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**THE RELATIVE EFFECTS
OF A LIVE AND VIDEOTAPED INSTRUCTOR
ON RATINGS OF PERCEIVED EXERTION
AND SUBJECTIVE FEELINGS OF STUDENTS
IN AN AEROBIC EXERCISE CLASS**

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DEDICATION

I would like to dedicate the hours and effort contained within these pages to a very dear friend, Tanya Elkins, who departed this world May 11, 1992. Tanya was a dear friend whose cheerful and loving spirit will not be forgotten. I love you, Tanya.

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ABSTRACT

With the increased level of participation in fitness activities, videotaped exercise programs have become extremely popular. The purpose of this study was to determine whether exercising to a live presentation versus exercising to a videotaped presentation during an aerobic dance session had a differential influence on subjects' ratings of perceived exertion (RPE) and their general feelings (FS) about the exercise experience.

A within-subjects design was used, with all subjects experiencing an equal number of exercise sessions under both conditions (live and videotaped). A counterbalanced order was used. The 23 female subjects were from an intact "Exercise to Music" class offered at The University of Tennessee.

The independent variables were the two exercise conditions (live and videotaped), and the dependent variables being measured were the RPE and FS scores. In order to control the intensity of the exercise, subjects were asked to stay within 150-160 beats per minute, which was monitored by using heart rate instruments and palpations taken from the carotid artery in the neck.

No significant difference between the live and videotape conditions for either measure was evident. It is recommended that further studies be conducted integrating the two instruments [Borg's RPE scale (1982) and Rejeski's FS scale (Rejeski, Best, Griffith & Kenney, 1987)] in an applied setting such as a classroom or fitness center.

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CHAPTER I

INTRODUCTION

Enthusiasm for fitness in our society is at an unprecedented level, with millions of people spending countless hours and billions of dollars on some form of exercise. Even with the busy lifestyles our fast-paced society dictates, seven out of 10 adults regularly schedule time for some type of exercise (*Sports Illustrated*, 1986). Whether they are walking on their lunch hours, pumping iron at a health club or hitting tennis balls, Americans are working out at a fever pitch. More than \$29 billion was spent in 1991 for sporting goods and athletic apparel (NSGA, 1992). Millions more are spent on such fitness luxuries as health club memberships and exercise videotapes.

This emphasis on fitness has evolved as a result of several factors. In 1962, President John F. Kennedy began the President's Council on Physical Fitness, increasing our awareness of the need for certain standards of fitness. Those children of the 60s are now the adults of the 90s, with more leisure time than their parents had and a heightened awareness of the benefits of a healthy life-style. Increasing media attention to health issues also has helped educate our population about the positive effects of exercise. Rising healthcare costs have made both individuals and companies aware that cardiovascular fitness and other preventative activities can keep them away from doctors and hospitals longer. Media-projected images of

the "ideal" female body are usually beautiful, thin models with firm breasts, thighs, buttocks and stomachs. The ever-elusive search for the fountain of youth also inspires people of all ages to exercise in order to look and feel younger.

Another reason many people participate in fitness programs is affiliation--an incentive that revolves around opportunities to attain, maintain and consolidate warm personal relationships with other people. Alderman and Wood (1976) found that affiliation was the leading incentive for participation among youth hockey players. Many athletes report they receive the greatest satisfaction from participation when they are with friends and other people. Professional hockey player Bobby Orr said the aspect of playing he would miss the most after retirement was "being with the guys" (Alderman and Wood, 1976). Upon his retirement from professional basketball, Earvin "Magic" Johnson said he would most miss the camaraderie he shared with his teammates and coaches (Johnson, 1991).

These examples also support Maslow's (1962) Theory of Needs. According to Maslow, the social need to belong and be loved is very strong. It might be contended that this need can be met in events occurring in a group setting, such as exercise and fitness classes, running clubs, team sports or other physical conditioning activities.

While most people have good intentions when they begin an exercise program, enthusiasm and regularity sometimes wane very quickly for a variety of reasons. If the workout is considered either too

difficult, too easy, time-consuming or boring, it is easy to justify dropping out. However, Carron, Widmeyer and Brawley (1988) found a significant relationship between group cohesion and individual adherence to physical activity. The results of this study revealed that group members were more likely to continue a fitness program if they felt the class was an integrated group, supporting the notion that the need to belong and be part of a group is a significant contributor to participation and adherence. In this study, participants stayed involved for longer periods of time when a cohesive environment occurred. In 1990, Carron, Brawley and Widmeyer found a positive linear relationship between class size and the level of satisfaction experienced by participants. For whatever reasons, people report being more satisfied when exercising with a group as opposed to working out alone.

Exercising or performing with another person or a group may be more enjoyable for a variety of reasons. When people exercise, their perceptions of the experience may be influenced by the people around them. Hardy, Hall and Prestholdt (1986) found that subjects reported lower ratings of perceived exertion when they performed with someone else than when they exercised alone. These investigators suggested that social influences may affect the relationships between cognitive processes, physiological indicants and the perception of exertion.

Two rating scales have been developed which can help evaluate those relationships. In 1962, Borg developed a scale to assess subjects' ratings of perceived exertion (RPE). The original scale had

15 points with mathematical anchors and was later revised to an 11-point scale (Borg 1982). This simplified scale has numbers which correspond to verbal labels representing different levels of exertion. Subjects are instructed to monitor stimuli such as heart beat, body temperature, work load and respiratory output, and then rate their level of exertion on a scale of 0.5 to 10, where 0.5 refers to very, very weak and 10 corresponds to very, very strong.

