The children will be given the informed consent to read. The project will be explained to them as thoroughly as possible, and then they will sign the informed consent if they choose to participate in the study.

All information obtained from the study will remain confidential. The students will be identified by number to ensure confidentiality when sharing the results.

A copy of the System for Observing Fitness Instruction Time (SOFIT) can be found in Appendix
E.

Approval was obtained from the Principal of Salem Heights Elementary School.

This dissertation project is receiving no funding.

Appendix C
(Parental Consent Form of Deaf Student)

Lauren Lieberman
Oregon State University
Womens Building
Corvallis, Oregon, 97330
(503) 737-3402

Date:

Dear Parent/Guardian,

I am writing to tell you about a study that I would like to do in _____ physical education class. The purpose of my study is to determine the effect of hearing peer tutors on physical activity levels of both the students who are deaf and the hearing peers. The physical activity levels are an indication of students' fitness levels. It is hoped that _____ will increase his/her physical activity levels during the course of the study.

In order to determine the physical activity levels, _____ will first be observed while participating in their regular physical education class without the assistance of a peer tutor. This will be used to establish a baseline, or get a starting point. The timeline for baseline is about three classes or until stability is reached. The next step is assigning each deaf student with a hearing peer tutor. The peer tutor will receive training to insure that his/her intervention with _____ will be appropriate. The training program will consist of signs, teaching techniques, and feedback skills. The amount and type of training received by the peer tutor will be an important part of the study. Your child will be expected to participate in the last training session during one or two of his/her recesses. This is to ensure appropriate receptive and expressive signing by the peer tutor. The overall timeline of the study is approximately 8 weeks. Each aspect of this study will occur in your child's regularly scheduled physical education class. The teacher and interpreter as presently assigned will be present in the class.

The results of _____ performance will be shared with you. Confidentiality will be maintained throughout the study. Neither _____ first or last name will be used in the research project. The students will receive a number which will identify the individual for the purpose of the investigation, yet they will still be addressed by name in class.

Participation in this study is voluntary. Refusal to participate will not result in penalty or loss of participation in physical education. You may withdraw _____ from the study at any time. There are no risks or discomfort involved in this study. In the event of an injury during the course of the study the University will not be responsible to provide the student with compensation or medical treatment.

The study will be supervised by Dr. John M.Dunn and Lauren Lieberman and will start January 3rd. If you have any questions or concerns please contact me

at 737-3402, or 757-0601. If you wish to allow _____ to be involved in this study, please sign the enclosed informed consent form, and return to Eleni Boston at Salem Heights. Thank you for your cooperation. I look forward to working with you and _____.

Sincerely,

Lauren Lieberman, Doctoral Candidate

INFORMED CONSENT

I have read and understand the purpose of this study.

I give my permission for my son/daughter to participate in this study.

_____
(child's name)

_____
(parent/guardian signature)

_____
(parent/guardian signature)

Investigators statement:
I have explained the purpose and procedures of this project to the participant' parent/guardian and answered all questions. I have given a copy of this informed consent to the parent/guardian.

_____ _____
Principal Investigator Date
John M. Dunn, Ed.D.
Professor of Exercise and Sport Science
Oregon State University
Corvallis, OR 97331
#737-0732

_____ _____
Investigator Date

Lauren J. Lieberman
120 Womens Building
Oregon State University
Corvallis, OR. 97331
#737-3402

Appendix D
(Peer Parental Consent)

Lauren Lieberman
Oregon State University
Womens Building
Corvallis, Oregon 97331
(503) 737-3402

Date:

Dear Parent/Guardian,

My name is Lauren Lieberman and I am a doctoral student in the Movement Studies in Disabilities Program at Oregon State University. I am writing to you to tell you about a study that I would like to do in _____physical education class. The purpose of this study is to determine the effects of hearing peer tutors on physical activity levels of both the deaf students and the hearing peer tutors. Physical activity levels are a direct indication of physical fitness levels. It is hoped that hearing peer tutors will increase the physical activity levels of students who are deaf.

_____ has been chosen by his classroom and physical education teacher to be a peer tutor for this study. If you agree to allow _____to participate in this study, he/she will be provided with introductory training to assist a student who is deaf in physical education. The training consists of sign language, teaching techniques, and feedback skills. The training place will take place during _____ recess or after school, you may choose which is most convenient for your family. _____ will attend the physical education class with the student he/she is tutoring. The overall timeline for this study is approximately 8 weeks. Each aspect of this study with the exception of the training program will occur in your child's regularly scheduled physical education class. The teacher as currently assigned will be present in the class.

The results of _____ performance will be shared with you. Confidentiality will be maintained throughout the study. Neither _____ first or last name will be used in the research project. The students will receive a number which will identify the individual for the purpose of the investigation, yet they will still be addressed by name in class.

Participation in this study is voluntary. Refusal to participate will not result in penalty or loss of participation in physical education. You may withdraw _____ from the study at any time. This is an observational study. There are no risks or discomfort involved in this study. In the event of an injury during the course of the study the University will not be responsible to provide the student with compensation or medical treatment.

This study will be supervised by Dr. John M. Dunn and Lauren Lieberman, and will start January 3rd. If you have any questions or concerns please contact

me 737-3402, or 757-0601. If you wish to allow _____to be involved in this study, please sign the enclosed informed consent form, and return to me in the self-addressed stamped envelope provided. Thank you for your cooperation. I look forward to working with you and _____.

