

THE EFFECTS OF THREE MOTIVATIONAL TECHNIQUES
UPON STUDENT PERFORMANCE ON A
SELECTED PHYSICAL FITNESS TASK

by

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Abstract

The intent of this study was to investigate the effects of three motivational techniques upon high school students' performance on a selected physical fitness test, the flexed arm hang. In addition, any interacting effects between the sex of the subject and the specific motivational technique were assessed. A random sample of 40 girls and 40 boys were assigned randomly to one of the following treatments: musical accompaniment, goal setting, verbal encouragement, and control. Each subject was tested individually on the flexed arm hang. The purpose of the test was to sustain the start position for as long a period of time as possible. Results of a two-factor analysis of variance indicated that there was no interaction at the .05 level of significance between the sex of the subject and the type of motivational technique used. Further, multiple t tests computed on all possible pairs of means indicated that the performance on the flexed arm hang was not significantly different for any one of the four treatments when compared to another treatment. Even though all null hypotheses were retained, there are numerous psychological and environmental factors that affect the performance of a physical task and influence how motivational techniques affect performance. Therefore the given techniques should not be discounted as significant motivators to increase the performance of a physical task.

CHAPTER I

INTRODUCTION

"To consider the subject of motivation is, in the end to ask ourselves the meaning of man, and why he does the things he does" (Fabrin, 1968, p. 3).

Motivation has been described as the heartbeat of any successful program, as the power that raises a man to any level he seeks, and as one of the most precious ingredients of any operation (Collins, 1980, and Hessel, 1980). One of the most widely accepted principles of human behavior is that people perform best when motivated (Fisher, A., 1967).

Motivation and physical performance are collateral terms. A discussion of athletic activity is incomplete without some reference to an individual's motivational disposition. Fisher (1976) stated, "Both ability and motivation are factors in performance, and if either of them is entirely lacking, the performance does not occur" (p. 222).

Motivation is an abstract concept which is exceedingly complicated and bewildering; it is not observed directly, but rather, is inferred from behavior. Motivational constructs, whether they are called drives, needs, or motives, are implicitly assumed to underlie the performance of motor skills, and can be considered the key to understanding behavior (Mouly, 1973, and Straub, 1978).

Statement of the Problem and Hypotheses

"Can physical performance be improved through motivational techniques?"

It is the intent of this study to investigate the effects of three motivational techniques, specifically, musical accompaniment, goal setting, and positive verbal encouragement, upon high school students' performance on a selected physical fitness test, the flexed arm hang.

In addition, any interacting effects between the sex of the subject and the specific motivational technique, were assessed.

Specifically the following hypotheses were tested:

1. On a selected physical fitness task, any motivational technique improves the performance of both male and female subjects, as compared to no motivational technique.
2. The effect of the motivational technique is dependent upon the sex of the subject.

Rationale for the Study

Rationale for the Problem and Hypotheses

The three motivational techniques investigated in this study, relative to their effectiveness in improving the performance of the flexed arm hang, were: musical accompaniment, goal setting, and verbal encouragement. The rationale for choosing these techniques and the associated task, is based on the author's observations and field experience as a physical education teacher and coach, as well as on empirical grounds.

It would be of benefit to a teacher to be aware of motivational techniques that will capture the student's interest immediately as he/she enters the class; techniques that could be applied to the class as a whole. Music is an example of a technique that can be applied to the class as a whole.

The research studies, detailed in the review of literature, lend support to the hypothesis that music improves the performance of a physical fitness task. Specifically relevant studies include those by Dillon (1952), Chipman (1967), Grocki (1968), Koschak (1975), and Anshel (1976).

Goal setting was chosen as a second motivational technique. This technique is based upon the concepts of several researchers in the field of motivation.

Cratty (1968) explains that by adolescence, the individual is aware of his ability on a variety of motor tasks, and that he is more interested in individual improvement rather than his ranking within a group. Therefore, self-improvement, which can be inspired by goal setting, is a strong motivational technique to improve performance of secondary students.

Mouly (1973) explains that there is a strong need for ego enhancement in adolescents, especially in middle class boys. Goal setting can be an effective motivational technique to improve performance as a means of attaining prestige and peer status, as well as feelings of adequacy and self-esteem, providing the goal is attained.

Oxendine (1968) suggests that setting a goal is especially appropriate and easy to establish in physical fitness tests.

Straub (1978) stated, "Probably the single most exciting technique for motivating athletes in recent years is that of shared responsibility and/or collaborative goal setting" (p. 59).

Detailed in the review of literature are the research studies that lend support to the hypothesis that goal setting improves the performance of a physical fitness task. Specifically relevant studies are those by Strong (1963), Locke and Bryan (1966), Wilmore (1968), Harvey (1970), Solinski (1970), Manness (1971), Botterill (1977), and Nelson, J.K. (1978).

Verbal encouragement was chosen as a third motivating technique for the following reasons. Firstly, the Manitoba Physical Fitness Performance Test Manual and Fitness Objectives offers administrative suggestions in conducting the flexed arm hang test, one of them being that it is essential that the subjects receive encouragement through verbal motivation. Secondly, Cratty (1968) stated, "The ability to raise and lower motivational levels of performers via verbal exhortation or verbal pacification is one of the most desired qualities in a coach or physical educator" (p. 78). Thirdly, as described in the review of literature, the following researchers lend support to the hypothesis that verbal encouragement improves the performance of a physical fitness task: Gerdes (1958), Nelson, J. (1962), and Hall and Cain (1965).

The flexed arm hang was chosen as the performance task to be tested for several reasons.

Cratty (1967) suggests that experimenters who have studied the effects of motivational techniques, such as goal setting, often use motor tasks because they produce exact performance scores. Cratty

also states that arousal is greatest during a task which requires an intense and sustained effort. The flexed arm hang demands an intense and sustained effort.

Kraus and Hirschland (1964) tested and compared American and European children aged 6 to 16 years on the fitness components of strength and flexibility. Their conclusions showed that over 50 percent of the American children failed the strength and flexibility tests, while less than 10 percent of the European children failed the tests. Kraus and Hirschland explained the high percentage of American children failing the tests due to the high degree of mechanization in our society, and lack of much physical activity due to mechanization. They urged that muscular tests be given at regular intervals and made a part of the student's complete school record. An implication of this suggestion is for physical education teachers to make use of muscular tests, such as the flexed arm hang, at regular intervals in the school year, to be used as a personal assessment of fitness.

A vital concern of physical educators is the physical fitness of their students, and the improvement of their performance capacities. Most events in athletics requires, above all else, the component of strength. It is believed that individuals who do not possess an adequate amount of muscular strength cannot learn and perform physical skills to an optimum level (McCloy, 1934). McCloy further states that arm strength is very important in the prediction of general motor ability. He believes that the development of strength in the upper body would improve the performance of any type of athletic event, and from the standpoint of promoting a more skillful performance, and

with it the greater interest and pleasure in participation, such development should be assured in school physical education.

The six criteria that Mathews (1973) suggests be used to evaluate a test in terms of its scientific worth are: reliability, objectivity, validity, norms, administrative feasibility, and educational application.

The flexed arm hang is a standardized test of physical fitness that is extensively used, and has long been accepted in the physical education profession. Standardized tests, which have prepared standard directions and provide norms, as in the flexed arm hang test, satisfy the criteria of objectivity and reliability (Knapp & Leonhard, 1968). The flexed arm hang test is simple enough to be administered with a minimum amount of equipment, and is practical both economically and time wise. Concerning the educational application, Mathews (1973) states that physical educators should include tests of strength and endurance as part of the student's evaluation. Mathews describes strength tests, such as the flexed arm hang, as being one of the most practical measures to evaluate the fitness of school-age children.

Hypothesis one states that on a selected physical fitness task, any motivational technique improves the performance of both male and female subjects, as compared to no motivational technique. The rationale for this hypothesis is based upon the following concepts.

Behavior, desirable or undesirable, does not just happen; it occurs in response to some form of stimulation and is directed toward attainment of a goal (Mouly, 1973). Motivation affects the individual through physiological changes, conscious sensations within the individual, and results in a more activated behavior, on the part of the individual, which can be easily observed and measured (Oxendine,

1968). Motivation is responsible for the persistence at any activity, the intensity and vigor of the performance relative to standards (Singer, 1976).

Hypothesis two states that the effect of the motivational technique is dependent upon the sex of the subject. The rationale for this hypothesis is based upon the following concepts.

Veroff, Wilcox, and Atkinson (1953) suggest that related learning experiences of males and females may be different enough so that the same cues in the environment may have differential motivating effects on the two sexes. These authors view adolescence as the time when the female role becomes more clearly defined as a noncompetitive role, and achievement is assigned almost exclusively to the male role.

Investigators have suggested that males and females differ in their need for stimulating achievement behavior (Straub, 1978). It has been argued that females work for love and approval, while males work for mastery. Females and males are equally accurate in assessing their abilities, but they tend to error in opposite directions; females tend to underestimate their competence and males tend to overestimate their competence.

Achievement stirring is particularly characteristic of the middle class way of life, especially among males, presumably because of the greater social expectations for boys to get ahead in our society (Phillips, 1958). Achievement is an avenue to self-respect for the males in our society (Mouly, 1973).

At the Canadian Psycho-Motor Learning and Sport Psychology Symposium (1975), researchers indicated that sport achievement is far

and away more important as a value among adolescent boys than achievement in other spheres of their life.

Lefcourt (1966) summarizes research showing that the need for achievement may be less useful for predicting female performance than it is for male performance. He recommends that more investigations concerned with achievement include sex as a variable.

It has been speculated that some females have a motive to avoid success (Beck, 1978). Some authors see this as equivalent to the fear of failure, or as a conflict between social stereotypes.

Beck (1978) states that laboratory research has shown females with a motive to avoid success do worse on a competitive, masculine, and/or difficult task, while females without this motive do better than their counterparts.

From personal observations the author believes that many girls view the flexed arm hang as a masculine and difficult task. Beck's (1978) interpretation of how this motive affects performance is that females with the motive to avoid success are in conflict about success in competitive situations, and their performance suffers; the females without the motive are challenged to do as best as they can, and do not have any ambivalence about doing so.

Detailed in the review of literature are the research studies by Strong (1963), Summer and Johnson (1979), and Walter and Marzoff (1951) that lend support to the hypothesis that the effect of the motivational technique is dependent upon the sex of the subject.

Significance of the Study

It is the intent that this investigation of knowledge and

research findings, concerning motivational techniques and the factors that influence motivational levels, will be of value to the physical educator, by helping him understand the relationship between motivation and performance, with the possibility of discovering a motivational technique which will result in a significantly improved behavioral performance.

The current widespread interest in physical fitness has focused attention to the relationship of motivation and performance. It is hoped that this study will answer some of the questions that the physical educator may have concerning the relationship between motivation and the optimal level of performance; such questions as:

1) "How do you get the student moving without literally building that 'proverbial fire' under him? and 2) "What needs to be said or done to encourage the student to put forth a maximum effort?"

It is a generally accepted fact that people learn what they want to learn, and that the motivated individual is essential for learning and effective performance.

A motivated condition is essential not only for learning, but also for effective performance in motor skills. For this reason, educators in general, and physical educators and coaches in particular, devote considerable effort towards motivating students. (Oxendine, 1968, p. 1972)

Tutko and Richards (1971) believe that the most important role played by the teacher is that of a motivator.

Daughtrey (1973) further states that, "underlying all effort to improve the quality of teaching is the element of motivation" (p. 253).

Inspiring children to use their potentialities for maximum

self-realization is obviously the most important task facing the teacher, for, in the final analysis, he is the key to motivation in the classroom. (Mouly, 1973, p. 344)

Any finding which indicates that a majority of students, in a large heterogeneous ability class, are likely to increase their output under a given stimulus should be of considerable interest to teachers.

While there seems to be little doubt that motivation is important in stimulating individuals to learn and perform, motivation is found, by teachers, to be a problem. Mouly (1973) stated, "In probably no area of pedagogical endeavor is the teacher so inadequate as in the area of motivation" (p. 337).

Roundy (1967) identified and rated the problems faced by teachers of boys physical education at the secondary level. The provision of effective and continuous motivation was rated as a major concern by 38 percent of the respondents.

Tu and Rothstein (1979) stated that a persistent problem in school physical education classes has been the identification and application of motivational techniques, which can be used to stimulate participation or improve performance.

A teacher will most certainly encounter students who do not exhibit any desire to perform, and it is in understanding and attempting to cope with such students that a knowledge of motivation will be useful (Ausubel & Robinson, 1969). A teacher cannot "make" a student be motivated, but he can arrange conditions that will increase the probability of motivation becoming stronger.

Carefully selected and conducted experiences can take an unmotivated student successfully through a learning segment and

cause him to become increasingly motivated for future learning.

(Russell, 1971, p. vii)

The task facing teachers is to find motivational techniques that will arouse the individual to achieve the task at hand. These techniques should be in the best interests of the individual's education, such as techniques that result in a positive attitude toward exercise and an increased desire to engage in physical activity. Teachers must also be aware that due to individual factors, such as various socioeconomic backgrounds, emotional reaction, expectations, etc., there are not any specific "hard fast" rules; there is no single best motivational technique for all students and tasks.

A further need for a study of this nature is suggested by the fact that the research which has already been done on the topic of motivation has produced much variability and discrepancy amongst investigators concerning the effectiveness of various motivational techniques.

While Strong's (1963) study of six motivating techniques, the majority of techniques involving some form of competition, concluded that motivation significantly increased performance on physical fitness tests, Reichenbach (1972)'s study did not conclude similar results. Reichenbach determined the relative influence of four motivation techniques, two of which involved a form of competition, on the performance of work on the bicycle ergometer. Reichenbach did not find any significant difference between the motivated groups and the control group, in terms of the accumulated work performed.

Zebas (1975) tested high school girls in their performance of

the standing broad jump, under the two motivational techniques of monetary reward and visual feedback through the use of a videotape recorder. She concluded that both her motivating techniques did not affect the distance jumped by the student executing the standing broad jump.