The other scale, developed by Rejeski, Best, Griffith and Kenney (1987), differentiates subjects' perceptions about the intensity of exercise and their feelings about their levels of enjoyment. This bipolar "feeling" scale (FS) is used to assess how subjects feel about the level of exercise they experience. More importantly, Rejeski et al. (1987) demonstrated that FS ratings are not necessarily correlated with RPE. For example, two people may be the same age, in the same health category, have similar fitness levels and report the same RPE. However, one person may feel good working out at that level of intensity while the other person may find it unpleasant. In short, the two scales (RPE and FS) appear to differentiate *what* people feel from *how* they feel (Hardy & Rejeski, 1989).

Many factors can affect RPE and/or FS ratings. Studies have shown that RPE is influenced by personality (DeMeersman, 1989), gender (Winborn, Meyers & Mulling, 1988), motivation (Kircher, 1984) and the experience of the subjects (Winborn et al, 1988). Other studies have revealed that FS ratings are influenced by sex-role

orientation (Houchstetler, Rejeski & Best 1985; Rejeski, Best, Griffith & Kenney, 1987) and instrumentation and training (Rejeski, Brodowicz, King & Ribisl, 1982).

As mentioned earlier, Carron et al. (1990) found a positive linear relationship between class size and satisfaction. While some participants enjoyed larger classes and others enjoyed a smaller group setting, all members reported experiencing the greatest satisfaction when personal instructor attention was received. This suggests that when one-on-one instruction and encouragement is offered, participants are more strongly motivated to improve and continue their program (Martins, 1983).

The exact reasons as to why this phenomena occurs may be influenced by the presence and traits of the instructor. Social psychologists such as Bandura have long acknowledged modeling, the learning of new behaviors through observing others, to be one of the most powerful ways of transmitting values, attitudes and patterns of thought and behaviors (Bandura, 1986). Bandura further hypothesized that model characteristics influence attention, and therefore, learning. Thus, it might be argued that the presence of an instructor during a conditioning program has model-like properties.

A good example of the use of modeling is Jazzercise Incorporated (Jazzercise Inc. 1991), a franchised aerobic workout program which conducts extensive training sessions for its new instructors. Instructor trainees are taught to use precise procedures in their class presentations. Poise, enthusiasm and the correct, consistent execution of the aerobic routines are stressed. Instructors

are taught to encourage a happy, energetic, and cohesive atmosphere in their classes. The success of Jazzercise's philosophy and methods is well-documented in this report. Its growth has been steady, and many participants have been in the program for several years. The emphasis Jazzercise places on instructor presentations and group cohesiveness must therefore be thought to have a strong influence on their participants' feelings about the program.

Although designers of activity classes and exercise programs vary in their opinions as to the importance of the instructor, one needs only to attend a Jazzercise or other high-energy aerobics class to see how Bandura's empirical paradigm can be applied to instructor modeling. The kind of workout participants experience may very well depend on the satisfactory or unsatisfactory involvement of the instructor/model. Lackluster instruction might lead to a lackluster class and dissatisfaction with the workout. An instructor who encourages, smiles and appears interested in how the individuals are doing might produce a more satisfied group. Because modeling is an important effector of performance and persistence (Bandura, 1969), there appears to be a difference in what participants feel when a live model is present. On the other hand, if the modeling theory is to be applied to aerobic instructor modeling, an important movement in the exercise and fitness field must be considered: exercise videos. There are a number of popular exercise videos that are presently being marketed with a great deal of success. For example, Misset (1991) sold more than 500,000 copies of her Jazzercise video in one year. A

major assumption underlying these video packages is that the exerciser can experience sensations and directions comparable to those provided by a live instructor. This study is an attempt to determine whether live instructors are a necessity, or if it is possible that a videotaped exercise program can be just as effective in influencing participants' perceptions of exertion and levels of satisfaction.

PURPOSE OF THE STUDY

The purpose of this study was to determine whether exercising to a live presentation versus exercising to a videotaped presentation during an aerobic dance session had a differential influence on (a) subjects' ratings of perceived exertion (RPE), and (b) their general feelings (FS) about the exercise experience.

OPERATIONAL DEFINITIONS

1. Borg's rating of perceived exertion (RPE): Developed in 1962, this is a psychophysiological category scale that requires respondents to estimate the magnitude of exertion they perceive during exercise. It is a measurement of "what" the organism is feeling during exercise (Borg, 1982). The range of responses are from 0.5 to 10, with 0.5

referring to the subject feeling very, very little exertion and with 10 indicating a feeling of very, very strong exertion.

2. Feeling scale (FS): Developed by Rejeski, Best, Griffith and Kenney (1987), this is a bipolar scale used to evaluate dynamic changes in affect during exercise. Subjects rate their moods about the workout. The range of responses is +5 to -5, with verbal anchors of +5 corresponding to "very good" and -5 being "very bad."

3. Moderately vigorous activity: In the present study, the range of working heart rates within which subjects were instructed to remain was determined by using the following formula: $220 - \text{age} \times .65$ and $220 - \text{age} \times .85$ (Hollifield & Trapp, 1989).

4. Aerobic dance activity: An exercise workout that is characterized by continuous rhythmical movement lasting longer than 30 minutes (Boutcher, 1990).

5. Live presentation: An aerobic dance routine where the instructor is physically present to lead the group in the workout.