Sincerely,

Lauren Lieberman
Doctoral Candidate

Appendix E
(Deaf and Hearing Student Consent Forms)

HEARING STUDENTS INFORMED CONSENT

I _____, understand that my parents have given permission for me to participate in a study which will involve me working with a hearing/deaf partner in physical education class. This research project will involve a committment on my part and I must understand and agree with the committment before signing this form. I understand that :

1) I was chosen for this study because I am physically fit, am a motivated student, and do not miss class often.

2) I will be observed in physical education class.

3) I will participate in a training program including signs, teaching skills, and feedback techniques after school and/or during recess four to five times for 30 minutes each time.

4) I will be expected to study the signs and the training program at home.

5) I will be tested on the material in the training program.

6) I will be expected to pair up with one deaf student during a portion of my physical education class. In my class I will be expected to use my signs and the tutoring program.

7) If I do not feel comfortable with the student I am assigned, I may request to tutor a different student, or choose not to continue the program.

I understand that this is a research project and will last about 8-10 weeks. This project is under the direction of Dr. John M. Dunn and Lauren Lieberman. If you have any questions before signing this informed consent please talk to Lauren and or Dr. Dunn.

My involvement in this project is voluntary, and I have been told that I may withdraw from participation in this study at any time without penalty and loss of benefit to myself.

_____

Signature

DEAF STUDENTS INFORMED CONSENT

I _____, understand that my parents have given permission for me to participate in a study which will involve me working with a hearing/deaf partner in physical education class. This research project will involve a committment on my part and I must understand and agree with the committment before signing this form. I understand that :

1) I was chosen for this study because I am physically fit, am a motivated student, and do not miss class often.

2) I will be observed in physical education class.

3) I will be expected to participate in the training program for one or two of my recess periods.

4) I will be expected to pair up with one hearing peer tutor during a portion of my physical education class. In my class I will be expected to work with and communicate with my peer tutor.

5) If I do not feel comfortable with the peer tutor I am assigned I may request a different tutor, or choose not to continue in the program.

I understand that this is a research project and will last about 8-10 weeks. This project is under the direction of Dr. John M. Dunn and Lauren Lieberman. If you have any questions before signing this informed consent please talk to Lauren and or Dr. Dunn.

My involvement in this project is voluntary, and I have been told that I may withdraw from participation in this study at any time without penalty and loss of benefit to myself.

_____

Signature

Appendix F
(Peer Training Overview)

PEER TRAINING OVERVIEW

I. Signs pertaining to physical fitness, motivation, and cuing.

A. Physical Fitness signs

Exercise
Fast
Gallop
Go
Hop
Jump
Move
Quick
Run
Short
Slow
Skip
Start
Stop

B. Motivational signs

Exactly
Excellent
Excited
Expert/Skilled
Fantastic
Final/Last
Goal
Good
Hooray
Much/lot
WOW
Work

C. Cueing signs

Attention/Pay attention
Circle
Different
Explain
Finish
First

Freeze
Game
Help
Lead
Line-up
Next
No
Ring/Circle
Same
Show/Show me/I'll demonstrate
Should/Need
Turn
Watch/Watch me/I'll watch you
Yes

II. Cueing Techniques

A. Cueing
B. Modeling
C. Physical Assistance

III. Feedback techniques

A. Positive General Feedback
B. Positive Specific Feedback

IV. The Importance of Physical Activity

A. Endurance
B. Muscular Strength/Endurance
C. Flexibility
D. Body Composition

Tutor Training Handout

Verbal Cue/Sign Cue

A signal or sign to tell someone what to do.

Examples:

" John run around the cones."
" Jane it is your turn for pull-ups."
" Let's stand on the black circle."
" Sara show me the crab walk"

Model

Modeling is a way of demonstrating how to do the activity. After you give a verbal cue, if the student does not do the activity or does the activity wrong you should repeat the cue and demonstrate what it is you want him or her to do.

Examples:

" Mary hop like this."
" Continue to perform sit-ups like this."
" Watch me participate in the relay race."
" When we get to station 3 do jumping jacks like this."

Physical Assistance

Physical assistance is used to help the student if he or she is unable to do the activity after you have given a verbal cue and model. You should only physically assist the student by directing his or her body part with your hands.

Example:

Stand behind the student and physically assist with a sit-up.
Stand sideways in front of a student holding hands, bend knees, and jump over the rope.
Tap the student on the shoulder when it is his/her turn to run, or participate in fitness activities.

Feedback

Positive Feedback

A supportive statement about the students motor skill response.

Examples:

"Good skipping"
"Nice crab walk"
"Great"
"Wow"

Positive Specific Feedback

A supportive statement that includes exact information about what was good about the motor skill response.

Examples:

"Nice reaching up with your jumping jacks."
"Great high knees with your skip."
"I like the way you use your arms in your run."
"That's the way to keep your feet moving in that station."

Skills

Cardiovascular Endurance

Running, skipping, galloping,, hopping, walking, sliding

Muscle Strength and Endurance

Sit-ups, crab walk, pull-ups, push-ups

Flexibility

Sidebends, toetouches, trunk twists, hurdlers stretch, butterfly, sprinters stretch

Examples of Scenarios:

Scenario 1
Tutor: Cue: "Mary jump over the rope"

Student: acceptable response

Tutor: Positive Specific Reinforcement

"Good job jumping over the rope so many times."