The research studies, explained under the review of literature, by Grocki (1968), Koschak (1975), and Anshel (1976), lend evidence to the suggestion that a musical accompaniment can be used as a motivational technique to improve the performance of a physical task. However, the investigations by Nelson, D. (1963), Coutt (1965), and McCormick (1972) do not support music as being an effective motivating technique to improve performance.

A person's motivation is generally believed to be a function of both extrinsic, and intrinsic incentives, that is, stimuli that act upon the individual to respond with the desired behavior. Extrinsic motivation comes from the expectation of rewards, either material in nature, or in the form of praise and admiration. Intrinsic motivation comes from drives, psychological and physiological processes, and from needs, such as the desire for achievement (Singer, 1976).

Traditionally, from an athletic viewpoint, motivation is often seen solely in extrinsic terms. Physical educators have always used awards to encourage and motivate individual improvement in skill development and physical fitness (Singer, 1980).

Singer (1976, 1980) expressed his viewpoint that excessive use and reliance on rewards can have severe consequences. He questions why people attempt to manipulate others externally, with little

regard to personal factors as the cognitive and affective processes.

Fisher, A. (1976) stated, "Unless extrinsic motivators are used sparingly and cautiously, they do more harm than good" (p. 245).

O'Leary and Drobman (1971) warn people that using rewards as a technique of reinforcement is a very complex undertaking and should only be used with caution.

Mouly (1973) stated, "A certain amount of the trouble teachers experience in motivating children stems from too exclusive a reliance on extrinsic incentives" (p. 346). Too many teachers attempt to force learning and performance through rewards that are related only artificially to the activity, instead of concentrating on making the task interesting, challenging, and/or providing for the satisfaction of student's needs, such as the need for achievement.

Straub (1978) expressed his viewpoint that the overuse of extrinsic incentives has become a serious problem, and that one's intrinsic motivation is being undermined by extrinsic motivation. Ridsdale's (1977) study on the effects of rewards upon intrinsic motivation and performance quality, lends credence to the contention that extrinsic incentives within the sports milieu may have negative effects upon the participant's intrinsic motivation.

While studies of verbal encouragement and motor skills reveal beneficial advantages in improving performance when praise is used, as discussed in this study under the review of literature, by researchers such as Gerdes (1958), Nelson, J. (1962), and Hall and Cain (1965), the investigations by Gerwitz and Baer (1958), Caskey (1968), and Radlinski (1975) do not support the use of verbal encouragement as an effective motivator to increase performance.

It is hoped that an investigation of this nature will make a contribution to the field of physical education, by updating the literature on relevant data, involving a physical fitness test which is very common to physical educators, and is recommended for use by the Manitoba Fitness Committee, the Canadian and American Association for Health, Physical Education and Recreation.

In reference to the topic of the need for achievement, general theory largely confines its empirical support to research with males, because of the scarcity, ambiguity, and inconclusiveness of empirical findings on female subjects (McClelland & Steele, 1973).

In the review of literature, on the Activation-Arousal Theory as described in Straub (1978), Oxendine closes with the comment, "We need much more field research in sport settings before refinement can be made in the use of techniques for promoting the desired aroused level of athletic participants" (p. 85).

Limitations of the Study

There are three limitations of this study. The first limitation concerns the physical fitness test. The validity of such a test is dependent upon securing an "all-out" effort by the participants. It is difficult to determine whether the individual is trying his best in any test. Secondly, there may have been experimental bias from the subjects. Knowing that they were part of a project might have affected their behavior. Further, some males may have been inhibited with a female experimenter who, for the majority of them, was not their teacher. Thirdly, although the author attempted to standardize

all instructions, there may have been experimenter bias if she interacted unknowingly differently with various students.

Delimitations

The delimitations pertain to the sample, task, and independent variables investigated in this study, and the reliability of the flexed arm hang test. Firstly, the data were obtained from a random sample of 40 girls and 40 boys, who were enrolled in the 1980 to 1981 second semester physical education classes at Sturgeon Creek Regional Secondary School. Therefore, inferences and conclusions from this study are only generalizable to the corresponding population. In addition, the data obtained are specific to the flexed arm hang, and cannot be considered representative of all motor tasks. Further, the interpretation of results regarding the effects of motivation is limited to the specific motivational techniques investigated. Finally, the music selected as one of the motivational techniques is specific to the "popularity" of the age range of the students composing the sample.

The reliability of a test is the degree of consistency of results upon repeated application of the test (Meyers & Blesh, 1962). While the flexed arm hang is a standardized test of physical fitness that is extensively used, and has long been accepted in the physical education profession (LaPage, 1981), Feldt and McKee (1958) question the estimation and interpretation of reliability of physical education skill tests. Reliability is derived from three scores. Firstly, the obtained score is the numerical value which actually arises when the

subject takes the test. Secondly, the true score is the mean of a hypothetical infinite series of measurements on that subject, each measurement being independent of the others and all taken under the same conditions. The error score is the difference between the obtained score and true score, which is a function of many internal and external factors. To obtain a true score, an infinite number of trials should be taken and the scores averaged. However, because the flexed arm hang requires an intense and sustained effort by the individual performing the task, more than one trial at a given testing session would introduce a fatigue factor, that would negatively effect the outcome of results. Therefore the author of this study used only one trial score, as did Solinski (1970) and Manness (1971), but accepts this procedure as a delimitation in the interpretation of her results.

Definition of Terms

Motivation

The determinants of human behavior, whether they are called drives, needs, or motives, are generally encompassed under the heading of motivation. Singer (1980) describes motivation as a state of need or a desire to learn or achieve. Mouly (1973) describes motivation as a state in which the organism's energies are mobilized selectively toward the attainment of a given goal. Daughtrey (1973) defines motivation as, "that within the individual which incites him to action; any idea, need, emotion, or organic state that prompts him to an action" (p. 241).

Motivation, defined in a scientific sense, is a measure of direction and intensity of expenditure of animal energy (Fabrin, 1968).

Motivation comprises three aspects of behavior, called the activating, directing, and sustaining aspects. The activating function is described by words such as arousal, stress, and tension. The directing and sustaining functions are described by words such as drive, need, incentive, and motive. Drives, defined as a state of disequilibrium or physiological tension, cause an individual to behave in a particular manner to satisfy an organic need. A need is a state of deficiency or excess. Incentives are stimuli that act upon the individual to respond with the desired behavior. Motives are factors or conditions that arouse and direct the organism toward certain stimuli, and attempt to explain the intensity with which the individual engages in something and/or the effort sustained in some activities; motives influence performance of a task. The motive is terminated by reaching a goal or obtaining a reward (Murray, 1964). Drives initiate the action to satisfy needs, but incentives and motives determine the specific behavior that results (Fisher, A., 1976, and Mouly, 1973). As an example, one of the primary motives in performance of a motor skill is the desire for mastery of that physical task to satisfy a basic achievement need (Cratty, 1968).

The two sources of motivation are extrinsic and intrinsic in nature. Extrinsic motivation stems from the expectation of rewards, either of the material kind, or in the form of praise. It places value on factors secondary to the focal learning or the performance itself. Intrinsic motivation stems from the drives, psychological

and physiological processes, and the needs such as the need for achievement and personal competence (Knapp & Leonhard, 1968, and Singer, 1976).

Incentives

Incentives are objects or conditions that have the possibilities for satisfying the individual's needs, and therefore can become the goals toward which behavior is directed. The effectiveness of incentives in orienting behavior is a function of the expectations they hold for the individual from the standpoint of his needs. Extrinsic and intrinsic applies to the relationship between the task and the goal (Mouly, 1973).

Extrinsic Incentive

Extrinsic incentives are arbitrary reinforcers acting from outside the individual, that are not related directly to the behaviors which produce them. Examples include money, praise, or the avoidance of punishment and blame. A given response is learned or performed "in-order to" receive the reward. The activity is performed as a means to an end (Fisher, A., 1976; Murray, 1964; Young, 1961).

Intrinsic Incentive

Intrinsic incentives are cues inherent in the learning process itself, that are directly related to the behavior that produced them. Intrinsic factors are mediated by the individual himself, who derives satisfaction from the activity itself. The activity is an end in itself, as opposed to means to an end (Sloane & Jackson, 1974, and

Straub, 1978).

Aspiration

Aspiration is a feeling one has concerning his potential for performance; it is a person's expectations, goals, or claims on his own future achievement (Cratty, 1967, 1968). One's aspiration level is the level of future performance in a familiar task, which an individual, knowing his past performance at that task, explicitly undertakes to reach (Grocki, 1968).

CHAPTER II

REVIEW OF RELATED LITERATURE

The development of the hypotheses tested in this study resulted from the review of literature in the different but related areas of physical education, psychology, and sociology.

It has been known for a number of years that the "so called" maximum strength and endurance of an individual can be altered by changing the physical and/or psychological environment in which the individual performs (Wilmore, 1968). Wilmore suggests that motivation breaks down the individual's psychological barriers, thus allowing the individual to surpass any level previously designated as his physical capacity.

The review of literature is divided into six subsections. The logical and empirical data relative to musical accompaniment, goal setting, and verbal encouragement being used as motivational techniques, is discussed under each respective heading. The fourth subsection discusses the three theories of motivation, that is, the Hull-Spence Theory, the Attribution Theory, and the Activation-Arousal Theory. The fifth subsection discusses the need for achievement, and its related topic of aspiration level. The final subsection discusses the variability among the sex of the subject.

Musical Accompaniment

The purpose of this subsection is to identify relevant logical and empirical data relating to music being used as a motivational technique.

The use of music has become very popular in the field of physical education (Oxendine, 1968). Music is often played while teams are warming up for an athletic contest.

It is logical to assume that certain types of music, especially with a stirring beat, may result in a measurable increase in excitability, and therefore, stimulate an individual to produce a greater effort during a performance task. Oxendine (1968) stated, "It is clear that emotional excitement has a profound effect on an individual's performance, but the exact nature or extent of its effect has not been determined" (p. 183).

Dillon (1952) concluded that swimmers who were taught with a musical accompaniment improved more in their swimming speed than the control group.

Chipman (1967) studied the effects of music on the number of sit-ups done by children aged 12 to 13 years. He found that those children performing with a quick tempo type of music, had significantly higher scores in the initial test, and higher improvement scores in the subsequent test, than the control group.

Grocki (1968), in his study of ninth and tenth grade boys, performing various exercises over a six day testing period, concluded that music enhanced the boys' physical performance.

Kochak (1975) found in her study on college women, that a musical accompaniment significantly improved the number of pushups done in a

two trial test of four selected exercises.

Anshel (1976) studied the effects of music on 32 graduate students, on the ability to perform the physical endurance task of riding a bicycle ergometer. He concluded that the mere presence of music promoted endurance of this physical task.

Franklin (1978) suggested that music be used by the exercise leader or fitness program coordinator, to stimulate interest and enthusiasm among participants.

Strobel and Bird (1978) observed a school in Scarborough, Ontario that used music during physical workouts, and concluded that music was an effective motivator in increasing work output.

While these previous studies support the possibility that music can be used as an effective motivator to increase physical performance, the following three studies concluded that music did not have any effect on the performance of individuals riding a bicycle ergometer.

Nelson (1963) studied the effects of varied musical accompaniments on 16 subjects riding the bicycle ergometer for 90 seconds. He concluded that music did not have any favourable or unfavourable effects on the endurance performance of the bicycle ergometer.

Coutt (1965) studied the pulse rates of 15 subjects, and their bicycle ergometer riding times, under three conditions of fast music, slow music, and without music. The analysis of variance did not show any significant difference among the effects of the three conditions for riding speed.

McCormick (1972) studied 26 college women riding a bicycle ergometer for as fast as they could for 10 minutes, under five

different musical environments. She did not find any significant difference among the groups in distance travelled, as compared to the control group.

Goal Setting

The purpose of this subsection is to identify relevant logical and empirical data relating to goal setting, or level of aspiration, being used as a motivational technique.

Frank (1935) defined level of aspiration as, "the level of future performance in a familiar task which an individual, knowing his level of past performance in that task, explicitly undertakes to reach" (p. 119). Aspiration level is an individual's expected or projected goal relative to his future performance (Cratty, 1967). It is part of the goal-directed aspect of intrinsic motivation that refers to the expectancy and pursuit of a "hoped-for" condition (Fisher, A., 1976).

Oxendine (1968) suggests that goal setting is one of the strongest motivators that can increase performance, while Strong (1963) suggests it is a motivational technique that is basic to all forms of motivation.

Kolb, Winter, and Berlew (1968) hypothesized that, Commitment to a goal lends to changes in behavior because this commitment a) increases motivation to change by emphasizing in consciousness the discrepancy between current behavior and ideal behavior and b) increases the probability that the behavior rather than the goal will be changed since conscious commitment to a goal reinforces the value and stability of that goal

(p. 457).

There are a number of research studies that support the use of goal setting as an effective motivational technique increasing performance.

Anderson and Brandt (1939) tested a total of 77 grade 5 students on the Woodworth-Wells Cancellation Test, comparing a control group to an experimental group that used goal setting as a motivational technique. The test was administered twice a week for three consecutive weeks. During the first trial both groups received the same control technique; during the following trials the control group received the control technique, while the experimental group received the motivational technique. The results showed that on the initial trial both groups were fairly equated on their test scores. However, on trials 3, 4, 5 and 6 the experimental group showed a mean score significantly superior to both their own first trial and to all the trials of the control group.

Tomekovic (1962) investigated the work of lathe-operators in three factories. First, testing his hypothesis with schoolage children, then with the factory workers, he concluded that performance goals set by the workers and supervisor acted as a significant motivating technique to increase their work output, as compared to being told what to do by their supervisor.

Strong (1963) tested 434 grade 6 girls and boys to determine the effects of six motivational conditions on seven physical fitness tests. Motivation was found to be a significant factor in increasing the performance scores of the fitness tests, with the goal setting and team competition techniques being the strongest motivational

conditions in improving performance.