6. Videotaped (VTR) presentation: An aerobic dance routine where exercise is directed by a pre-recorded videotape of the instructor.

7. Heart rate monitor: An apparatus worn by the subject during exercise. A chest strap is worn just below the breast and a digital wrist watch also is worn. This enables the subject to determine moment-to-moment heart rate.

ASSUMPTIONS

The following were assumptions of this study:

1. Each subject was aware of the level of exertion she was experiencing or perceiving.
2. Each subject was able to remember what she experienced or perceived.
3. Each subject was willing to reveal to the instructor what she experienced.
4. Each subject avoided fabrication of her perceptions and reported her true feelings.

LIMITATIONS

The following were limitations of this study:

1. The study was limited to female students enrolled in activity classes at The University of Tennessee, Knoxville.
2. The results were limited by the ability of the subjects to recall and record their heart rates, perceptions of exertion and feelings during exercise sessions.

DELIMITATIONS

The following represented delimitations of this study:

1. Only students from Exercise to Music classes were used.
2. For control purposes, videotaped instructional sessions were conducted using a pre-recorded videotape of the exercise leader.

SIGNIFICANCE

This study represented an attempt to compare the effects of exercising to a live aerobic dance presentation and exercising to a videotaped aerobic dance presentation on the perceptions of exertion and general feelings of subjects. It was anticipated that the results of this research might be valuable to health facilitators in the development of group exercise programs. The potential motivational aspects of leader presence may be estimated, and the results used to develop programs that will facilitate adherence.

CHAPTER II

REVIEW OF LITERATURE

This chapter is divided into the following three sections: (1) motives, incentives and group dynamics, (2) Borg's rating of perceived exertion scale (RPE) and Rejeski's feeling scale (FS) and (3) instructor influence.

Motives, Incentives and Group Dynamics

There are many social and psychological variables which influence and motivate people to begin an exercise program. This study will investigate some of these factors which affect ratings of perceived exertion and the feelings of subjects in an exercise setting. The theoretical basis of this study will rest on Maslow's (1962) hierarchy of needs.

Maslow's model depicts human needs in a hierarchical manner. The need to belong and be loved tends to emerge once the physiological and safety needs have been met on a consistent basis. Maslow said all of us need to feel wanted and accepted by others. While some of us find this need gratified through our friends or family life, others find it through membership in groups and organizations.

Alderman and Wood (1976) found that a leading incentive for participation in a sport setting is affiliation, an incentive that revolves around opportunities to attain, maintain and consolidate warm personal relationships with other people. An incentive/motivation inventory was given to 425 youth hockey players, ages 11 to 14. The inventory was based on the following seven systems of incentive motivation: (1) independence, (2) power, (3) affiliation, (4) arousal, (5) esteem, (6) excellence, and (7) aggression. Affiliation ranked highest among the youths' reasons for participation.

Because affiliation is such a strong personal motive within team sports, it might be contended that an exercise program that presents a group approach could meet the need to belong. Carron, Widmeyer & Brawley (1988) examined the relationship between group cohesion and individual adherence to physical activity. They found these two factors were directly related. Subjects in this study found participation to be much more enjoyable when other people were present. The research in psychology and sociology confirms that a group can have a great impact on its members (Carron, 1988). Cohesiveness is a dynamic process whereby a group tends to stay together and remain united in the pursuit of its goals and objectives. By definition, cohesiveness contributes to group development, maintenance and the accomplishment of goals. Carron et al (1988) further affirmed this in a cross-sectional study which included fitness class members, recreation sport participants and elite athletes.

The fitness class participants who perceived the groups' task and social aspects to be more attractive tended to continue their programs longer.

A second factor involving the group relates to the impact of group size in an exercise setting. Carron, Brawley and Widmeyer (1990) investigated 41 exercise classes whose membership ranged from five to 46 participants. Three findings were significant: (1) The small and large classes were perceived more favorably than the medium-sized classes, (2) members of large groups experienced a decrease in personal involvement, and (3) members' perceptions of the instruction decreased as the class size increased. This study has direct implications for exercise practitioners whose goals are to enhance individual satisfaction and productivity and to reduce absenteeism and dropouts. Taken together, this research suggests that group factors influenced the perceptions of satisfaction of exercise participants.

Rating of Perceived Exertion and Feeling Scale

Along with incentives, practitioners also are interested in educating participants about exercise workouts. Teaching class members to monitor their physical and psychological characteristics can help the individuals get maximum benefits from an exercise session. One scale developed by G.V. Borg helps participants do just that--attend to physical attributes such as muscle and joint activity,

cardiovascular response and respiratory and central nervous system signals (Borg, 1982). These integrated signals, perceptions and experiences make up a "gestalt" of perceived exertion. Borg's original scale had 15 points with verbal anchors and was primarily used for exercise prescriptions. The anchors and numbers were designed to match the subjects' heart rates. For example, 13 would indicate the subject was working somewhat hard--their heart rate (HR) would be around 130 beats per minute. However, as more research was conducted, Borg found that HR and RPE did not necessarily correspond with each other, and therefore proposed that no single value should be used as an indicator of dangerous strain. Instead, Borg found that the two complement each other (Borg, 1982). Thus, the scale was revised in 1982 to an 11-point scale with anchors from 0.5, indicating a very, very weak response, to 10, indicating a very, very strong physical response.