Scenario 2
Tutor: Cue: "John do five push-ups"

Student: unacceptable response

Tutor: Positive General Feedback: "Good try"

Tutor: Repeat Cue and Model: John, do the push-ups like this."

Student: acceptable response

Tutor: Positive Specific Reinforcement
" Nice job, I like the way you bent your elbows all the way"

Scenario 3
Tutor: Cue: "Sue do the crab walk"

Student: unacceptable response

Tutor: Repeat Cue and Model: "Sue do the crab walk like this."

Student: unacceptable response

Tutor: Questions the subject: "Can I help you?"

Tutor: Provides Physical Assistance

Tutor helps student lift her hips up for a correct crab walk.

Student: acceptable response

Tutor: Positive Specific Reinforcement: That's the way to lift your hips, now try to do it yourself.

Peer Tutor Quiz

Name_____
Date_____

Choose the correct answer

positive specific feedback physical assistance
verbal cue positive general feedback
model

1) A sign or signal to tell someone what to do is a _____ _____.

2) If the student does not understand how to do the skill, or is doing it wrong, you should

_____.

3) You should give _____ _____ to the student only if the verbal cue and modeling does not work.

4) A statement that is supportive and gives exact information about what was good about a skill is called

_____

5) A statement that is supportive but does not give exact information about what was good about a skill is called

_____

Circle the correct answer.

6) An example of a positive specific feedback statement is:

a) "good job."
b) "good sliding sideways I like the way you use your arms."
c) "good try"
d) "slide like this"

7) The student you are working with is unable to gallop, a verbal cue you may give to help the student gallop is:

a) "slide you back foot to your front foot then step with your front foot again."
b) "gallop"
c) "try again"
d) "you will get it this time"

8) After giving a verbal cue to jump with knees bent, the student is unable to do the skill correctly, you say:

a) "almost try again."
b) "that was pretty good"
c) "watch me, bend your knees and jump."
d) "good jump."

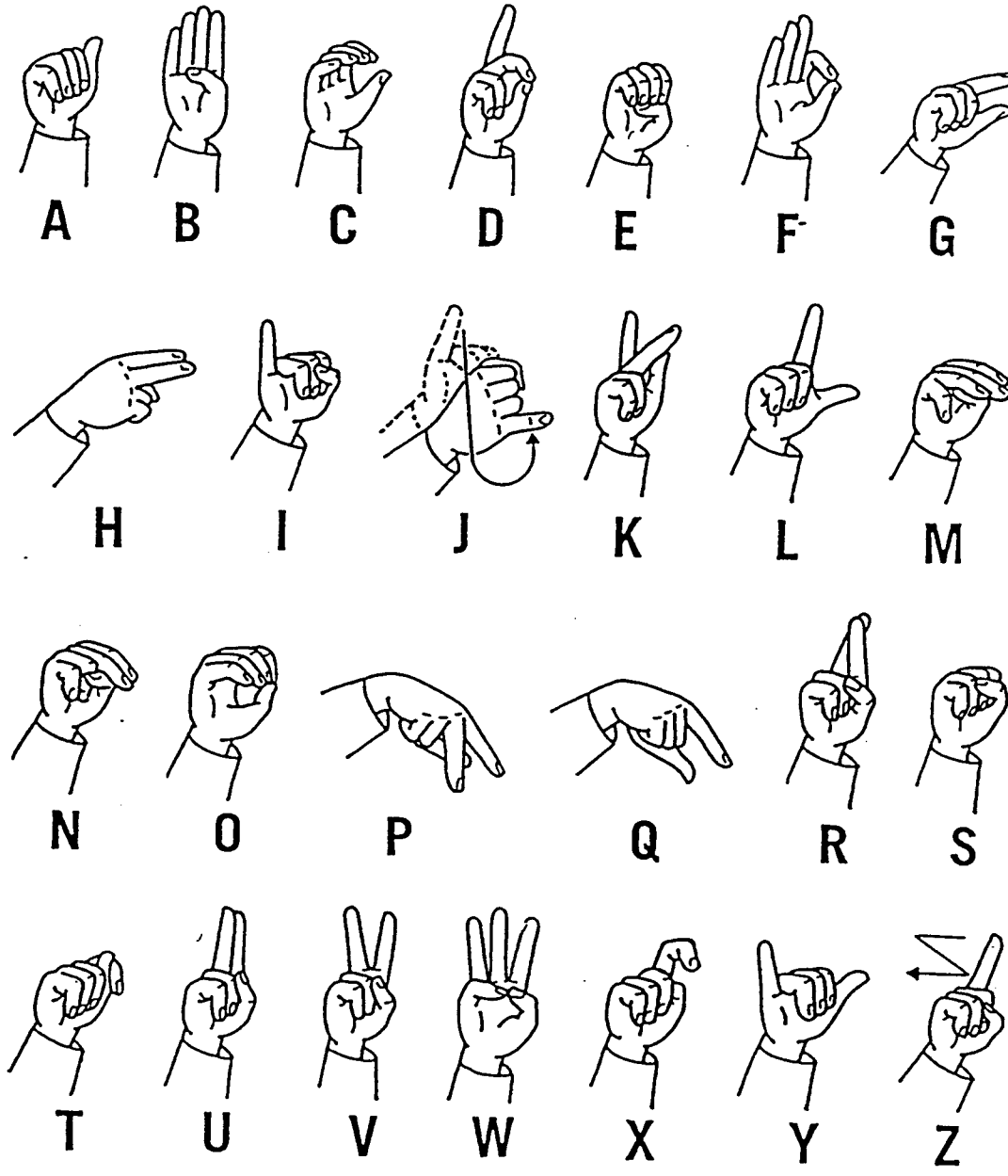
9)After giving a verbal cue and model for the student, he or she is still unable to perform a hurdlers stretch correctly, you say:

a) "is it o.k. if I help you?' and if the student agrees sit beside him and put hand on outstretched leg.
b) "do you want me to take your turn for you?"
c) "do you want to do something else?"
d) "try again, I know you will get it."