Locke and Bryan (1966) tested the principle that performance goals influence one's level of performance. They studied male university students on a complex psychomotor task. One group was given a specific goal, and the other group was told to do their best. The group given the goal measured a greater intensity of effort per unit of time on the task than the other group.

A further study by Bryan and Locke (1967) suggested that goals can be used to motivate individuals, who are not highly internally motivated to perform a task, or who must perform a task that to them is dull and uninteresting, for example, as in a test situation. The subjects were 10 male and 10 female university students, who were grouped according to their personality characteristic as being a "high" motivation person or a "low" motivation person. The "high" motivation group was told to do their best, while the "low" motivation group was given a specific goal to attain, on an arithmetic task. Towards the completion of the second retest, the "low" motivation group had improved, to the level of the "high" motivation group, both in terms of performance and favourable attitudes towards the task.

Wilmore (1968) tested 22 college males on their work capacity on the bicycle ergometer. Each subject was motivated through a competitive situation, of having each person set his own goal competing against his past performance, and simultaneously paired against a partner, the two being matched by their past performance. The results showed that the mean work output and riding time for the motivated group was significantly greater than the control group's work output and riding time.

Harvey (1970) investigated the effects of four motivational techniques upon children's performance on selected sport skills. His conclusions included that setting a goal was effective in improving the performance of students in grades four and five on three sport skills.

Solinski (1970) tested the effects of orally setting a goal on 12 male varsity athletes performing the flexed arm hang. His results showed that at the .05 level of significance, the experimental group, that orally stated a goal, significantly increased their mean improvement score from the initial test to the retest, while the control group did not show a significant mean improvement score.

Manness (1971) studied the effects of setting a private goal and a public goal, on 45 male physical education undergraduate students at the University of Manitoba, performing the flexed arm hang. A correlated t test of the differences between the pre- and post-test mean scores for the control, private, and public groups, showed that all three groups improved significantly at the .01 level of confidence with t scores of 3.83, 4.81, and 5.26 respectively. An uncorrelated t test, used to find whether or not there was a significant difference in improvement scores between the three groups, showed that setting a goal significantly improved performance in the flexed arm hang. The t scores of 2.42, at the .05 confidence level, and 2.06, at the .01 confidence level, between the control and private, and the control and public groups respectively, supported Manness' hypothesis that setting a level of aspiration improves performance. With a t score of .19, there was no significant difference between the mean improvement scores of the private and public groups,

although the tendency seemed to be that the private goal group improved to a slightly greater degree than did the public goal group.

Botterill (1977) tested the effects of different goal setting procedures on 75 boys, aged 11 to 14 years, on a hand grip endurance task. He concluded that simple goal setting more than doubled the endurance performance of the hand grip task.

Nelson, J.K. (1978) tested 100 college men for maximal elbow flexion strength prior to an endurance exercise bout. Three motivational techniques, including stating the same goal for all subjects, were compared to the method of not using any motivational technique. The results showed that all treatment groups surpassed the control group, and Nelson concluded that endurance was highly influenced by motivation.

Tu's (1979) study on individuals participating in a jogging program showed that the individuals performed better and improved more quickly when they set their own performance goals, as compared to the teacher setting the goals.

Based upon the aforementioned research, goal setting has been shown to be an effective motivational technique increasing performance.

Verbal Encouragement

The purpose of this subsection is to identify relevant logical and empirical data relating to verbal encouragement being used as a motivational technique.

Praise, which can be either in the form of the spoken word, written comment, or even a smile or physical gesture, generally acts

as a facilitator to performance (Fisher, A., 1976). Motivation can be fostered by cheering and encouragement; both seem to abet performance. Research indicates that when this motivational technique is used, the individual can heighten his performance, especially in endurance type tasks (Oberteuffer & Ulrich, 1962). Oberteuffer and Ulrich speculate that the cheering and encouragement may act to release inhibitory mechanisms which limit one's power, strength, and endurance.

Gates and Rissland (1923) suggested,
Nothing contributes more to a satisfactory rapport than praise of the child's efforts. Under no circumstances should the examiner permit himself to show displeasure at a response, however absurd it may be. Exclamations like find, splendid, etc. should be used lavishly (p. 21).

Praise, encouragement, and recognition are used extensively in the behavior modification approach to learning and performance.

The single most important procedure a physical education teacher could learn from the behavior modification approach is how to best use verbal praise as social reinforcement. (Presbie and Brown, 1980, p. 2)

Numerous studies, about the effectiveness of verbal encouragement, have demonstrated that this motivational technique generally facilitated performance of a task.

Gerdes (1958) studied the effects of verbal encouragement, team competition, previous scores, and retesting, on four tasks of speed, strength, and accuracy in sport skills. He concluded that all motivational techniques improved performance on the tasks, especially

in strength. While there was not one technique significantly most effective in improving performance, Gerdes stated that verbal encouragement was especially helpful.

Page (1958) researched the effects of personalized compliments on a written test, as a form of praise, on over 2000 senior high students. The results showed that on the post-test, students that received personalized praise on the pre-test achieved higher scores than the "no praise" group, and the "praise" group. The "praise" group achieved higher scores than the "no praise" group.

Dinoff (1960) studied the influence of verbal encouragement on the frequency of particular classes of Rorschach variables. He concluded that what the examiner says in a testing situation affects the subjects' performance, as the experimental groups received higher scores than the control group. The subjects, when asked, reported that they were not aware that the experimenter was attempting to influence their performance.

Magnusson (1960) found that verbal reinforcement yielded more positive results by 33 males on the Rorschach Test, than not any reinforcement situation.

Nelson, J. (1962) studied the effects of 10 different motivational techniques, varied from verbal encouragement to competitive situations, on college men exercising to exhaustion on an elbow-flexion ergograph. He concluded that all motivational techniques improved performance on the task.

Hall and Cain (1965) found that verbal encouragement by the experimenter increased the number of situps done by grades seven and eight boys.

Anderson, Manoogian, and Reznick (1976) compared the effects of money, a "good player" award, and verbal praise, as motivational techniques on a drawing activity done by preschool children. Both the money and the award produced a pretest-to-posttest decrement in the amount of time spent on doing the activity; verbal praise increased the time spent on doing the activity.

While these previous studies support the possibility that verbal encouragement can be used as an effective motivator to increase performance of a task, researchers warn us about the use of praise. Cratty (1968) suggests that a teacher who continually praises is often looked upon as insensitive by his students, and as a person who does not really perceive the reality of the situation, or the real quality or lack of it as evidenced by the performers. Oxendine (1968) suggests that too frequent praise is a disadvantage, because the individual develops a dependence upon extrinsic rather than intrinsic motivation, and thereby develops false values (interest in the reward instead of the activity itself). Mouly (1973) suggested that, "Incentives such as praise tend to be objectionable in that they imply that there must be an external paymaster sitting in judgement over his workers" (p. 347). Volez (1976) commented, "Let it be understood that the basis of motivation does not lie in gimmicks or pep talks, in bulletin boards or inspirational messages" (p. 1). Straub (1978) cautions people that too much praise, especially if it is scarcely deserved, may decrease the individual's efforts, and produce little concern for improvement.

The following three studies concluded that verbal encouragement did not increase the performance of a task.

Gerwitz and Baer (1958) experimented with three groups of children on a simple motor skill game. Group one was isolated for 20 minutes before starting the game. Group two went directly to the experiment. Group three was "satiated" while proceeding to the experiment, with approving verbal comments by the experimenter. All groups were praised during the game practice session. The results were: group one was superior in acquiring and performing the skill, and group three did the poorest.

Caskey (1968) studied the effects of verbal and visual motivation on children in grades 1 through 3, on the performance of the standing long jump. Caskey concluded that the visual motivation positively affected performance above and beyond the verbal motivation.

Radlinski (1975) found in her study on college women that positive verbal motivation did not produce any significant difference in the performance of the flexed arm hang.

Theories of Motivation

While, universally it is agreed that motivation affects performance, experimental studies of performance variables are concerned with the two dimensions of motivation, that is, the choice, direction, or selection of a task, and the intensity level, persistence and vigor with which one performs the task (Hilgard, 1956, and Straub, 1978). It is the latter arousal dimension, also termed stress, tension, drive, and/or activation, that has a tremendous influence on performance (Screven, 1959).

The theories connected with arousal and behavior, specifically in motor performance, include the Hull-Spence Drive Theory, the

Attribution Theory, and the Activation-Arousal Theory (Thomas & Halliwell, 1976).

The Hull-Spence Drive Theory suggests a linear relationship between activation and performance, that is, the higher the arousal, the better the performance, and the lower the arousal, the poorer the performance (Thomas & Halliwell, 1976)(see Figure 1).

The Attribution Theory is a more cognitive and less mechanistic view, than the Hull-Spence or Activation-Arousal Theories, in explaining arousal and performance (Thomas & Halliwell, 1976). People perceive four major causes of success and failure. These are: ability, effort, task difficulty, and luck. These variables are arranged in a two by two table in which one dimension is locus of control, and the other dimension is stability (see Table 1).

A person's success or failure may be under his control (internal), and either variant, that is changeable (effort) or invariant (ability); or a person's success or failure may not be under his control (external), and either variable (luck) or invariant (task difficulty).

Singer (1976) explains that one who sees the locus of control as outside of himself, dependent on task difficulty or luck, will behave differently than one who feels there is an internal locus of control based on skill or effort.

Rotter's (1967) theory of locus of control suggests that individuals who are categorized as "internals" believe that rewards or other reinforcements result because of their behavior or attributes. "Internals" believe in the relationship of behavior and rewards, and feel they have some control over their environment. They behave in a manner to create feelings of competence and self-

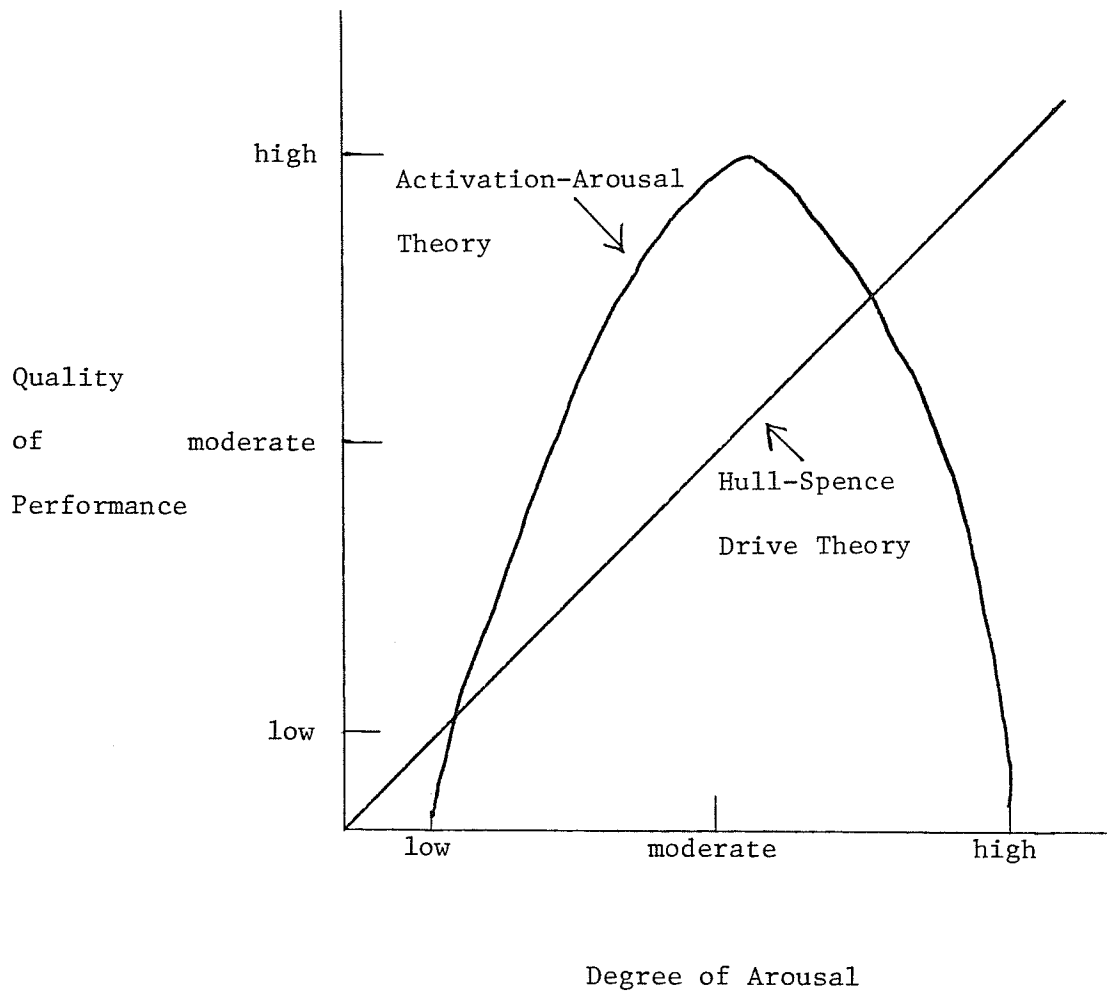


Figure 1. The Hull-Spence Drive Theory and the Activation-Arousal Theory of the activation-performance relationship. (From Sport Competition Anxiety Test by Rainer Martens, 1977, 119.)

Table 1

Attribution Theory:

Four Major Causes of Success and Failure

Locus of Control			
Stability	Stable	Internal ability	External task difficulty
	Unstable	effort	luck

Note. From "Affective Behavior in Children's Athletics" by
 Jerry R. Thomas and Wayne Halliwell, ERIC Document Reproduction
Service No. ED 127322, 1976, 7.

determination. "Externals" believe that rewards are determined primarily by luck or fate, and do not feel they have control over their environment. According to Rotter, a self-perceived internal locus of control, whereby performance is attributed to ability and effort, is necessary for intrinsic motivation. An external locus of control, whereby performance is attributed to luck and task difficulty, is associated with extrinsic motivation (Singer, 1976).