Ratings of perceived exertion (RPE) during exercise represent subjective assessments of work intensity. This "gestalt" is formed from an overall perception of effort, but the manner in which it is formed is not clearly understood (Mihevic, 1981). The following section will review the effects of personality, gender and social/psychological factors on RPE.

DeMeersman (1989) and Hardy, McMurray and Roberts (1989) found differences in RPE among Type A and B personalities. Both studies used the Jenkins Activity Survey (JAS) to differentiate between the two types. Type A personalities are characterized by some of the following traits: intense, sets high standards, needs to control,

fast thinking, vigilant, self-centered and restless. In this study, subjects were asked to respond to questions from the JAS such as, "How would your wife (or closest friend) rate you?" Subjects responding with the phrase "definitely hard driving and competitive" were considered Type A personalities, while those who responded "definitely relaxed and easy going" were labeled non-Type A (Pervin, 1989).

DeMeersman (1989) measured RPE and neuroendocrine reactivity in 18 undergraduates during a metabolically equivalent physical stressor (cycle ergometry). He found that Type A subjects underrated perceived exertion as compared to Type Bs. Hardy et al (1989) investigated psychophysiological responses of 10 Type A subjects and 10 Type B subjects. Their findings were parallel with DeMeersman's, showing that Type A subjects had a greater response to high intensity exercise stress and differed in their affective reactions to work at various intensities. Type A's were more positive about light-to-moderate exercise, and more negative about the high intensity exercise as compared to Type B's.

Several studies have been done to determine the relationship of gender to RPE. Winborn, Meyers and Mulling (1988) examined the relationship among gender, athletic experience and accuracy in ratings of perceived exertion. While some differences in RPE were revealed, they were related more to experience than to gender.

Specifically, the experienced, athletic females reported lower RPEs than did the less athletic females and the nonathletic males. It was also found that low experienced males reported lower RPEs than high experienced males. This suggests that some psychological mediator other than gender was responsible for the differences between the two groups. Okwumabua, Meyers, Schleser and Cooke (1983) reported similar findings with novice runners.

If it is accepted that males receive a greater amount of encouragement to participate in sport than do females, the results of Winborn et al and Okwumabua et al would indicate that experience is a greater influence on RPE than gender. Their results show that RPE accuracy may be influenced by gender, but that exposure to athletic experience facilitates and overrides gender differences.

Boutcher, Fleischer-Curtian and Gines (1988) examined differences among male and female subjects and the effects of an audience. An "audience" was defined as one or more persons watching, with the subject motivated to please his or her audience. Self-construction was defined as the motive to maintain consistency between one's public self and one's desired self. Baumeister (1982) developed the self-presentation theory which states that individuals generate positive self-images so they will appear attractive, competent and honest to others.

The defining characteristics of audience-pleasing self-presentation is that individuals attempt to present themselves in a favorable manner and in accordance with the values of the audience (Schlenker & Leary, 1982). This aspect of self-presentation is specific

to the characteristics of a particular audience and is generated by the motive to obtain rewards controlled by the audience. Boutcher et al (1988) found males reported lower RPEs at high intensity workloads in the presence of female experimenters, supporting Baumeister's theory. Therefore, it is plausible that male subjects feel that the exercise situations are high in social evaluation. These data support the suggestion that experimenters can influence laboratory studies and that much of the response to exercise stimuli may be a response to motivational and emotional factors associated with the exercise environment (Boutcher et al, 1988).

With respect to motivational considerations, Weiner (1977) suggested that emotions represent major determinants of motives. Weiner suggests that a study of the emotions associated with activity could lead to better understanding and prediction of motivation and behavior. Young (1973) suggests three ways emotions are manifested: (1) the conscious or subjective experience of emotion, (2) physiological changes which take place under specific emotions, and (3) observable emotional behavior such as gritting one's teeth or verbal responses. It is accepted that emotion is a function of how the situation is appraised by the individual and that both arousal and cognitions are necessary determinants of emotion and behavior (Vallerand, 1983).

Evidence supporting the influence of psychological factors on RPE has been provided by manipulating motivational strategies (Rejeski & Ribisl, 1980). They reported that subjects' RPEs were

lower when they were led to believe they would be exercising for 30 minutes as compared to 20 minutes. The authors concluded that psychological influences on RPE may be limited to submaximal work because the effect was not present toward the end of the exercise session when internal physiological cues were most intense.

Hardy, Hall and Prestholdt (1986) conducted two experiments examining the effect of social influence on RPE. In the first experiment, exercisers worked at different workloads on a cycle ergometer alone and then in the presence of another exerciser. Lower RPEs were reported under coaction conditions. Pennebaker & Lightner (1980) found that subjects who heard distracting street sounds through headphones reported less fatigue and noticed fewer physical symptoms than subjects who heard their respiration amplified. In a follow-up investigation, Rejeski (1981) found that subjects' jogging times were better on a cross-country trail, where an increase in external attention was necessary, than on a running track of the same distance. They reasoned that when external cues are salient, responsivity to internal states is diminished. Boutcher & Trenske (1990) examined the effects of sensory deprivation and music on RPE and found that subjects reported lower RPEs when they listened to music and higher RPEs under sound deprivation conditions.

As stated earlier, the RPE is most successfully used in conjunction with the subjects' heart rate. However, current research has shown that using a scale to rate emotions is also beneficial (Rejeski, Best, Griffith and Kenney, 1987). In order to better

understand participant behavior, Rejeski (1981) began thinking about subjects' perceived exertion and how this related to what people think they are doing. Rejeski gave particular attention to noticeable psychological dispositions which substantially affect "effort sense." He and his colleagues reasoned that perceived exertion is integrated with a variety of social and psychophysiological variables. This led to the development of a feeling scale (FS) to help sensitize the subject to emotional cues (Rejeski, Best, Griffith & Kenney, 1987).