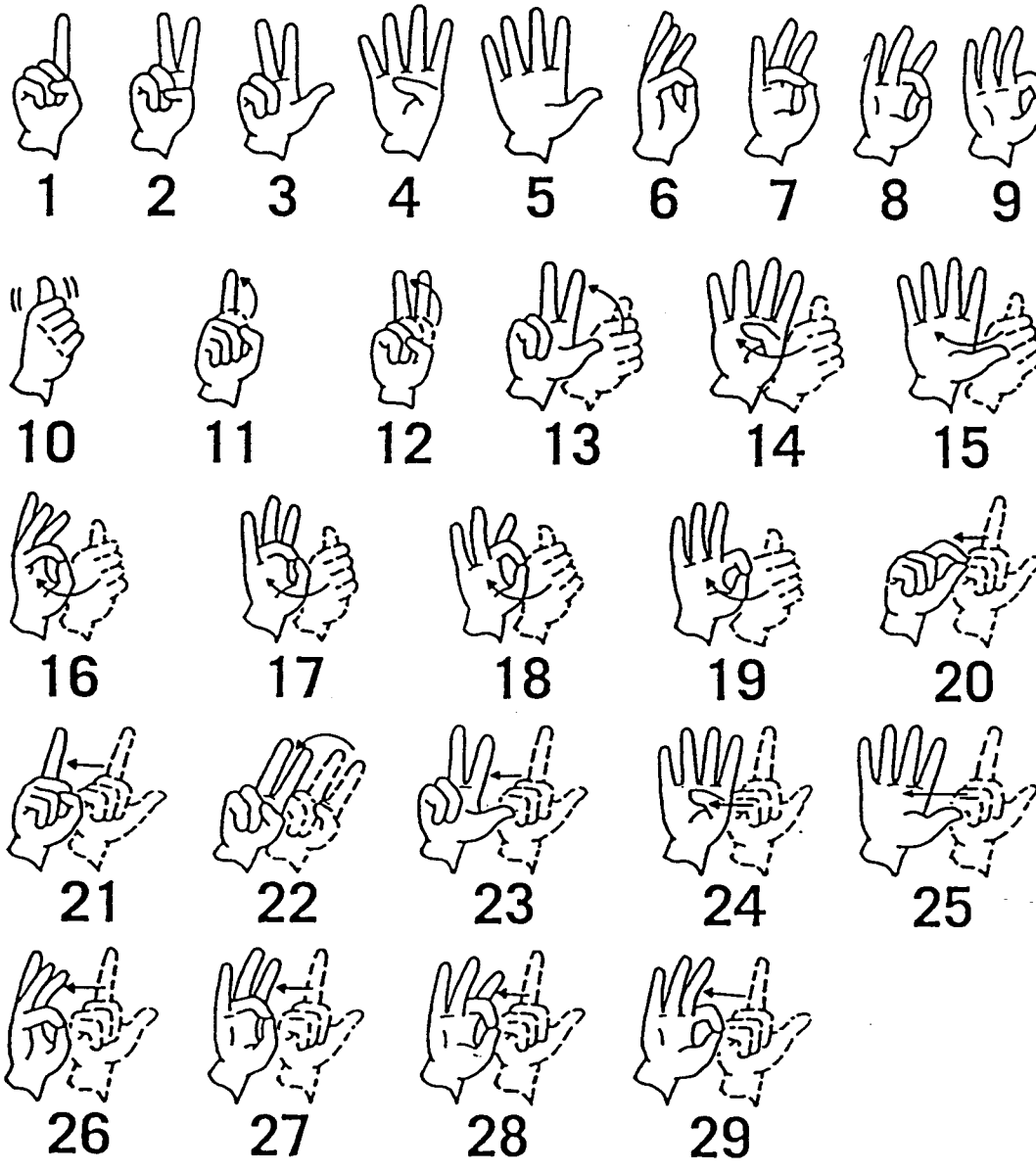
10)"Good job throwing is an example of:

a) positive specific statement.
b) corrective feedback statement.
c) verbal cue.
d) positive general feedback statement.