The "Overjustification" Hypothesis is closely related to the Attribution Theory of arousal and behavior. This hypothesis states that a person's intrinsic motivation to participate in an activity may be undermined by inducing him to engage in that activity for an extrinsic goal or reward. Thomas and Halliwell (1976) believe that the "overjustification" hypothesis may have implications for physical education programs. It is possible that through the grading system, rewards, and, for example, the Canada Fitness badges, in our school physical education programs, we are decreasing one's intrinsic motivation and strengthening the need for external rewards.

Singer (1980) states that performing for a reward is not as personally desirable as motivation to perform for competence, achievement, fulfillment, and satisfaction. Csikszentmihalyi (1975) believes performance will improve, without directing attention to it, when one focuses on the exploration and enjoyment of the skill; when the attention is directed to external awards, performance is directed away from the skill and toward the reward.

Straub (1978) explains how the receipt of extrinsic rewards affects a person's intrinsic motivation by one of two processes. The first process is the change in the perceived locus of control, from

an internal to an external control. Rotter (1967) believes this change in perceived locus of control will diminish intrinsic motivation. The second process involves the change in one's feelings of competence and self-determination with the receipt of extrinsic rewards. Rewards may decrease intrinsic motivation if they diminish one's feelings of competence and self-determination. Since most rewards in athletic performances are contingent upon superior performance, it would seem reasonable to assume that receiving an award should increase an individual's intrinsic motivation, because the award provides him with the information about his personal competence in a given task. However, if the controlling aspect of these rewards is more salient than the information dimension, then the individual perceives his involvement as controlled by the pursuit of an award. Straub (1978) also suggests that competition can decrease intrinsic motivation by the same two processes. Firstly, if the individual performs, not in an attempt to better himself, but to earn the award of a win, his locus of control is of an external rather than internal nature. Secondly, because competition is a source of feedback from the environment, if the individual experiences constant failure, his feelings of personal competence will decrease, which may cause a loss of intrinsic motivation.

Further logical and empirical literature concerning the "over-justification" hypothesis was discussed under rationale for the study.

The Activation-Arousal Theory suggests a curvilinear or inverted U relationship between activation and performance. As the individual's arousal level increases from a state of deep sleep to high excitement, there is a progressive increase in performance

efficiency, but only up to a certain or balanced point, after which an increase in arousal decreases performance (Duffy, 1962; Straub, 1978; Thomas & Halliwell, 1976). There is an optimal level of arousal within each individual, and within each specific task (see Figure 1).

Stennett (1957) tested the hypothesis that an inverted U relationship exists between the level of arousal and the level of performance, by studying 31 male university students on an auditory tracking task, under four different incentive conditions. These conditions ranged from one in which the subjects were under the impression their scores were not recorded, to one condition in which their scores determined whether or not they avoided a 100 to 150 volt shock and earned bonus money. A counter balance technique in the presentation of experimental conditions was used. Stennett concluded that his data strongly supported the hypothesis that an inverted U relationship exists between level of arousal and level of performance.

However, there are not any simple generalizations that can be made regarding the inverted U theory. While this theory does appear to be favoured over the Hull-Spence Drive Theory and the Attribution Theory, the problem with the inverted U hypothesis is the inability to measure precise points along the arousal continuum (Martens, 1977). The factors mediating the relationship between arousal and performance include the difficulty or complexity of the task, and the individual differences in susceptibility to arousal (Straub, 1978). Oxendine (1968) views this as a problem, for the teacher, using the inverted U theory, of knowing whether a task is complex or simple, or whether an individual's arousal is at a high or low level.

The Yerkes-Dodson Law as explained by Fisher (1976), is used as a point of reference for the optimal arousal levels of tasks. According to this Law, complex tasks are performed better when one's arousal is at a low level, while simple tasks are performed better when one's arousal is at a high level. Table 2 includes a summary of suggestions, based on research and opinions, regarding the optimal arousal level of the "typical" participant in a variety of sport activities (Fisher, A., 1976).

Oxendine (1968) suggests the following guidelines one may consider as to the optimal level of arousal for a specific task:

1. A high level of arousal is essential for optimal performance in gross motor activities involving strength, endurance and speed.
2. A high level of arousal interferes with the performance of complex skills, fine muscle movements, coordination, steadiness, and general concentration.
3. A slightly above-average level of arousal is preferable to a normal or subnormal arousal state for all motor tasks.

Understanding the optimal level of arousal for each activity is only part of the information needed to make effective use of arousal and performance. Also required is the means of determining individual arousal levels at a particular time, and the ability to alter these levels.

One's anxiety is a factor that can interfere with performance (Fisher, A., 1976). The personality disposition of trait anxiety is an important factor determining the responsiveness of a person to an arousal-eliciting stimuli (Martens, 1977). Martens defines trait anxiety as the predisposition to perceive environmental stimuli as

Table 2

Optimal Arousal Level For A Variety of Sports Skills

Level of Arousal	Sports Skills
5 (extremely excited)	football blocking and tackling, running (200, 400 metres), sit-ups, push-ups, flexed arm hang test, weight lifting.
4	running very short and long races, shot put, swimming races, wrestling, judo.
3	basketball skills, boxing, high jump, most gymnastic skills, soccer skills.
2	baseball pitchers and batters, fencing, tennis.
1 (slight arousal)	archery, bowling, golf putting.
0 (normal state)	

Note. From Psychology of Sport Issues and Insights by A. Craig Fisher, 1976, 131.

threatening or nonthreatening, and to respond to these stimuli with varying levels of state anxiety. State anxiety is the existing emotional state characterized by feelings of tension, and associated with the activation of the individual. In general, high trait anxiety people tend to do more poorly than people who are low in trait anxiety under conditions that involve failure or a negative evaluation of performance.

Phillips (1962) suggests highly anxious individuals perform better under neutral conditions, while less anxious individuals perform better under ego involving conditions. Phillips' research supports previous findings that the female test anxiety scores are higher than the male test anxiety scores. McClelland and associates (1953), as well as Phillips (1962), suggest possible explanations for this anxiety data. McClelland (1953) explains that females may be more anxious than males in a testing or achievement-oriented situation, because for females there are negative consequences, and hence anxiety, associated with success. The implication of success in competitive achievement situations suggests aggressiveness, while the essence of femininity lies in repressing aggressiveness. This theory, referred to as the motive to avoid success, is discussed in greater detail under achievement motivation. Phillips (1962) suggests that an expression of anxiety is incongruous to the male's conception of himself, which causes him to be more defensive about admitting anxiety.

Another individual factor affecting arousal and performance is one's visual field (Straub, 1978). Vision in the peripheral field is quite variable among different people, and can vary over time

within the same individual. A "too high" arousal level can narrow one's visual field so that the individual is less able to respond to peripheral or secondary stimuli, often causing an increase in error rate. Females have better peripheral vision than males, but females are more susceptible to anxiety, and evidence greater visual narrowing in activities involving high risk. Peripheral discrimination is highly modifiable through prior experience of the individual in a specific task. Straub (1978) suggests the following guidelines one may consider as to how an individual's visual field affects arousal and performance:

1. A relatively narrow focus is needed in all-out endurance, speed and strength tasks where accuracy is not of prime concern.
2. The range of essential task cues is narrower for simple than complex tasks.
3. Skills demanding a narrower attentional focus can tolerate higher levels of arousal since there are fewer task cues, and therefore less a chance of task-relevant cues being eliminated through the perceptual narrowing process.

The Need for Achievement

The strength of motivation to achieve, as manifested in the performance of an act, is assumed to be the multiplicative function of the following: 1) the strength of the motive, 2) the expectancy, that is, the subjective probability that the act will have as a consequence the attainment of an incentive, as aroused by situational cues, and 3) the value of the incentive (Atkinson, 1957).

The motive, called the need for achievement, can be defined as,



"a desire or tendency to overcome obstacles, to exercise power, to strive to do something difficult as well as quickly as possible" (Beck, 1978, p. 317). Straub (1978) defined the achievement need as, "the desire to excel one's self; to increase self-regard by the successful exercise talent" (p. 112). Atkinson (1957) views the achievement need in terms of the capacity for taking pride in what one accomplishes. McClelland (1953) defined the achievement need as, "the positive or negative effect aroused in situations that involve competition with a standard of excellence, where performance can be evaluated as successful or unsuccessful" (p. 112). Cratty (1968) states that one of the primary motivating factors of anyone performing a motor skill is the desire for mastery of that task to satisfy their basic need for achievement. Duffy (1962) states that one's need for achievement not only affects performance, but influences how a motivational technique will affect the individual to perform.

Aspiration level is a concept closely aligned to the personality trait of the need for achievement (Cratty, 1967). One's aspiration level affects the degree to which motivational technique can arouse the need for achievement, which in turn affects the performance of any given task (Atkinson, 1958). Anderson and Brandt (1939) defined level of aspiration as, "a person's expectations, goals, or claims on his future achievement in a given task" (p. 221). They further explain that the experience of a performance, as a success or failure, does not depend solely on its objective goodness, but on whether the level of aspiration appears to be attained or not attained.

Frank (1935) defined level of aspiration as, "the level of future

performance in a familiar task which an individual, knowing his level of past performance in that task, explicitly undertakes to achieve" (p. 119). Frank further explains that the level of past performance means the "goodness" of the individual's past performance as he knows it. The relation of the level of aspiration to the level of past performance primarily depends upon the relative strength of the following three needs: 1) the need to keep one's level of aspiration as high as possible regardless of one's level of performance, 2) the need to make one's level of aspiration approximately even with one's future performance as closely as possible, and 3) the need to avoid failure, where failure is a level of performance below the level of aspiration regardless of its absolute "goodness".

Frank (1941) summarized his research on the studies of aspiration as follows:

1. The individual's evaluation of himself is a major factor affecting the results of motivation.
2. The level of aspiration situation is usually a threat to one's self-esteem, in that the individual exhibits his ability before someone else (the experimenter), and openly commits himself to his expectations of future achievement.
3. Task difficulty is important in setting the level of aspiration.

Cratty (1967, 1968) and Oxendine (1968) describe seven variables that influence one's level of aspiration.

The first variable, past experience in a specific task, influences aspiration level by providing an anchoring point upon which to base an estimate of the subsequent performance. Usually a

background of success raises aspiration levels, while a background of failure usually lowers aspiration levels.

The second variable, is the unique characteristics of the task. Performance on some tasks are enhanced by high arousal states, while some tasks are enhanced by low arousal states, as shown in Table 2. Tasks which have a known proficiency limit, such as the bullseye in an archery target, produce a greater feeling of failure and stress when projected goals are not achieved, than performing tasks whose norms may not be known. Oxendine (1968) indicates that a high or low level of aspiration is not a general personality characteristic which is the same for all tasks. It is specific to a particular task and varies with the prior successes and/or failures.

The third variable is the individual's status of his performance in relation to his own and/or to other's status. When performing motor skills, an individual invariably compares his performance score against norms he perceives are typical of individuals similar to him in age, sex, and experience (Gruen, 1945).

The fourth variable is the cultural and social forces. Cratty (1967, 1968) states that the projected performance in motor tasks is usually found to be overestimated because of the cultural expectations relative to physical activity. Individuals from higher socioeconomic backgrounds are less likely to fluctuate in their estimations of projected performance than lower socioeconomic groups. Gould (1941) found in her study on goal setting that the undergraduate students who had the lowest discrepancy scores, between their last performance and the estimated future performance of the "task at hand", were in a better economical and social position than

those students who had the higher discrepancy scores. Women, believed to have less pressure placed upon them in our society to get ahead, find goalsetting situations less stressful than men; men are less stable than women in their self-estimations of performance.

Festinger's (1957) theory of cognitive dissonance suggests that a public, as opposed to a private, declaration of a goal could substantially influence performance. Once the intention to perform at a given level is identified publicly it is more likely one will follow up with the appropriate performance to maintain cognitive consistency and avoid feelings of dissonance. Brehn and Cohen (1962) also suggest that goals should be professed in public; this pronounced commitment leads to a higher motive to achieve at a given task. Individuals realize failure will threaten self-esteem, and therefore they are likely to increase performance.

However, Gould (1941) found in her study that there was not any evidence that a person's verbal estimation of a goal statistically improved performance over a non-verbal estimate. Manness (1971) also found in his study that there was not any significant difference between the mean improvement scores of the group setting a public level of aspiration as compared to the group setting the private level of aspiration.

The fifth variable is the personality traits of the individual. Those individuals secure and relatively well-adjusted socially, and who possess stable concepts of their performance potential, are less affected by momentary success or failure when estimating their ability in future tasks. A highly anxious individual is more disturbed by stressful situations. People with high aspiration levels usually

perform better than people with low aspiration levels.

Strickland and Jenkins (1964) tested 40 male college students, who were grouped according to the personality variable of a high or low need for approval, on a motor readiness task. The two motivating conditions were positive verbal approval and negative verbal comments. The results showed that regardless of the motivating condition used, the high need for approval students demonstrated a significantly higher rate of performance than did the low need for approval students.

Botterill (1977) found in his study of the effects of goal setting on the performance of an endurance task, that there was a great deal of range and variance in his task scores. He suggested that this variance in scores was affected by the individual psychological factors, and he recommended that careful consideration should always be given to the psychological and motivational factors which will influence maximal endurance testing.

The sixth variable is the nature of the stimulant. Competition can create a disturbing effect upon the accuracy of aspiration level. An individual may try harder if he is competing against another person.

The seventh variable is one's parental training. Winer (1971) stated, "Because of the large differences in experiences and background, the responses of people to the same experimental treatment may show relatively large variability" (p. 261). The need for achievement can be learned in childhood as a result of particular parental practises. Atkinson and Feather (1966) report their findings on the parental influences on boys as follows:

1. Mothers of boys who are high in need achievement tend to expect an earlier development of mastery and independence.
2. Mothers of boys high in need achievement offer bigger rewards for accomplishment.
3. Mothers of boys low in need achievement are more restrictive.