This bipolar scale was designed to assess ongoing affective responses during submaximal exercise. It has a range of +5 to -5, with verbal anchors of +5 = very good, +3 = good, +1 = fairly good, 0 = neutral, -1 = fairly bad, -3 = bad, and -5 = very bad (Rejeski, Best, Griffith & Kenney, 1987). Rejeski (1985) explored the notion that perceived exertion may be both an active and a passive process. He argued that subjective estimates of physical work may be antecedents of RPE and that a comparison process should be an active one. Rejeski suggested that when work is performed at less than 85 percent intensity level, psychological information becomes more relevant.

The studies reviewed in this section suggest that many factors influence RPE. Some, such as personality and gender, cannot be controlled; however, they can be taken into consideration when evaluating class members' responses and RPE. Other factors such as experience and audience effect can influence the responses given by exercise participants. This should be taken into consideration when evaluating RPE. As stated earlier, what people *think* they are doing

may be as important as what they are actually doing (Rejeski, 1981). There seems to be a connection between the FS and RPE scales; however, there are few studies to date that have investigated the two together. Hardy and Rejeski (1989) found that FS and RPE responses were somewhat similar but not isomorphic. From a phenomenological perspective, there is a difference between what one feels and how one feels at different intensities of physical work. Their experiment examined the relationship between the two measures and found that as work load increased, stronger physiological responses were reported and RPE was higher. However, FS ratings were lower. Hardy and Rejeski (1989) concluded that the measurement of exercise-related affect is influenced by time and context. They further reasoned that FS ratings may provide a direct measure of the reinforcing property of exercise under moderate levels of intensity; i.e., exercise consistency or exercise addiction. These results are consistent with the earlier work of Rejeski (1981 & 1985) which indicated the existence of a complex relationship among cognitive processes, physiological indicants and perceptions of exertion. Therefore, in the present study, both RPE and FS ratings were obtained under moderate exercise conditions.

Model/Instructor Influences

There are a variety of health and fitness practitioners who would argue that a live exercise instructor is more effective than a videotaped

instructor for teaching purposes. There are several national aerobic certification organizations that train instructors year-round. Their emphasis is on correct dance technique and body work, teaching methods and some motivational modes.

In 1969, Judi Sheppard Misset founded Jazzercise Inc. (1991) on the premise that live is better. Since then, Jazzercise has trained more than 4,700 instructors to teach some 13,000 weekly classes to more than 400,000 students. Yet, in 1982, Misset produced and recorded her first exercise video and sold more than 500,000 copies the first year.

These figures suggest that not only are many people exercising in studios and gyms, but they also are buying exercise videotapes. It is not known how many of these tape buyers are exercising, and if so, what their programs consist of in terms of frequency, duration and intensity. Still, the exercise video market is large, growing and very competitive, and the influence of the instructor in videos seems to be just as crucial as it is in live exercise sessions.

Shape (Veit, 1992) fitness magazine makes an annual analysis of the newest exercise videotapes on the market, rating them on overall instruction, production, quality, creativity and safety. It recently asked respondents questions such as: (1) "Would this routine keep me motivated? (2) Would I get bored in the middle of the workout? (3) Is it safe for beginners, yet challenging enough for the advanced? (4) Is the instructor warm, friendly and knowledgeable? (5) Are the instructions clear and easy to follow? and (6) Do the box or the instructor make any claims that are false or misleading?"

It is apparent from this analysis that the instructor's role is an important consideration for those interested in purchasing exercise videotapes. While there has been little research in the area of aerobic instruction, social psychologists have long acknowledged modeling to be one of the best ways to transmit values, attitudes, thought and behavior patterns (Bandura, 1986). The studies that have been conducted have primarily examined skill acquisition and performance. These studies have not resulted in any clear-cut conclusions as to whether a live model or a videotaped model is more conducive to learning; however, several very important findings have been reported.

Yando, Seitz and Zigler (1978) proposed a two-factor theory of imitation based on Bandura's conceptualization and mediational-contiguity theory (1969). Yando et al's theory addresses three developmental factors: (1) attention span, (2) selective attention and (3) motivational orientation.

The participants' attention span and their selection of attentive responses is related to the actions of the model. How well the participants attend to the model's directions and demonstrations is assumed to directly affect their performances. Motivational orientation addresses the role of intrinsic and extrinsic reinforcers on incentives. Extrinsic motives refer to rewards and punishments that may occur as a result of modeling or not modeling. Yando et al, however, focused on intrinsic/competence-related motives (primary characteristics of the model in relation to the observer). Competence motives refer to the individual's desires to do something well.

According to Harter (1981), when individuals engage in mastery attempts which are seen as successful, they exhibit positive effects such as enhanced self-esteem and a sense of internal control. These characteristics are then predictive of future motivated behaviors.

From the modeling perspective, the central notion would be to meet competence or intrinsic motives by demonstrating optimal challenges for the observer to emulate. Yando et al suggest that choreographing routines that vary in task difficulty, type of instructional strategy, spacing of demonstrations and emphasis on learning versus performance goals are ways of challenging students (Yando, et al, 1978). This can be applied to the routines that aerobic instructors use. This optimal challenging modeling (Yando, et al 1978) also motivates students by increasing their level of selective attention and the length of time in which they are attentive to the instructor and their comments.