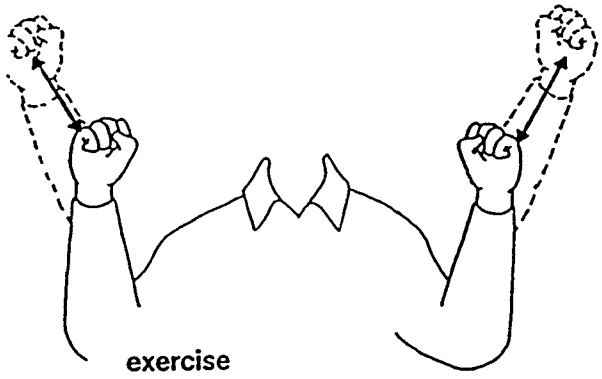
The Manual Alphabet



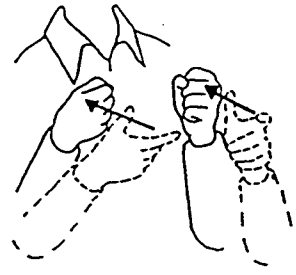
Numbers



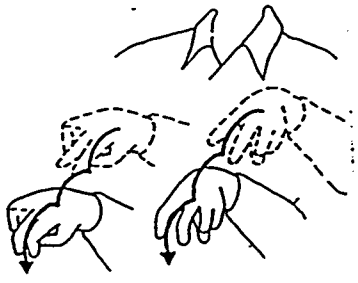
PHYSICAL FITNESS SIGNS



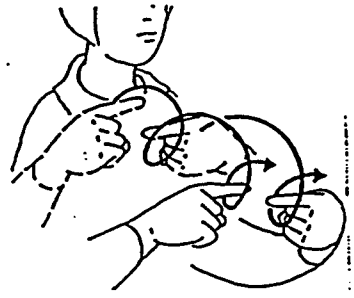
exercise
S shape both hands, arms held above shoulders. Push up and out.



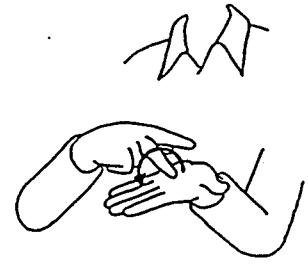
fast
L shape both hands, palms facing, index tips out. Draw back quickly into S shapes.



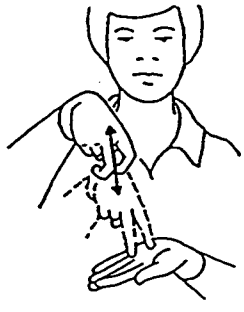
gallop
V shape both hands, palms down, tips out. Jump forward several times, bending V fingers.



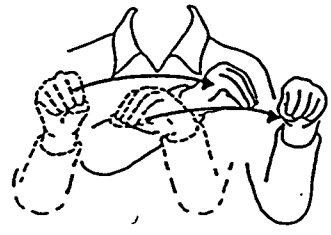
go (alt.)
One shape both hands, palms in, tips facing. Rotate around one another while moving forward.



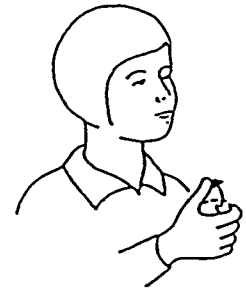
hop
LH open B palm up, tips out. Place middle finger of right P on left palm then hop forward once.



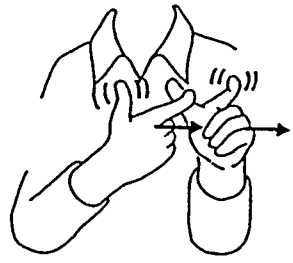
jump
LH open B palm up, tips out. Place tips of right V in left palm and pull up quickly, changing into bent V shape. Repeat motion.



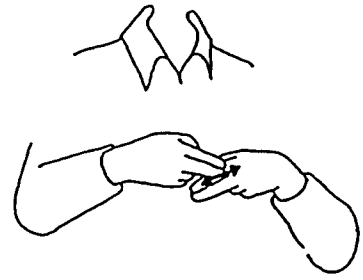
move
O shape both hands, palms down. Move from right to left or vice versa.



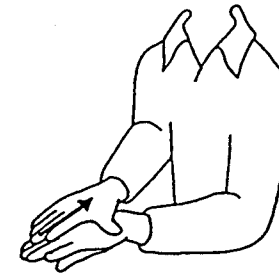
quick
Flick thumb up from under index of right fist, which is held palm left.



run
L shape both hands, index tips out, LH a little ahead of right. Hook right index finger around left thumb. Wiggle L shape fingers while moving both hands forward.

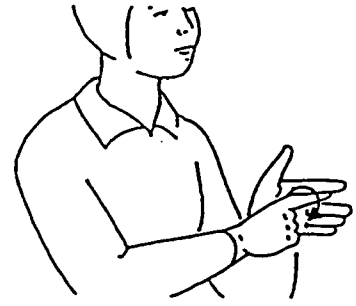


short
H shape both hands, left palm right, tips out; right palm in, tips left. Rub right H back and forth on top of left H.

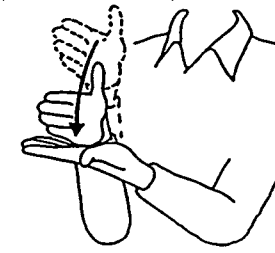


slow
Draw palm of RH slowly up back of LH.

skip
LH open B palm and tips slanted right. Place middle finger of right K on base of left palm, then twist forward quickly so that index tip rests on fingers.

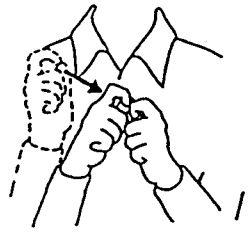


start
Five shape LH palm and tips slanted right. Place right index between left index and middle fingers and make half turn.