McClelland, Atkinson, Clark, and Lowell (1953) report their findings on the parental influences on children as follows:

1. Parents who force a child to be "on his own" and give up being nurtured by adults at an early age are training a child to be achievement oriented.
2. Sons who rank low in the achievement need perceive their fathers as more friendly and helpful than sons who rank high in achievement need.
3. Mothers of sons with a low achievement need tend to demand less in the way of independent achievement at an early age, and tend to be more restrictive than other mothers.
4. Mothers who use physical rewards for fulfillment of achievement demands have sons who average a need for achievement score twice that of sons of mothers who use more attenuated means of affective arousal.

McClelland and associates (1953, 1973) summarize their evidence on achievement motivation in females as follows:

1. Mothers of high-achieving girls have been described as more strict, authoritarian, and controlling than mothers of low-achieving girls.
2. Both pre-school and elementary girls show strong achievement motivation associated with maternal hostility and non-nurturance; this reappears again at the secondary level.

3. The female's achievement need is more closely tied to social acceptability, whereas the male's achievement need is more closely tied to leadership capacity and intelligence.

The expectancy that a performance will be followed by a consequence incorporates two contrasting personality predispositions, that is, the need for success and the need to avoid failure (Mouly, 1973). Atkinson (1957, 1965) considers these two needs or motives as a function of two situational variables entitled the perceived expectancy of success and the incentive value of the task being performed.

Success and failure must be defined in terms of the individual. The need for success is the tendency to engage in achievement-oriented behaviors that result in satisfaction and pride from the success. The need to avoid failure is the tendency to prevent feelings of shame that result from failure in a performance. Atkinson (1957, 1958) theorized that when the uncertainty regarding the performance outcome is greatest, that is when there is a 50:50 chance of succeeding, the motivation to achieve is strongest, and the individual will raise his level of aspiration and will work harder to achieve to his goal. The strength of motivation to achieve decreases as the probability of success increases from 50:50 to near certainty of success at 90:10, or to the opposite extreme probability of success at 10:90.

Performance and need achievement relate positively when the expectancy of satisfying the need to succeed is stronger than the need to avoid failure (Atkinson & Feather, 1966, and McClelland & Steele, 1973). Those with a stronger motive to achieve success than

to avoid failure will persist longer at a task and choose an intermediate level of task difficulty. McClelland (1955) conducted a study of 52 high school and college students designed to investigate the relation of certain task variables to the achievement motive. He concluded that those subjects with higher achievement need scores directed more attention and effort to the arithmetic task, and produced a better output and quality on the task than those subjects with lower achievement need scores.

Those whose disposition to avoid failure is stronger than the motive to succeed will avoid tasks of intermediate difficulty, that is a probability of success at 50:50; anxiety about failure is greatest at this point. The individual will choose either the easiest probability of success at 90:10, or the most difficult at 10:90. Atkinson (1957, 1958) believes the setting of a very low or very high level of aspiration is a protective strategy the individual uses to minimize anxiety about failure.

The theory of motivation when applied to a competitive-achievement task implies the relationship of performance to the expectancy of goal-attainment should take a bell-shaped curve when the predominant motive is to achieve or to avoid failure (see Figure 2).

The value of the consequence to the individual, along with the strength of the expectancy that a performance will be followed by a consequence, determines the strength of the tendency to act in a certain manner (Raynor, 1969). The motive incentive system includes the following seven incentives: 1) affiliation (being socially reassured that one is acceptable and worthwhile with friends),

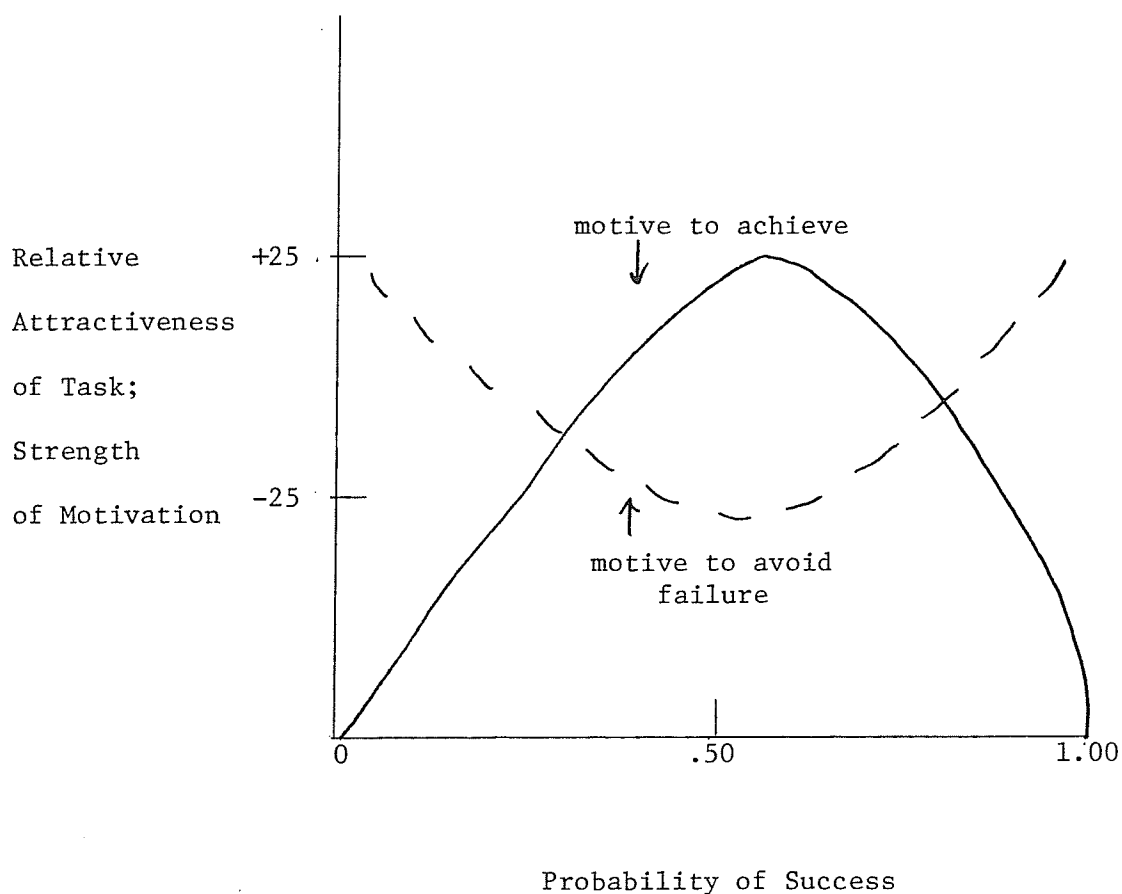


Figure 2. The relationship performance to expectancy of goal attainment. The very difficult and very easy tasks arouse less fear of failure and are less unattractive than moderately difficult tasks. (From "Motivational Determinants of Risk-Taking Behavior" by John W. Atkinson, Psychological Review, 1957, 64, 365.)

2) power (having the opportunities to influence other people's attitudes and opinions), 3) independency (being able to do things on one's own), 4) stress (focussing on the excitement and pressure of a task), 5) excellence (doing something very well for its own sake), 6) success (being attached to extrinsic rewards which include status and prestige), and 7) aggression (dominating others). Straub (1978) states that the two strongest and most consistent incentives for young athletes are affiliation and excellence, with stress being the third strongest incentive.

Atkinson (1958) tested a sample of female college students competing for a monetary prize of \$1.25 or \$2.50 on drawing and arithmetic tasks. They were divided into groups where their stated probabilities of winning were 1 to 20, 1 to 3, 1 to 2, and 3 to 4. The results showed the highest performance occurred at an expectancy of winning of 1 to 2 for \$2.50, and showed a drop in performance occurred at an expectancy of winning of 3 to 4 for \$2.50. Atkinson concluded that not only the amount to be won was important, but the attractiveness of attaining the goal, or the incentive value, must also be taken into account when motivating performance.

Atkinson and Reitman (1956) conducted a study of 93 male college students designed to elaborate on Tolman's Expectancy Theory that goal-directed action is a joint function of the strength of the motive to achieve and of the expectancy aroused by situational cues that performance is instrumental to attainment of a goal. They concluded that the relationship of the achievement motive to performance was significantly positive, when the expectancy that performance was instrumental in producing feelings of pride and

accomplishment was aroused.

In summary, an individual with a high need for achievement will set goals that are challenging to him, while the individual deficient in this personality trait will demand little of himself, and set a low goal relative to his previous performance of a given task (Cratty, 1967). The individual with the high need to achieve demonstrates an extremely high persistence at tasks, demonstrates an exceptional quality in performance, takes reasonable risks and enjoys stress, and accepts personal responsibility for actions (Singer, 1980). The tendency of the person high in achievement motivation is to look for more difficult tasks as he masters old ones, and to persist at a task in face of failure (Atkinson, 1957). Anxious individuals tend to set extremely high or low goals. Cautious individuals tend to keep level of aspiration below their past performance.

Sex of the Subject

As discussed previously under the rationale for the study, the differences in the environmental and learning experiences of males and females result in varied effects by a given motivational technique on the performance of a task. The following studies lend support to the hypothesis that the effect of the motivational technique is dependent upon the sex of the subject.

Strong (1963) tested 434 grade 6 girls and boys to determine the effects of six motivational conditions on seven physical fitness tests. The results showed that for the girls alone, the mean gains for the motivated group were greater than the mean gain of the

control group for two of the fitness tests, namely the bent arm hang and sit-ups. The results for the boys alone showed the mean gains for the motivated groups were greater than the mean gain of the control group for six of the seven fitness tests, not the standing long jump. On the whole, Strong's motivational techniques were more effective in improving performance with the boys than the girls.

Summer and Johnson (1979) in their study on 52 college males and females also found that goal discrepancies were lower in the female scores than the male scores. Goal discrepancy equals the difference in the score between one's last performance and one's present level of aspiration.

Walter and Marzolf (1951) studied the results of 40 males and 40 females, in grades 4, 6, 8, and 12, performing a ball hitting task, to discover what extent there were sex differences in level of aspiration. They found that the female discrepancy scores were lower than the male discrepancy scores. Walter and Marzolf explain the higher goal discrepancy in the male scores as compared to the female scores due to the male's greater need for the achievement variable.

CHAPTER III

METHODOLOGY

Sampling Procedures

The sample for this study consisted of 40 girls, randomly selected from the total female population of 139 students, and 40 boys, randomly selected from the total male population of 225 students. All students were enrolled in the 1980 to 1981 second semester physical education classes at Sturgeon Creek Regional Secondary School. Each student was required to take this half credit course during his/her high school years for graduation. The students' ages ranged from 15 years to 20 years, with the majority being 16 years old.

The students' last names were listed alphabetically, according to their physical education class section. The two separate sample groups of 40 girls and 40 boys were assigned at random to one of the following treatments: musical accompaniment, goal setting, verbal encouragement, and control.

Task

The task in this investigation was a physical fitness test, measuring the upper body strength and endurance, called the flexed arm hang.

The equipment included a horizontal bar, a chair, if needed, to

reach the bar, chalk for the participants' hands, and a stopwatch.

Each subject grasped the bar with palms toward the face, hands shoulder width apart, and eyes level with the bar. The face did not touch the bar. The subjects were assisted, when necessary, to the starting position by the experimenter; any swinging motion was stopped prior to commencing the test.

The purpose of this test was to hold the start position as long as possible, thereby measuring the amount of force the upper body muscles could exert for a sustained period of time.

The flexed arm hang was selected as a suitable test for the following reasons. The Board of Directors for the Canadian Association of Health, Physical Education, and Recreation required its research committee to design and undertake a project, in the year of 1963, that would establish national norms of physical fitness for Canadian Children aged 7 to 17 years (Manitoba Department of Education, 1977). The committee agreed that the flexed arm hang was a reliable and valid measure of fitness, and that it was simple enough for any teacher not trained in fitness measurement to administer. In the years 1976 to 1977, over 10,000 Manitoba school children, aged 5 to 18 years, were assessed as to their physical fitness levels. The Manitoba Physical Fitness Performance Test Manual and Fitness Objectives compiled the results of this assessment into the norms of fitness for Manitoba children. This battery of tests, which included the flexed arm hang, was selected on the basis of research studies which found these tests sufficiently reliable and valid measures of fitness.

However, there is one criterion where the author believes the

flexed arm hang test may be weak, that is the validity of the test; does the test measure what it is supposed to measure? Johnson (1932) explains that exercises involving strength, speed or endurance, are products of experience, and for an athletic exercise to be valid, it must be corrected for the experience of the subjects in that activity. The flexed arm hang is an activity that the majority of students have experienced in the physical education classes since grade one. Wendler (1938) further adds that tests of strength are valid because undoubtedly they are what they purport to be. The author of this study believes that the validity of the flexed arm hang can only be assumed when the participants give an "all-out" effort. Karpovich and Sinning (1971) stated, "The weakness of the performance type of test is its great dependence on the cooperation of the subject, without which the test has no value" (p. 281).

Independent Variables and Procedure

The two independent variables were sex and type of motivational technique. The sex variable included the two levels of male and female subjects. The motivational technique variable included four levels of different treatments, that is, musical accompaniment, goal setting, verbal encouragement, and control.

All subjects in the four treatment groups were tested individually, without an audience. Each subject was given instructions as to how to perform the test, and told that their time would be called out by the experimenter at ten-second intervals. The experimenter then said "do your best", and the test commenced with the subject approaching the bar. Timing began when the individual

was in the start position, and stopped when the subject's forehead dropped below the bar.

The musical accompaniment group heard music played on a tape machine while being tested. The music played was a popular song in the eyes of the students, as judged by the investigator at a recent soc hop at the school. The song, by the group Trooper, was called The Boys in the Big White Sports Car.