When teaching via visual demonstration, two additional characteristics have been shown to influence performance levels-- augmentation and model qualities (McCullagh, Stiehl & Weiss, 1988). Augmented information is used after a movement has been completed or in the form of verbal cues while the person is performing. This feedback may refer to any information not inherent in the task that conveys information to the learner (Newell, Morris & Scully, 1985). Roach and Burwitz (1986) tested Bandura's notion (1986) that verbal cues act as mediators for enhancing cognitive retention and found that the verbal cues enhanced performance. They concluded that

verbally-directed cues may enhance the observer's attention and subsequent performance. Adams (1971) examined the role verbal information plays on learning a task. His closed loop theory relies on knowledge of results (KR). Giving feedback after a movement is completed aids in the learning process and has been linked to better error detection by the subject. It was Adams' contention that by providing subjects with error information, they could better analyze their movements and become active in the learning process.

The second characteristic which may influence performance is model attributes and qualities. Who is demonstrating and what they are saying and doing when demonstrating, are relevant characteristics which may influence the observer. Bandura (1969) presumes that observers will selectively focus their attention to relevant cues dependent on attributes of the model. There have been few tests of this hypothesis, however, several studies have found performance differences for model characteristics such as competence (Baron, 1970), prestige (Mausner, 1953), status level (McCullagh, 1986), age (Bandura & Kapers, 1964), social power (Mischel & Grusec, 1966) and similarity (McCullagh, 1986). McCullagh and Caird (1988) affirm that the effect of model characteristics in observational learning is clear. While model characteristics do affect performance, it is unclear whether these differences are due to attentional or motivational differences and whether learning is affected as suggested by Bandura .

In relating model research to aerobic instruction, it might be inferred that the role of the instructor may be significant. It is very

possible that participant RPEs and FSs can be influenced by instructor appearance (Jazzercise, 1991), perceived similarity (Gould & Weiss, 1981), verbal cues and information (Newell et al, 1985, Roach & Burwitz, 1986), and visual demonstration (Carroll & Bandura, 1982). However, to date, no studies have been conducted in an exercise setting to determine the influence on feeling states of live models versus videotaped models.

In summary, it is reasonable to presume that instructor characteristics may influence the observer's performance, motivation, RPE and FS ratings. However, whether the influence would be different if the model were live or videotaped remains unclear.

CHAPTER III

METHODS AND PROCEDURES

This study was designed to investigate the effects of live and videotaped presentations on the perceptions of exertion and feelings of subjects during submaximal exercise. In this chapter, the following topics are addressed: (a) subjects, (b) task, (c) materials and apparatus and (d) testing procedures.

Subjects

The subjects who participated in this study were 23 female graduate and undergraduate students from an "Exercise to Music" class at the University of Tennessee. This class lasted 7 1/2 weeks. The subjects were volunteers whose ages ranged from 18 to 33 years with a median age of 20. A questionnaire to assess previous exercise experience was completed by 17 of the 23 subjects (Appendix B). The results of this questionnaire indicated that all subjects exercised at least once a week. Approximately half of the subjects had exercised from zero to three months and the other half for 12 months or more. Fourteen of the 17 subjects had participated in organized athletics. Finally, 11 subjects indicated they regularly listened to music when exercising.

The purpose of the study and its participation requirements were explained to each subject. The subjects were told they were not required to participate, and that their grade would in no way be affected by either participating or not participating. Subjects who agreed to participate were asked to sign a consent form (see Appendix A).

Task

The task for this experiment was aerobic dance. Each day, the instructor lead the class in a five-to-10 minute warm-up which was followed by a 30-to 40-minute dance segment and a five-to-10 minute cool-down period. The music used was moderate to fast in rhythmical beats which corresponded to the dance routine designed by the instructor. The instructor encouraged and talked to the participants throughout the workout.

Materials and Apparatus

The materials used for this study included the following:

1. Heart rate monitors: UNIQ heart watch, model 8799, designed by Computer Instruments Corp.

2. Two 14" x 20" posters illustrating Borg's RPE scale and Rejeski's FS scale. The validity ($r=.97$) and reliability ($r=.96$) of the RPE scale has been previously established (Borg, 1982). The FS was derived from Zuckerman and Lubin's (1985) *Manual for the MAACL-R: The multiple affect adjective check list revised*, the validity ($r=.93$) and reliability ($r=.87$) of which were established by those investigators (Zuckerman & Lubin, 1985).
3. A tape cassette with up-tempo music was used in the classroom. A Design portable stereo (used to play the music).

Procedures

Testing took place on Wednesdays and Fridays in an auxiliary gym. The experimenter served as the instructor in both the live and videotaped exercise segments. The routines were designed and choreographed by the experimenter with the level of intensity geared toward a moderate workout (i.e., 150 - 160 beats per minute [bpm]). Identical clothing was worn. Encouraging comments, voice fluctuation, and the type and frequency of remarks were alike for both conditions.