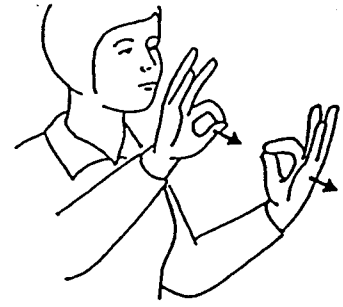


stop
LH open B palm up, tips out. Strike little finger side of right open B down on left palm.

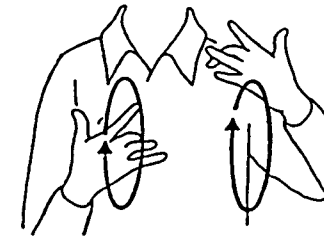
MOTIVATIONAL SIGNS



exact
Closed X shape both hands, right hand held behind left. Tap thumbs and index tips together once.

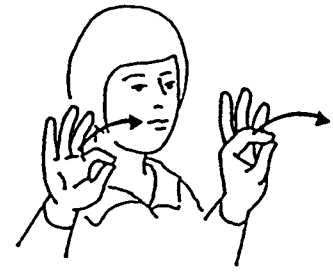


excellent
F shape both hands, left palm in, right palm out. Jerk both hands forward slightly.

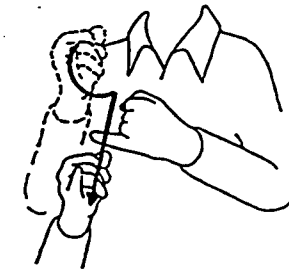


excite
Five shape both hands, palms in. Alternately brush tips of middle fingers upward on chest.

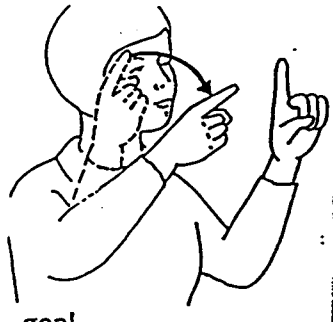
expert
Grab little finger side of left open B with RH. Pull RH down sharply ending in A shape.



fantastic
F shape both hands, fingers spread. Arc forward and out.

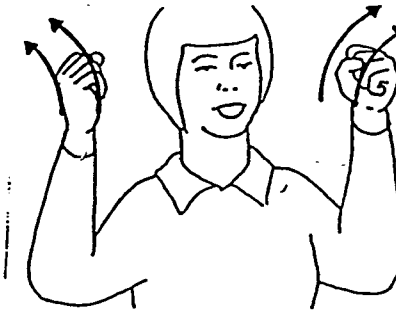


final
I shape both hands, left palm in, tip right; right palm left, tip out. Bring right I up in semicircle then down, striking the tip of left little finger.

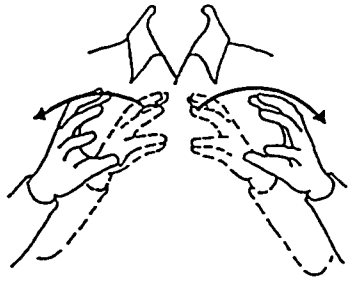


goal
One shape both hands. Place tip of right index on forehead then point toward left index.

good
Open B both hands, palms in, tips slanted up. Place right tips on mouth then move out and down, placing back of hand in left palm



hooray!
Place fists at sides of head and simultaneously shake up and

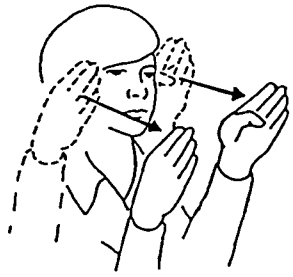


much
Claw shape both hands, palms facing. Place tips close together then arc apart.

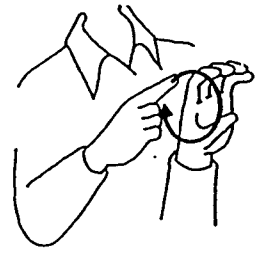
wow
Fingerspell W-O-W in rapid succession.

work
S shape both hands, palms down. Hit back of left S with right S. Repeat motion.

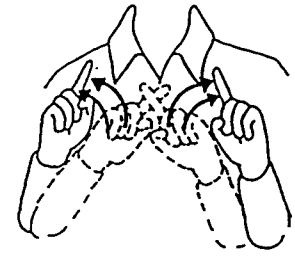
CUEING SIGNS



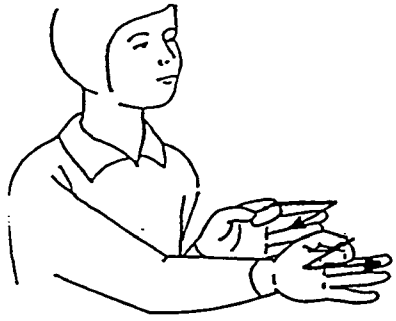
attention
B shape both hands, palms placed on temples. Move forward parallel to one another.



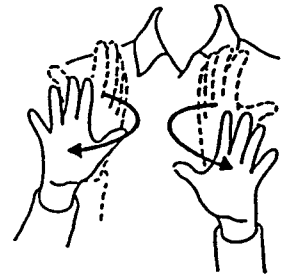
circle
C shape LH. Circle thumb side with right index finger clockwise. (Sometimes made without left C.)



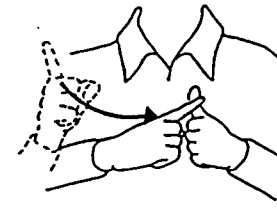
different
Cross index fingers and pull apart so that fingers point outward. Repeat.