The goal setting group was individually asked, "How long do you think you can hold the arm hang position?" The experimenter asked the student the duration of his pervious attempts at the task, and then she helped the student choose a realistic goal for his/her capabilities.

The verbal encouragement group received constant encouragement from the experimenter with the following statements: "you're doing great", "you're nice and still-excellent", "way to go", "keep up the good time". The experimenter made a sincere effort to make use of only those four comments, to prevent possible experimenter bias by interacting differently with individual subjects.

The control group did not receive a motivational technique.

Dependent Variable

Each subject was scored on their performance of the flexed arm hang by the total period of time in tenths of seconds that the subject maintained the start position.

Techniques Used in Data Analysis

A two-factor analysis of variance was performed to test

hypothesis two, that is, that the effect of the motivational technique is dependent upon the sex of the subject. The specific test of this hypothesis was the test of the two-way sex by motivational technique interaction.

Hypothesis one, that is, on a selected physical fitness task, any motivational technique improves the performance of both male and female subjects, as compared to no motivational technique, was tested by computing *t* tests on all possible pairs of mean scores on the flexed arm hang for the four treatment groups. The Tukey HSD criterion was used to control the probability of Type I error at .05 for the set of comparisons (Dinham, 1976).

There are four assumptions that underlie *t* tests of differences between population means. The first two assumptions, that is, random sampling, and independence of observations within each sample and between each sample, were satisfied in this investigation. The third assumption, that the populations from which the samples are selected are normally distributed, may be waived and the tests will not result in excessive rates of Type I error, particularly if the sample sizes are sufficiently large, as was the case for this study. The fourth assumption, that the populations from which the samples are selected have equal variances, may also be waived and the effects of assumption violation on Type I error will be negligible, if the sample sizes are equal, as was the case for this study (Dinham, 1976; Glass & Stanley, 1970; Scheffe, 1959).

The .05 level of significance was chosen as the criterion for the rejection of or the failure to reject the null hypotheses. Both Edwards (1972) and Glass and Stanley (1970) recommend the .05 level

of significance as a reasonable criterion for rejection of or failure to reject a null hypothesis.

The investigator did not consider age of the subject as a factor in the data analysis. Seymour (1960), in his study on strength and physical fitness indexes, indicated that an analysis of data by individual years, at the senior high school level, is an unnecessary breakdown of data. He further suggested that treating boys of ages 15, 16, and 17 years as a single group is a statistically defensible procedure and one which is strongly desirable from the standpoint of ease in scoring data. In this study 82.5 percent of the sample were 15, 16, and 17 years of age.

The means and standard deviations were tabulated for each group. A simple graph is utilized to show the mean performance per group.

CHAPTER IV

RESULTS AND DISCUSSION

The purpose of this study was to investigate the effects of the three motivational techniques, musical accompaniment, goal setting, and verbal encouragement, upon high school students' performance on a selected physical fitness test, the flexed arm hang. In addition, any interacting effects between the sex of the subject and the specific motivational technique, were assessed.

The data obtained to test the two hypothesis were the performance scores, of the flexed arm hang, recorded in tenths of seconds. The separate sample groups of 40 girls and 40 boys were assigned at random to one of the following treatments: musical accompaniment, goal setting, verbal encouragement, and control (see Appendix A1).

The results and discussion chapter is divided into two major subsections. Firstly, the results subsection explains the two-factor analysis of variance, and its outcome, that was performed to test hypothesis two, that is, that the effect of the motivational technique is dependent upon the sex of the subject. Following is the explanation of the multiple t tests, and their outcomes, performed to test hypothesis one, that is, on a selected physical fitness task, any motivational technique improves the performance of both male and female subjects, as compared to no motivational technique. Secondly,

the discussion subsection summarizes, interprets, and theorizes about the results of this investigation, under the headings of hypothesis one and hypothesis two.

Results

Hypothesis Two

The results of the two factor analysis of variance are presented in Tables 3 and 4, and pictorially displayed in Figure 3. Cell means and standard deviations are presented in Table 3 and pictorially in Figure 3, while Table 4 displays a summary of the analysis of variance. An assessment of Table 3 and Figure 3 show that the goal setting group produced the highest mean score for the male subjects, while the musical accompaniment group produced the highest mean score for the females. The verbal encouragement group produced the lowest mean score for both the male and female subjects, although it appears that the male subjects were more positively affected by this motivational technique, in increasing their performance of the flexed arm hang, than the female subjects. However, as seen from Table 4, the F test of the sex by motivational technique interaction was not significant (also see Appendix B1). Thus, the null hypothesis that there is no interaction effect between the sex of the subject and the type of motivational technique was not rejected.

Hypothesis One

As previously stated, to test the hypothesis that, on a selected physical fitness task, any motivational technique improves the

Table 3
Means and Standard Deviations (S.D.)
for the Sex by Motivational Technique Design

		Motivational Technique				
		Musical Accom- paniment	Goal Setting	Verbal Encour- agement	Control	Marginal Means
Female	Mean	45.870	40.070	23.550	33.300	35.697
	S.D.	14.755	24.003	14.285	19.448	
Male	Mean	68.010	71.980	61.880	62.770	66.160
	S.D.	19.727	22.523	25.821	18.030	
Marginal Means		56.940	56.025	42.715	48.035	

Table 4
Analysis of Variance Summary Table

Source	DF	Sum Squares	Mean Squares	F
A (sex)	1	18559.230	18559.230	45.48
B (motivation)	3	2758.921	919.640	2.25
AB	3	671.211	223.737	0.55 ^a
Error	72	29379.355	408.046	
Total	79	51368.715		

Note.

$$^a .05 F_{3, 72} = 2.74$$

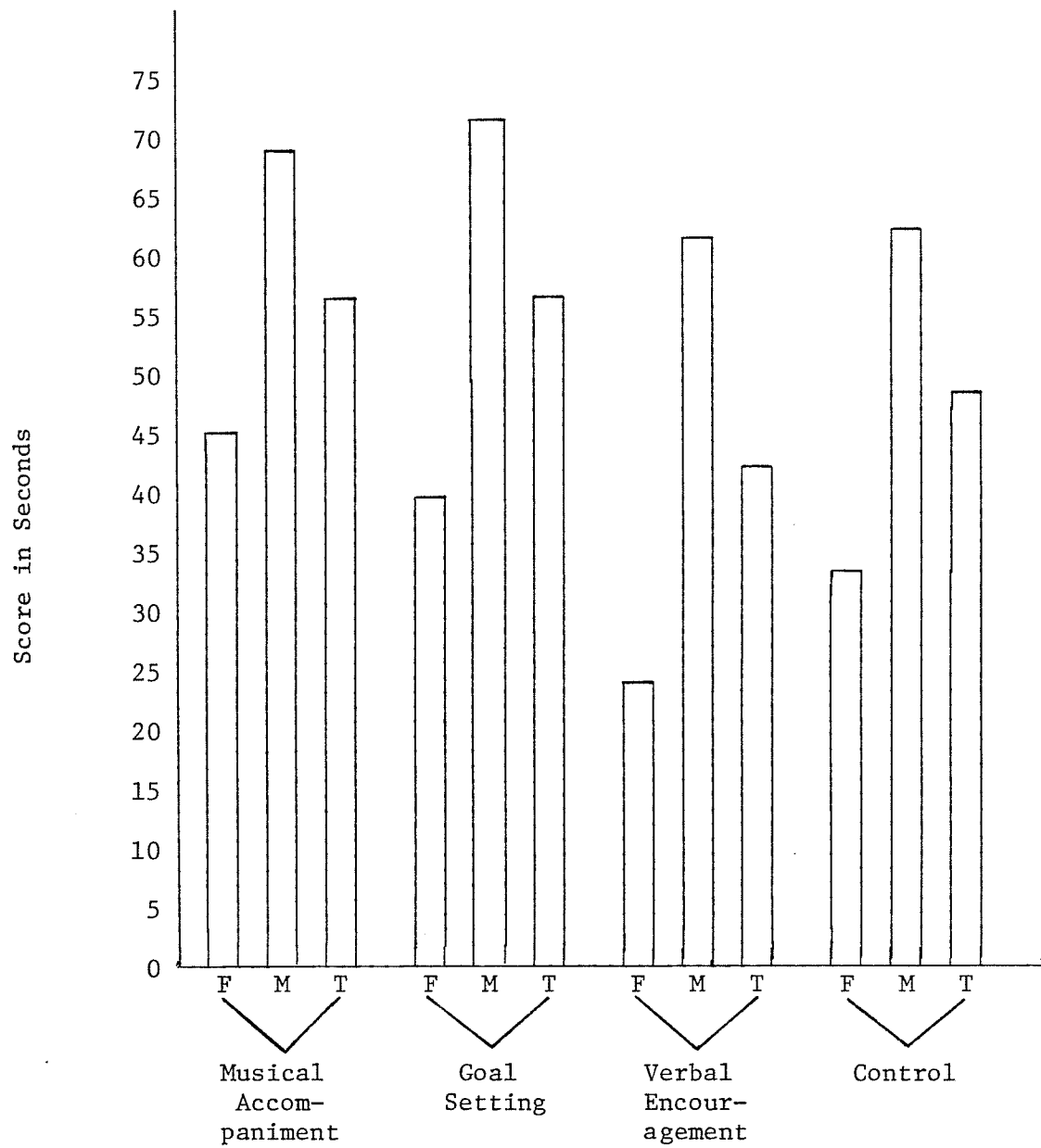


Figure 3. Mean performance per group

F = female

M = male

T = total

performance of both male and female subjects, as compared to no motivational technique, t tests on all possible pairs of means were computed. The results of this analysis are presented in Table 5. As seen from the Table, none of the pairwise comparisons proved to be statistically significant (also see Appendices C1 to C7). Thus, the null hypothesis that the performance on the flexed arm hang is not significantly different for any one of the four groups as compared to another group, was not rejected.

Discussion

In the present study, 80 high school students performed the flexed arm hang under one of the following motivational conditions, musical accompaniment, goal setting, verbal encouragement, and control.

Hypothesis One

Hypothesis one, that any motivational technique improves the performance of both male and female subjects, as compared to no motivational technique, on a selected physical fitness task, could not be supported by the results of this investigation. The non-significant results of the t tests on all possible pairs of performance means supported the null hypotheses that the performance on the flexed arm hang is not significantly different for anyone of the four groups as compared to another group.

These results are similar to the studies by Reichenbach (1972) and Zebas (1975). Reichenbach (1972) did not find any significant

Table 5

Pairwise Comparison Summary Table: Values of t

		Group			
		1	2	3	4
Group	1		0.1446	2.2473	1.4068
	2			2.1027	1.2623
	3				-0.8405
	4				

Note.Group 1 = musical accompaniment ($\bar{X} = 56.940$)Group 2 = musical setting ($\bar{X} = 56.025$)Group 3 = verbal encouragement ($\bar{X} = 42.715$)Group 4 = control ($\bar{X} = 48.035$)

$$.05q_{4, 75} \div \sqrt{2} = 2.633$$

difference between four motivated groups and the control group, in terms of the accumulated work performed on the bicycle ergometer. Zebas (1975) concluded that her two motivational techniques did not affect the distance jumped by the students executing the standing broad jump.

Possible reasons for the given motivational techniques not significantly affecting the performance of an individual on the flexed arm hang in this investigation include: the choice of the task, the expectancy of the performance being followed by a given consequence, the choice of the motivational techniques, and the lack of spectators.

Firstly, the results of this investigation may have been different if another task was chosen; not the flexed arm hang. Cratty (1968) suggests that continual exposure to a task results in habituation, a decrease in intrinsic motivation, and a resulting decrease in the inclination and capacity to perform. The flexed arm hang may be such a task. The majority of the subjects in this investigation have been tested on the flexed arm hang every year since grade one. Possibly the students just did not try to perform to their capacity, no matter what motivational technique was applied. If the students did not give an "all-out" effort, the test is not valid. Karpovich and Sinning (1971) stated, "The weakness of the performance type of test is its great dependence on the cooperation of the subject, without which the test has no value" (p. 281).

The flexed arm hang is a test that measures the upper body fitness components of strength and endurance. The author believes that the development of strength is especially lacking in female

students. Kraus and Hirschland (1964) compared American and European children, aged 6 to 16 years, on the fitness component of strength. They concluded that their result, of over 50 percent of the American children failing the strength tests, was due to the high degree of mechanization and lack of physical activity in our society. Possibly the students in this investigation were simply lacking in the development of upper body strength and endurance, and therefore, did not have the ability to perform at a higher standard in this task, no matter what motivational technique was applied.

Secondly, as discussed under the literature review, one of the variables affecting the strength of motivation to achieve, as manifested in the performance of an act, is the expectancy that a performance will be followed by a consequence. The expectancy of the consequence is related to the difficulty of the task, and the accompanying chance to succeed, as influenced by one's past success or failure in that given task. The author believes that, from personal teaching experience, the flexed arm hang is a difficult task for students, especially for the female students, and that several students have experienced failure with this task in relation to its norms. Atkinson (1957, 1958) theorized that when there is a 50:50 chance of succeeding, the motivation to achieve is the strongest, and the individual will work harder to achieve his goal. However, as the probability of success approaches a 10:90 chance, as the author believes some students view their chances of success are with this task, because of their background of failure, the strength of motivation and effort decreases. Unless an "all-out" effort is put forth by the participant of a performance test as the flexed arm hang,

the test is not valid.

Thirdly, the results of this study may have been different if other motivational techniques were applied. Caskey (1968) concluded that verbal motivation was not a significantly effective motivator for increasing the standing broad jump performance of children. He speculated that possibly other motivational techniques may be needed for that specific task, which may also apply to the flexed arm hang task. The task facing teachers is to find motivational techniques that will arouse the individual to achieve the task at hand. Teachers must be aware, that because of individual factors such as various socioeconomic backgrounds, emotional reactions, expectations, etc., there are not any specific "hard fast" rules; there is not one best motivational technique for all students and all tasks.