Testing took place under two conditions. In the first, subjects were asked to perform an aerobic dance routine with the instructor. In the second condition, participants exercised to the identical routine performed by the instructor shown on a videotape. Due to limited availability of heart rate monitors, one-third of the participants wore light-weight wrist and chest monitors on each day in order to maintain a working heart rate of 150-160 bpm. The order in which subjects wore the monitors was counterbalanced. Subjects not wearing the monitors palpated their heart rates at the carotid artery for six seconds and multiplied the obtained value by 10. Two posters were placed in the room. One depicted Borg's RPE scale, and the other showed Rejeski's FS ratings. Heart rates (BPM), ratings of perceived exertion (RPE), and feeling scale ratings (FS) were taken and recorded twice during the exercise bout (Appendix B). The heart rate was taken cardiac dance segment and the second about mid-way through the cardiac dance segment. Testing took place over six days with all subjects experiencing three live and three videotaped sessions.

Design

A within-subjects design was used, with all subjects experiencing an equal number of exercise sessions under both conditions (live and videotaped). The following counterbalanced testing order was used: Day 1: Live; Day 2: Videotape; Day 3: Videotape; Day 4: Live; Day 5: Videotape; Day 6: Live.

CHAPTER IV

RESULTS

The purpose of this study was to determine if exercising to a live presentation and exercising to a video-taped presentation had a differential affect on the ratings of perceived exertion or the feelings of subjects.

Since it was possible that heart rate (HR) differences might influence RPE and FS, an attempt was made to ensure that HR for the two exercise conditions, live (L) and videotaped (VTR), was statistically similar. Descriptive statistics for HR, RPE and FS are presented in Table 1.

Inspection of Table 1 reveals that there was little difference in the HR, RPE or FS ratings between the two conditions. However, the mean difference was in the directions predicted. In order to determine whether the HR difference was significant, a one-way ANOVA was performed (Table 2).

The results of the ANOVA revealed no significant difference in HR between exercise conditions. Therefore, it was assumed that any differences found in RPE or FS ratings were due to social and/or psychological factors rather than to physical intensity.

The ANOVAs for RPE and FS are presented in Tables 3 and 4, respectively. Inspection of these tables indicates no significant difference between exercise conditions for either measure.

TABLE 1

**DESCRIPTIVE STATISTICS FOR HEART RATE,
RATINGS OF PERCEIVED EXERTION,
AND FEELING SCALE RATINGS**

Measure	Video		Live	
	Mean	SD	Mean	SD
Heart Rate	158.70	13.08	160.48	13.07
RPE	4.65	1.58	5.13	1.60
FS	1.70	1.94	2.52	2.06

TABLE 2

ANALYSIS OF VARIANCE FOR HEART RATE

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Between Conditions	1	36.54	36.54	.21
Within Conditions	44	7518.61	170.88	<u>P</u> =.65
Total	45	7555.15		

TABLE 3
ANALYSIS OF VARIANCE FOR
RATINGS OF PERCEIVED EXERTION

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Between Conditions	1	2.63	2.63	1.04
Within Conditions	44	111.83	2.54	<u>P</u> =.31
Total	45	114.46		

TABLE 4
ANALYSIS OF VARIANCE FOR
FEELING SCALE RATINGS

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Between Conditions	1	7.85	7.85	2.0
Within Treatments	44	176.6	4.01	<u>P</u> =.17
Total	45	184.5		

CHAPTER V

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

This chapter includes a discussion of the results of the present study and some possible explanations for the findings. The purpose of this study was to determine if exercising to a live instructor versus exercising to a video taped instructor had any differential affect on subjects' RPE and FS scores. Analysis of the data suggested no significant differences between the two conditions.

There are several possible explanations for these findings. Perhaps the facts that the instructor/experimenter was present and that the subjects were exercising with other people in both conditions diminished the influence of the two types of presentations. This suggestion is congruent with Hardy, Hall & Prestholdt's (1986) finding that subjects' RPEs were lower when they exercised with someone else than when exercising alone. A similar finding was reported by Boutcher, Fleisher-Curtian & Gines (1988) in their investigation of audience effects on RPE. They found that male subjects reported lower RPEs when they wished to impress the female experimenter than when exercising with a male experimenter. Thus, it might be contended that the lack of significant differences in the perceptions of exertion and feelings in the two exercise conditions used in this study was due to the fact that the instructor was in the classroom when both

conditions were experienced by subjects and that other exercisers were present as well.

A third factor that might be considered is the verbal cues and encouragement given by the instructor in both conditions. People go to classes to be motivated and encouraged to exercise. In this study, cues and encouraging statements were limited and consistent for both conditions. Augmented feedback has been shown to enhance the modeling affect on motor performance (McCullagh, Stiehl & Weiss, 1988). Perhaps this is due to the attentional focus of the observers. Attending more closely to the instructor may draw subjects' attention away from salient internal cues and toward more external cues. This can be seen in the Pennebaker & Lightner (1980), Rejeski (1981), Boutcher & Trenske, (1990) and Hardy, Hall & Prestholdt (1986) studies. These studies found that as subjects' external focus increased, responsivity to internal cues decreased. The hypothesis that the present study rests upon was based on the premise that a live instructor would more likely promote external focus by subjects than would a videotaped instructor, thus affecting RPE and FS ratings. However, the findings did not indicate a difference in the effects of live versus videotaped presentations.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this study, it was concluded that there were no differences in RPE or FS scores under the two exercise conditions (live versus video taped).

To date, there have been few studies that have simultaneously assessed RPE and FS scores. The value of the present study is that it looked at these two factors within a normal classroom setting. The following recommendations are offered for the consideration of future investigators:

1. More studies are needed combining the use of RPE and FS scales to help determine the effects of exercise variables on each.
2. Studies are needed investigating whether exercising alone or exercising under live conditions or exercising alone with an instructor present has any differential effect on subjects' RPEs or FS ratings.
3. An applied study is needed that compares the effects of exercising alone to a videotape with exercising in a "real world" group setting with a live instructor since these are likely the two most popular exercise environments in use today.