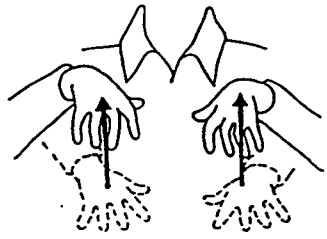
explain
F shape both hands, palms facing, tips out. Move back and forth alternately.



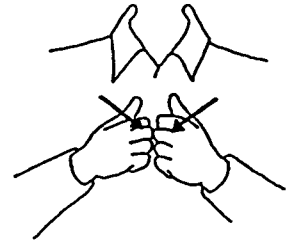
finish
Five shape both hands, palms in. Turn suddenly so that palms and tips face out.



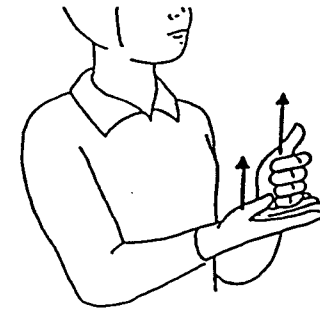
first
A shape LH knuckles right, thumb up. Strike left thumb with tip of right index.



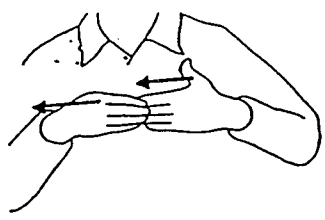
freeze
Five shape both hands, palms down, tips out. Bring up into claw shapes.



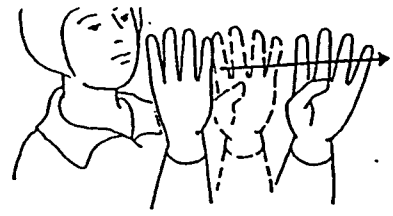
game
A shape both hands, palms in, thumbs up. Hit knuckles together once while moving hands down slightly.



help
Place little finger side of left A, thumb up, in right palm. Raise right palm up.

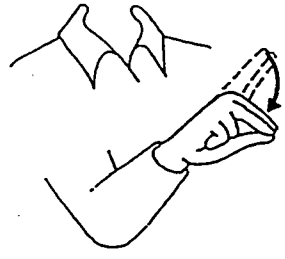


lead
LH open B palm in, tips right. Grasp with fingers and thumb of RH and pull to right.

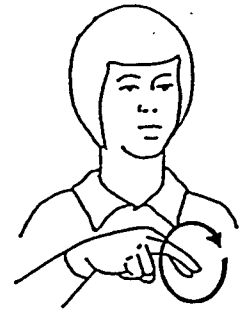


line up
Four shape both hands, left palm right, right palm left. Place right hand behind left then move LH forward.

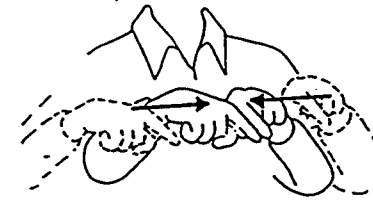
next
Open B both hands, palms in. Place back of right fingers against left palm then arc RH over LH.



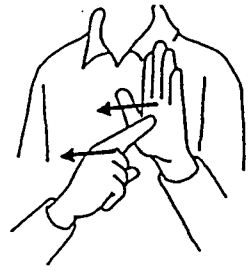
no
Snap middle finger, index, and thumb together quickly.



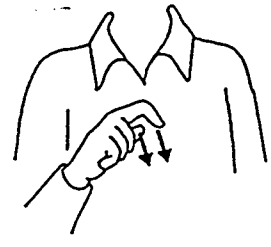
ring (circle)
Form circle in air with right R, tips out.



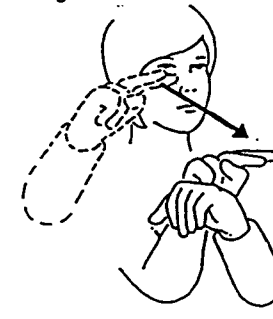
same
One shape both hands, palms down, tips out. Bring index fingers together.



show (verb)
LH open B palm out, tips up. Place right index tip in middle of left palm and move both hands forward.

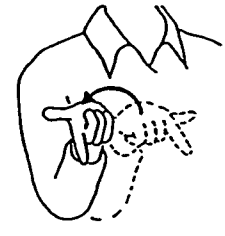


should
X shape RH knuckles down. Move down. Repeat.



watch (verb)
Place back of right V just under right eye. Move out over left hand which is held palm down.

yes
S shape RH. Shake up and down at wrist.



turn
L shape RH palm down. Turn so that palm faces up.

Appendix G
(SOFIT)

SOFIT DEFINITIONS FOR THE PEER TUTOR PROJECT

PHYSICAL ACTIVITY LEVELS

5- Very Active

Running
Skipping
Galloping
Hopping
Sliding
Grapevine
Jumping/Jumping Jacks
Crab Walk/Bear Walk
Sit-Ups
Push-Ups

4- Walking

Walking
Crawling on hands and knees
Walking with arms in motion (4A)

3-Standing

Standing
Standing and stretching (3A)
Standing bouncing ball or throwing (3A)

2-Sitting

Sitting
Sitting stretching (2A)
Push up position but not actively engaged
Sit up position but not actively engaged

1- Lying Down

Lying down not attempting fitness task
Lying down and stretching (1A)

SOFIT TEACHER BEHAVIOR DEFINITIONS FOR THE PEER TUTOR STUDY

Promoting (P)-
Promoting active engagement by prompting, or encouraging fitness activity and/or providing feedback, examples:

Keep going!
Good job
Terrific!
That's it
WOW
A few more!
One more time!