Gates and Rissland (1923) tested 74 college students on a motor coordination task and a colour-naming test. The three experimental groups were verbal encouragement, verbal discouragement, and control. While only nine percent of the subjects improved in both tests under verbal encouragement, 50 percent of the subjects who improved in one of the tests, under verbal encouragement, did not improve in the other test. These results coincide with the theory that there is not one best motivational technique for all students and all tasks.

As discussed in the review of literature, the Activation-Arousal Theory of Motivation suggests a curvilinear or inverted U relationship between activation and performance. As the individual's arousal level increases from a state of deep sleep to high excitement, there is a progressive increase in performance efficiency, but only up to a certain or balanced point, after which an increase in arousal

decreases performance (Duffy, 1962; Straub, 1978; Thomas & Halliwell, 1976)(see Figure 1). However, Martens (1977) states the problem with the inverted U theory is the inability to measure precise points along the arousal continuum. Oxendine (1968) views this as a problem for the teacher, of knowing whether an individual's arousal is at a high or low level. The Yerkes-Dodson Law, as explained by Fisher (1976), is used as a point of reference for the optimal arousal levels of tasks. According to Table 2 outlining the optimal arousal levels for a variety of sports skills, the flexed arm hang test requires a high level of arousal, listed as a number 5 on a scale of 1 to 5. Possibly the motivational techniques that were chosen for this study were not stimulating enough to excite the individual to a high level of arousal.

Fourthly, while this investigation studied the effects of motivation during a private performance of a physical skill, that is, only the teacher and student present, usually a physical fitness test is performed in front of the class in the school environment. Had this investigation studied the effects of the given motivational techniques, coupled with the realistic situation of an audience, the results may have shown significance. The author believes, from personal observations of fitness testings, that spectators enhance the performance of the participant through vocal and emotional support.

Nelson, D. (1963) concluded that, while a musical accompaniment did not affect the performance of subjects riding the bicycle ergometer, had he used music in conjunction with the presence of others, his results could have conceivably shown a significant

performance improvement.

Harvey (1970) concluded that team competition and level of aspiration were effective in improving the performance of students in three sport skills; but he also suggested that with people watching and knowing a participant's performance, that the participant may do better simply for his social status.

Singer (1965) tested 16 college athletes and non-athletes on a stabilometer. After practising three trials privately, then performing three trials before spectators, the non-athletes performed significantly better on two of the three trials in front of the spectators, while the athletes did not perform better in front of the spectators. The non-athletes said that they were nervous, while the athletes said that they were not nervous in front of the spectators.

Triplett (1898) concluded that the individual seems better able to endure the pain of endurance activities when onlookers are present.

Cratty (1967) suggests that an audience can exert an important influence qualitatively and quantitatively upon the performer's efforts.

Laird (1923) sums up the powerful influence of an audience in his statement, "Many games are supposed to be won or lost by the remarks of the fans" (p. 236).

The specific motivational technique of musical accompaniment also did not significantly affect performance in the studies by Nelson, D. (1963), Coutt (1965), and McCormick (1972). Nelson, D. (1963) concluded that music did not have any favourable or unfavourable effects on subjects riding the bicycle ergometer for 90 seconds. Coutt (1965) concluded that there was no significant difference

between the experimental groups and the control group for riding speed on the bicycle ergometer. McCormick (1972) concluded there was no significant difference between the experimental groups and the control group for distance travelled in 10 minutes on the bicycle ergometer.

A possible reason for these last three studies not showing any significant difference in results, may be that musical accompaniments do not affect tasks primarily involving the component of speed, as relative to a specific task, to the extent that music affects endurance skills, as suggested by Chipman's (1967) study on sit-ups, Koschak's (1975) study on push-ups, and Anshel's (1976) study that promoted endurance on the bicycle ergometer. However, this explanation does not account for Dillon's (1952) results that, under musical conditions, subjects did improve in their speed of swimming. Dillon suggests, because swimming involves a rhythmical motion, that rhythmical music would increase one's speed in swimming. Yet, one would have thought that riding a bicycle also involves a rhythmical motion, and therefore rhythmical music would increase one's speed in cycling. The flexed arm hang is certainly not a task that can be endured for as long a time as riding a bicycle ergometer, nor is it a task that involves a rhythmical motion.

One must keep in mind though, the individual psychological variables and the environmental factors affecting performance results, which include how one is stimulated by the specific selection of music. Coutt (1965) did suggest that his results may have been nonsignificant due to an incorrect selection of music. That may have been the situation in this investigation.

The review of literature strongly supports goal setting as an effective motivational technique increasing performance. Cratty (1968) and Mouly (1973) believe that because there is a strong need for self-improvement and ego enhancement in adolescents, especially middle class boys, that goal setting can be effective in improving performance. As shown in Table 4 and Figure 3, the highest mean performance score was by the males in the goal setting group. Overall, the goal setting group mean was a very close second to the musical accompaniment group mean. The explanations for the specific technique of goal setting not significantly affecting performance in this study, may coincide with Festinger's (1957) theory of cognitive dissonance, and the theory that the incentive value of attaining the goal affects performance (Atkinson, 1958, and Raynor, 1969).

Festinger's (1957) theory of cognitive dissonance suggests that a public, as opposed to a private, declaration of a goal could substantially influence performance. Once the intention to perform at a given level is identified publicly, it is more likely one will follow up with the appropriate performance to maintain cognitive consistency and avoid feelings of dissonance. Brehn and Cohen (1962) also suggest that goals pronounced in public lead to a higher motive to achieve at a given task. Individuals realize failure will threaten self-esteem, and therefore they are likely to increase their performance effort. In this investigation, if the subjects had to announce their goal in front of their peers, and perform in front of them, possibly a greater number of subjects would have reached their goal (65 percent reached their goal; see Appendix A1), and/or there would have been a significantly higher mean performance score as

compared to the other group mean performance scores. Performing in front of the experimenter may not have been enough of a threat to their self-esteem. The effect of an audience was discussed earlier in this chapter.

Atkinson (1958) states that the attractiveness of attaining the goal, or the incentive value, must be taken into account when motivating performance. Mouly (1973) suggests that the goal the individual sets for himself determine his relative success in performance of the task and as a person. Success and failure are meaningful only with reference to a target. Possibly attaining success in this investigation was not a meaningful experience for these students. Mouly states that goal setting can improve performance as a means of attaining prestige and peer status. Straub (1978) states that the two strongest and most consistent incentives for young athletes are affiliation and excellence. Affiliation can be defined as being socially reassured that one is acceptable and worthwhile with friends. However, in this investigation there was not an audience, just the experimenter. Therefore, there was not an opportunity for attainment of prestige and peer status, nor could the affiliation incentive have been a factor affecting performance.

The specific motivational technique of verbal encouragement also did not significantly affect performance in the studies by Gates and Rissland (1923), as discussed earlier in this chapter, and Gerwitz and Baer (1958), Caskey (1968), and Radlinski (1975), as discussed under the review of literature. Of special interest is the study by Radlinski on college women. She concluded that positive verbal motivation did not produce any significant difference in the

performance of the flexed arm hang. The explanations for verbal encouragement not significantly affecting performance in this study, may include the lack of time element, and may be explained by the overjustification hypothesis.

The investigator did not have enough time to use verbal encouragement to the fullest extent for five of the female subjects (see Appendix A1). The female subjects numbered 2, 4, 5, 8, and 10 performed for such a short period of time that the investigator was not able to give all that much encouragement. The longer period of time the subject performed the task, the more verbal encouragement they received from the investigator. Therefore, while a sincere effort was made to make use of four specific comments, as stated in Chapter III, the frequency of the comments was greater for the subjects who performed a longer time period, than those subjects who performed for a shorter time period.

The overjustification hypothesis states that a person's intrinsic motivation to participate in an activity may be undermined by inducing him to engage in that activity for an extrinsic goal or reward. Thomas and Halliwell (1966) suggest that through the grading system, rewards, and, for example, the Canada Fitness badges in our school physical education programs, we are decreasing one's intrinsic motivation and strengthening the need for external rewards. However, Thomas and Halliwell further add that extrinsic incentives may effectively increase the interest in a given activity where the attractiveness of the activity is at a low level, such as the flexed arm hang test.

The author of this study believes the flexed arm hang is an

unpopular test with students, because of their continuous exposure to the test year after year, and their background of failure, as discussed earlier in this chapter. These students may have asked themselves, "so what's in it for me?" Traditionally, from an athletic viewpoint, motivation is often solely in extrinsic terms. Physical educators have always used awards to encourage and motivate individual improvement in skill development and physical fitness (Singer, 1980). As there was not any material rewards to be received for a "good" performance, the students may not have given an "all-out" effort. Verbal encouragement may not have been an effective extrinsic motivator; a "stronger" motivator, such as a material reward may have produced different results for these students.

Anderson, Manoogian, and Reznick (1976) found that while verbal praise increased the amount of time preschool children spent on doing a drawing activity, money and a "good player" award produced a pretest-to-posttest decrement in the amount of time spent doing the activity. These authors concluded that their lower socioeconomic subjects saw the verbal encouragement as a genuine concern for them; but if middle-class subjects were tested, as in this study, money would have been required to improve the performance on the task.

Hypothesis Two

Hypothesis two, that the effect of the motivational technique is dependent upon the sex of the subject, could not be supported by the results in this investigation. The nonsignificant F statistic of the two-factor analysis of variance supported the null hypothesis that there is no interaction effect between the sex of the subject, and the

type of motivational technique used.

This result is similar to that found by Gerwitz and Baer (1958) in their study of verbal encouragement on a motor skill game. In their study, males and females were tested by a female experimenter. The test of the sex by verbal encouragement technique interaction was nonsignificant.

A possible explanation for these nonsignificant results could be a large within group variance. In this investigation, Appendix A1 shows the variability in the scores of the students recorded in tenths of seconds. The Analysis of Variance Summary Table, Table 4, illustrates an overall estimate of 408.046 as the error variance. This large error term may have masked any between group variance; that is, to have a significant F statistic with such a large group variance implies one would need a very large between group variance.

The large within group variance in this study may be a result of the heterogeneous sample. Winer (1971) stated, "Because of the large differences in experiences and backgrounds, the responses of people to the same experimental treatment may show relatively large variability" (p. 261). The students at Sturgeon Creek School come from a wide geographical environmental area, including all of St. James-Assiniboia, Headingley, Brooklands, and other areas of Winnipeg.

Straub (1978) suggests that to improve the predictability and account for behavioral variance in laboratory and field settings, one major qualification has been to acknowledge individual differences in ability level, skill, and competence. Had this investigation tested the "athletes", or the "non-athletes", possibly the within group variance would have shown such a high score.

Fisher (1979)'s study on swimmers, aged 10-13 years old, found that there was no significant difference between the mean scores of the experimntal group that used a videotape recorder as a motivator, and the control group. Fisher tested and compared their swimming speed on the front crawl, as well as their knowledge of the mechanics of the stroke. He concluded that one of the reasons for his non-significant result was that the sample was not a homogeneous group.

Even though the theories by researchers such as Veroff, Wilcox and Atkinson (1953), Lefcourt (1966), and Straub (1978), suggest that the related learning experiences of males and females may be different enough so that the same cues in the environment may have differential motivating effects on the two sexes, and that males and females differ in their need for stimulating achievement behavior, our knowledge about females and their need for achievement is lacking. McClelland and Steele (1973) state that theory largely confines its empirical support to research with males, because of the scarcity, ambiguity, and inconclusiveness of empirical findings on female subjects.

In closing, as an investigator, one must remember that statistical error is inevitable in any study. Glass and Stanley (1970) stated, "In testing any statistical hypothesis the researcher's decision that the hypothesis is true or that it is false is never made with certainty; he always runs a risk of making an incorrect decision" (p. 275). Edwards (1972) further warns that, "No single experiment can establish absolute proof of falsity of the null hypothesis no matter how improbable the outcome of the experiment is under the null hypothesis" (p. 21). In this investigation, a

major delimitation was the use of only one trial score. To obtain a true score, many trials should be taken and the scores averaged.

Possibly, Martens (1977) sums up our lack of knowledge as to the relationship between motivation and performance, due to the variability and discrepancy amongst investigators, with this statement,

We know little about what aspects of performance are affected by various levels of arousal; we are naive about the influence of diverse sources of arousal on various motor tasks; and, we have little understanding of the role of individual differences.

(p. 127)

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

"To consider the subject of motivation is, in the end to ask ourselves the meaning of man, and why he does the things he does" (Fabrin, 1968, p. 3).

The purpose of this study was to investigate the effects of three motivational techniques, specifically, musical accompaniment, goal setting, and verbal encouragement, upon high school students' performance on a selected physical fitness test, the flexed arm hang. In addition, the interacting effects between the sex of the subject and the specific motivational technique were assessed.

The subjects for this investigation consisted of 40 males and 40 females randomly selected from the students enrolled in the 1980 to 1981 second semester physical education classes at Sturgeon Creek Regional Secondary School. The random samples were drawn from a population of 139 female students and 225 male students.

The subjects in each of the sample groups of 40 girls and 40 boys were randomly assigned to one of the following treatments: musical accompaniment, goal setting, verbal encouragement, and control.

The task in this investigation was a physical fitness test, measuring upper body strength and endurance, called the flexed arm hang. The purpose of this test was to sustain the start position for as long a period of time as possible. The start position was a bent

arm hang grasp of a bar, with palms toward the face, hands shoulder width apart, eyes level with the bar, and the face not touching the bar.

The two independent variables were type of motivational technique, which included the four treatments of musical accompaniment, goal setting, verbal encouragement, and control, and the sex variable. The dependent variable was a performance in front of the experimenter, on the flexed arm hang, scored in tenths of seconds.

A two-factor analysis of variance was used to test the hypothesis that the effect of the motivational technique is dependent upon the sex of the subject. To test the hypothesis that any motivational technique improves the performance of both male and female subjects, as compared to no motivational technique on a selected physical fitness task, *t* tests were computed on all possible pairs of group performance means. The .05 level of significance was chosen as the criterion for the rejection of or the failure to reject the null hypothesis.