4. An applied study is needed that focuses on the social interaction between instructor and students and how this relates to performance and persistency in an exercise program.

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APPENDICES

Appendix A
CONSENT FORM

I, _____ hereby volunteer to participate in a research study examining my feelings about aerobic exercise.

I understand that I will be asked to rate my perceived exertion and my general feelings about the exercise before and during two routine sessions of aerobic dance. I will also be asked to wear a lightweight wrist monitor and a sensor strap around the rib cage area. This instrumentation will permit moment-to-moment heart rate monitoring in beats per minute. I understand that I may ask questions of the experimenter at any time, and may choose not to participate or to withdraw from the study at any time without penalty. I understand that whichever decision I choose, it will have no influence on my grade in the class. I also understand that I may obtain feedback about my performance and receive a summary of the results of the study if I so desire.

I understand that my data will remain confidential and that only group scores will be discussed in written reports.

DATE _____ PARTICIPANT'S
SIGNATURE _____

Experimenter:
Yvonne Harrison Cook
Under the direction of Dr. C. Wrisberg
344 HPER
University of Tennessee
Knoxville, TN 37996-2700
(615) 974-5111

Appendix B**ATTENTION QUESTIONNAIRE**

(The frequency of subjects' responses are given in parentheses)

1. Sex M _____ F _____ Age _____
2. How long have you been exercising for fitness?
 (7) 0 - 3 months
 (2) 3 - 12 months
 (8) 12 months or longer
3. How frequently do you exercise?
 (13) 1 - 3 times per week
 (2) 4 - 5 times per week
 (1) 6 - 7 times per week
4. Were you ever involved in organized athletic competition?
 (14) Yes (3) No
5. List the activities you were involved in:

6. How long do you exercise at a time?
 ___ 0 - 20 min.
 ___ 20 - 30 min.
 ___ 30 - 40 min.
 ___ 40 min. or longer
7. How would you characterize your intensity training?
 ___ Low intensity
 ___ Moderate intensity
 ___ High intensity

INSTRUCTIONS FOR QUESTIONS 8 - 16

The following statements concern your attention while exercising. Please indicate on a scale from 1 to 7 how true you feel these statements are with regard to your exercise program. Please do not leave any statements unmarked.

EXAMPLE: I listen to a "walkman" while I run.

1. Never or almost never true
2. Usually not true
3. Sometimes but infrequently true
4. Occasionally true
5. Often true
6. Usually true
7. Always or almost always true

Thus, if you listen to a "walkman" every time you run, you would circle 7.

EXAMPLE: I listen to a "walkman" while I run.
1 2 3 4 5 6 7

Never or almost never true	Usually not true	Sometimes but infrequently true	Occasionally true	Often true	Usually true	Always or almost always true
1	2	3	4	5	6	7

8. When I exercise, I do not listen to my breathing.

1 2 3 4 5 6 7

9. When I exercise, I think about concerns other than exercise.

1 2 3 4 5 6 7

10. I do not feel physical discomfort when exercising.

1 2 3 4 5 6 7

11. When I exercise, I sing to myself.

1 2 3 4 5 6 7

12. When I exercise, I do not think about how my body feels.

1 2 3 4 5 6 7

13. When I exercise, I talk to myself.

1 2 3 4 5 6 7

14. I like to exercise with a partner for conversation.

1 2 3 4 5 6 7

15. When I exercise, I listen to music.

1 2 3 4 5 6 7

16. I ignore my heart beat when exercising.

1 2 3 4 5 6 7

Appendix C

NAME _____

<u>Borg's Rating of Perceived Exertion (RPE)</u>		<u>Feeling Scale (FS)</u>	
0	Nothing at all	-5	Very bad
0.5	Very, very weak (just noticeable)	-3	Bad
1	Very weak	-1	Fairly bad
2	Weak (light)	0	Neutral
3	Moderate	+1	Fairly good
4	Somewhat strong	+3	Good
5	Strong (heavy)	+5	Very good
6			
7	Very strong		
8			
9			
10	Very, very strong (almost max)		

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
	W NW	W NW	W NW	W NW	W NW	W NW
	L V	L V	L V	L V	L V	L V
BPM	__ __	__ __	__ __	__ __	__ __	__ __
RPE	__ __	__ __	__ __	__ __	__ __	__ __
FS	__ __	__ __	__ __	__ __	__ __	__ __

VITA

Yvonne Harrison Cook was born in Macon, Georgia, on August 13, 1961. She received a B.S. in Health, Physical Education and Recreation from The University of Tennessee at Chattanooga in May, 1984, and was certified to teach biology and health and physical education in grades K through 12.

Cook was a health and physical education teacher in the Dinwiddie County, Virginia, public school system from 1984 to 1990. During that time, she also coached girls fast pitch softball and both boys and girls varsity tennis. From 1986 to 1991, she served as assistant manager, head life guard, swim instructor, lifeguard instructor and water aerobics instructor at the Sutherland Mannor Swim Club in Sutherland, Virginia, and was a tennis instructor and aerobic instructor for the Dinwiddie Recreation Department.

In August, 1990, she entered graduate school at The University of Tennessee, Knoxville, majoring in sports psychology. She received the Master of Science degree in August, 1992.