Also non verbal such as:
High five/low five
Thumbs up
Hand claps
Smiles

Demonstrating (D)
Demonstrates how to do a fitness task or participates with students in fitness activity, examples:

Peer tutor says, "Watch me", then proceeds to demonstrate task. They may also say, "I'll show you", "Like this", etc.

Also if peer tutor is engaged in fitness activity alongside the deaf student...that is demonstrating.

Instructing (I)
Instruction is providing lectures, description, prompts, or corrective feedback to students related to physical education content other than the fitness activities. Examples:

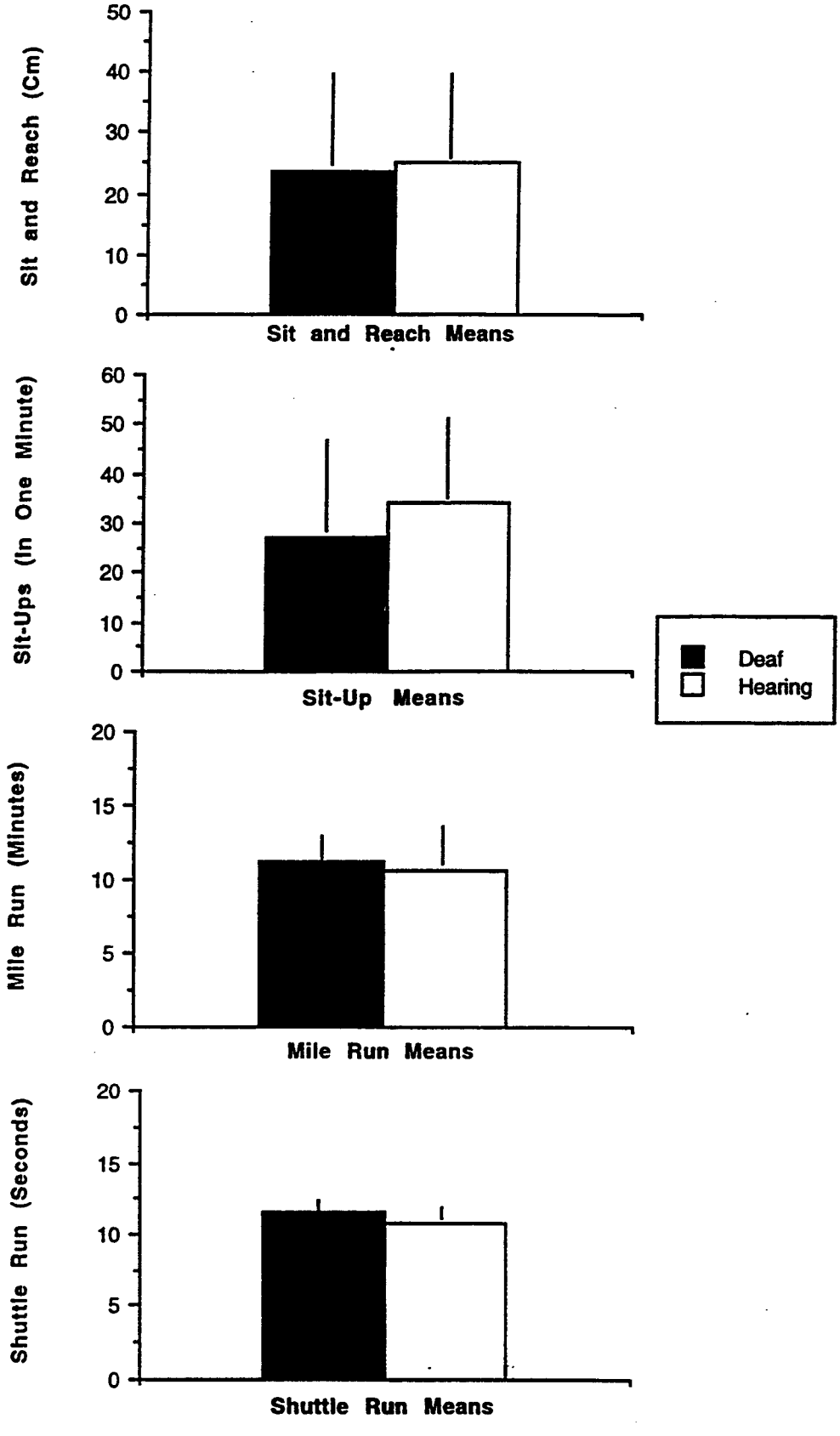
"Line up behind John"
"We are running around the cones"
"Next, 25 jumping jacks"
"Start now"
"Keep your hips off the ground for the crab walk"

Monitoring (M)
Monitors the individual, observing without giving any feedback.
The peer tutor monitors the deaf student.

Off Task (O)
Fooling around and being silly and not tutoring the deaf student at all.

Running to the other side of the gym when that is not the task.
Buddying up with another person other than the deaf student (unless groups of three or more)
Being timed out for bad behavior

Appendix H
(Fitness Scores for Hearing and Deaf Students)



Physical Fitness Pretest Results
for Deaf and Hearing