The following results were obtained from the analysis of the data:

1. The analysis of variance *F* test of the sex by motivational technique interaction was nonsignificant at the .05 level of significance. Therefore, the null hypothesis that there is no interaction effect between the sex of the subject and the type of motivational technique used was not rejected.
2. The *t* tests on all possible pairs of means were nonsignificant at the .05 level of significance. Therefore, the null hypothesis that the performance on the flexed arm hang is not significantly

different for anyone of the four groups as compared to another group was not rejected.

3. An assessment of Table 3 and Figure 3 presenting the means and standard deviations for the sex by motivational technique design, shows that the goal setting group produced the highest mean score for males at 71.980, while the musical accompaniment group produced the highest mean score for females at 45.870. The verbal encouragement group produced the lowest mean score for both the male subjects at 61.880 and the female subjects at 23.550. The musical accompaniment group and the goal setting group produced the highest overall mean scores of 56.940 and 56.025 respectively. The lowest overall mean score was performed by the verbal encouragement group at 42.715.

Conclusions

Within the limitations and the purpose of this study, the following conclusions can be drawn for this investigation:

1. There is no significant difference in the performance of an individual executing the flexed arm hang for any one of the motivational techniques, musical accompaniment, goal setting, or verbal encouragement, as compared to each other or to no motivational technique.
2. The sex of the individual and the type of motivational technique used do not interact to affect performance of the flexed arm hang.
3. The goal setting group produced the highest mean performance score for the males; the musical accompaniment group produced the highest mean performance score for the females.
4. The musical accompaniment group produced the highest overall mean

performance score; the verbal encouragement group produced the lowest overall mean performance score.

5. There does not appear to be any one best motivational technique for all students and all tasks.

6. Both intrinsic and extrinsic incentives can and should be used as motivating techniques in physical fitness tests.

7. The student's motivation to perform at his/her optimal level is a tremendous responsibility for the teacher. The teacher's behaviors and attitudes act as a releaser and reinforcer of motives.

8. There are numerous psychological and environmental factors that affect performance, and influence how motivational techniques affect performance.

Recommendations

The following recommendations are made, based on the findings derived from this study:

1. Teacher education should include courses on "how to motivate", so that teachers may learn the different motivational techniques and the factors affecting motivation.

2. Practitioners in the field of education should be constantly updating their knowledge of motivation and performance, by studying the recent research and attending professional inservices on the topic.

3. Teachers should be aware that various socioeconomic backgrounds, with different expectations of achievement, bring students together at school. Careful consideration should always be given to the individual variables that affect motivation and physical performance,

for example, psychological characteristics, needs, sex, age, fitness level, etc., as well as the situational variables, for example, the type of task and type of motivational technique.

4. Teachers should be willing to use, and have at their access, a number of different motivational techniques, both intrinsic and extrinsic in nature, at any given time in their classes.
5. For the individual who possesses a poor attitude towards, and low achievement motivation in physical activity and fitness, the teacher should strive to obtain an understanding of the characteristics of high need achievers and the motivational techniques that can enhance this need.
6. Further research is needed on the topic of motivation and physical performance, testing different motivational techniques, various physical skill tests, and considering the factors of age, sex, the homogeneity of the sample, the socioeconomic background of the subjects, and the individual psychological characteristics.
7. A repeat investigation of this study needs to be done, with peers watching the testing procedure, since the majority of physical fitness tests in school are performed in front of an audience.
8. Although the results of this investigation were nonsignificant at the .05 level of significance, there seems to be an indication that two of the specific motivational techniques did affect the performance on the flexed arm hang. The mean performance scores for the musical accompaniment group and the goal setting group were greater than the mean performance score for the control group. Any significant effect at the .05 level of significance may have been cancelled out by certain psychological, physical, and environmental factors that affect performance, and influence the way motivational techniques

affect performance. Therefore, do not necessarily discount the motivational techniques of musical accompaniment, goal setting, and verbal encouragement for increasing the performance of a physical task.

9. Consider that the level of significance for retention of, or rejection of the null hypothesis was at .05. This figure means, that for a given motivational technique to significantly improve the performance of the flexed arm hang test over another technique, 95 percent of the subjects would have had to improve their performance. Concerning the educational applicability, this percentage need not be as great as it is. One might consider using a motivational technique that improved the performance of a student in a given task if at least 75 percent (.25 level of significance) of the subjects improved their performance. However, keep in mind that when one decreases the chances of Type I error (rejecting a true hypothesis) by increasing the level of significance from .05 to .25, there is an increase in the probability of Type II error (accepting a false hypothesis).

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APPENDICES

Appendix A1

Score in Tenths of Seconds by Students in Each Group

		Males	Females
Musical	1.	54.5	44.1
Accompaniment	2.	87.0	63.0
Group	3.	60.0	42.5
	4.	82.2	43.0
	5.	69.0	45.1
	6.	51.4	59.0
	7.	103.4	10.0
	8.	34.0	42.0
	9.	70.8	54.0
	10.	67.8	56.0
Goal	1.	95.0 (95)	76.0 (70)
Setting	2.	51.0 (70)	33.0 (30)
Group ^a	3.	63.2 (65)	11.0 (10)
	4.	50.5 (40)	61.0 (60)
	5.	100.4 (90)	60.2 (50)
	6.	56.3 (45)	35.5 (50)
	7.	49.4 (50)	47.0 (40)
	8.	104.0 (100)	17.0 (30)
	9.	60.0 (60)	56.0 (60)
	10.	90.0 (90)	4.0 (5)

Note. Thirteen students reached their goal.

^aNumbers in parenthesis indicate the goal stated by each student.

		Males	Females
Verbal	1.	55.0	42.6
Encouragement	2.	76.0	12.2
Group	3.	50.7	27.2
	4.	64.5	7.5
	5.	91.4	15.0
	6.	22.0	40.2
	7.	104.5	25.0
	8.	66.2	17.0
	9.	63.0	42.8
	10.	25.5	6.0
Control	1.	63.2	19.0
Group	2.	64.0	57.0
	3.	59.4	4.6
	4.	30.0	17.0
	5.	70.6	54.4
	6.	63.0	43.6
	7.	99.2	19.2
	8.	43.4	34.0
	9.	63.5	60.0
	10.	71.4	24.4

Appendix B1

Two-Factor Analysis of Variance

Research Hypothesis: The effect of the motivational technique is dependent upon the sex of the subject, relative to the performance on the flexed arm hang test.

Statistical Hypothesis:

Ho: no interaction effect between A x B

Test Statistic:

$$F = \frac{MS_{A \times B}}{MS_{Error}}$$

where MS = mean square

A x B = sex x motivation

Error = error within

Decision Rule: The null hypothesis may be rejected for $\alpha \leq .05$ with 3,72 df if $F \geq 2.74$

Computations: A ST43 Stats on Line computer program was done. Table 3 summarizes the two-factor analysis of variance.

$$\begin{aligned} \frac{MS_{A \times B}}{MS_{Error}} &= \frac{223.737}{408.046} \\ &= 0.5483131 \end{aligned}$$

Decision: The null hypothesis may not be rejected.

Conclusion: There is no significant interaction effect between the sex of the subject and the motivational technique, relative to the performance in the flexed arm hang test.

Appendix C1

Pairwise Comparison Procedure

Test Statistic:

$$t = \frac{\bar{X}_{.j} - \bar{X}_{.j^1}}{\sqrt{\frac{2MS_{\text{pooled}}}{n_j}}}$$

where $\bar{X}_{.j}$ = the mean of any group,

$\bar{X}_{.j^1}$ = the mean of any group where $j \neq j^1$,

$$\begin{aligned} MS_{\text{pooled}} &= \frac{SS_{\text{Error}} + SS_{\text{AB}}}{df_{\text{Error}} + df_{\text{AB}}} \\ &= \frac{29379.355 + 671.211}{72 + 3} \\ &= \frac{30050.566}{75} \\ &= 400.67421, \end{aligned}$$

and n_j = total number of scores in any group mean ($n_j = 20$)

Decision Rule: The null hypothesis may be rejected for $\alpha \leq .05$ if

$$t > 2.633 \text{ (df 4, 75)}$$

$$\begin{aligned} 2.633 &= \frac{\text{Tukey's } .05 \text{ criterion for 4 and 75 degrees of freedom}}{\sqrt{2}} \\ &= \frac{(3.724)}{\sqrt{2}} \end{aligned}$$

Appendix C2

Pairwise Comparison Computations:

Musical Accompaniment Versus Goal Setting Technique

Research Hypothesis: The performance on the flexed arm hang will not be significantly different in the group utilizing musical accompaniment as opposed to the group utilizing the goal setting technique.

Statistical Hypothesis:

$$H_0: \bar{X}_{.1} = \bar{X}_{.2}$$

$$H_1: \bar{X}_{.1} \neq \bar{X}_{.2}$$

Computations:

$$\begin{aligned} t &= \frac{\bar{X}_{.1} - \bar{X}_{.2}}{\sqrt{\frac{2(400.674)}{20}}} \\ &= \frac{56.940 - 56.025}{\sqrt{\frac{801.348}{20}}} \\ &= \frac{.915}{\sqrt{40.0674}} \\ &= \frac{.915}{6.3298815} \\ &= 0.1445525 \end{aligned}$$

Decision: The null hypothesis may not be rejected.

Conclusion: The performance on the flexed arm hang is not significantly different in the group utilizing musical accompaniment as opposed to the group utilizing the goal setting technique.

Appendix C3

Pairwise Comparison Computations:

Musical Accompaniment Versus Verbal Encouragement Technique

Research Hypothesis: The performance on the flexed arm hang will not be significantly different in the group utilizing musical accompaniment as opposed to the group utilizing the verbal encouragement technique.

Statistical Hypothesis:

$$H_o: \bar{X}_{.1} = \bar{X}_{.3}$$

$$H_i: \bar{X}_{.1} \neq \bar{X}_{.3}$$

Computations:

$$\begin{aligned} t &= \frac{\bar{X}_{.1} - \bar{X}_{.3}}{6.3298815} \\ &= \frac{56.940 - 42.715}{6.3298815} \\ &= \frac{14.225}{6.3298815} \\ &= 2.2472774 \end{aligned}$$

Decision: The null hypothesis may not be rejected.

Conclusion: The performance on the flexed arm hang is not significantly different in the group utilizing musical accompaniment as opposed to the group utilizing the verbal encouragement technique.

Appendix C4

Pairwise Comparison Computations:

Musical Accompaniment Versus Control Technique

Research Hypothesis: The performance on the flexed arm hang will not be significantly different in the group utilizing musical accompaniment as opposed to the control group.

Statistical Hypothesis:

$$H_0: \bar{X}_{.1} = \bar{X}_{.4}$$

$$H_1: \bar{X}_{.1} \neq \bar{X}_{.4}$$

Computations:

$$\begin{aligned} t &= \frac{\bar{X}_{.1} - \bar{X}_{.4}}{6.3298815} \\ &= \frac{56.940 - 48.035}{6.3298815} \\ &= \frac{8.905}{6.3298815} \\ &= 1.4068193 \end{aligned}$$

Decision: The null hypothesis may not be rejected.

Conclusion: The performance on the flexed arm hang is not significantly different in the group utilizing musical accompaniment as opposed to the control group.

Appendix C5

Pairwise Comparison Computations:

Goal Setting Versus Verbal Encouragement Technique

Research Hypothesis: The performance on the flexed arm hang will not be significantly different in the group utilizing goal setting as opposed to the group utilizing the verbal encouragement technique.

Statistical Hypothesis:

$$H_0: \bar{X}_2 = \bar{X}_3$$

$$H_1: \bar{X}_2 \neq \bar{X}_3$$

Computations:

$$\begin{aligned} t &= \frac{\bar{X}_2 - \bar{X}_3}{6.3298815} \\ &= \frac{56.025 - 42.715}{6.3298815} \\ &= \frac{13.31}{6.3298815} \\ &= 2.1027249 \end{aligned}$$

Decision: The null hypothesis may not be rejected.

Conclusion: The performance on the flexed arm hang is not significantly different in the group utilizing goal setting as opposed to the group utilizing the verbal encouragement technique.

Appendix C6

Pairwise Comparison Computations:

Goal Setting Versus Control Technique

Research Hypothesis: The performance on the flexed arm hang will not be significantly different in the group utilizing goal setting as opposed to the control group.

Statistical Hypothesis:

$$H_0: \bar{X}_{.2} = \bar{X}_{.4}$$

$$H_1: \bar{X}_{.2} \neq \bar{X}_{.4}$$

Computations:

$$\begin{aligned} t &= \frac{\bar{X}_{.2} - \bar{X}_{.4}}{6.3298815} \\ &= \frac{56.025 - 48.035}{6.3298815} \\ &= \frac{7.99}{6.3298815} \\ &= 1.2622669 \end{aligned}$$

Decision: The null hypothesis may not be rejected.

Conclusion: The performance on the flexed arm hang is not significantly different in the group utilizing goal setting as opposed to the control group.

Appendix C7

Pairwise Comparison Computations:

Verbal Encouragement Versus Control Technique

Research Hypothesis: The performance on the flexed arm hang will not be significantly different in the group utilizing verbal encouragement as opposed to the control group.

Statistical Hypothesis:

$$H_0: \bar{X}_{.3} = \bar{X}_{.4}$$

$$H_1: \bar{X}_{.3} \neq \bar{X}_{.4}$$

Computations:

$$\begin{aligned} t &= \frac{\bar{X}_{.3} - \bar{X}_{.4}}{6.3298815} \\ &= \frac{42.715 - 48.035}{6.3298815} \\ &= - \frac{5.32}{6.3298815} \\ &= - 0.840458 \end{aligned}$$

Decision: The null hypothesis may not be rejected.

Conclusion: The performance on the flexed arm hang is not significantly different in the group utilizing verbal encouragement as opposed to the control group.