MUSIC’S EFFECT ON HEART RATE, RATINGS OF PERCEIVED EXERTION, AND AFFECT OF OLDER WOMEN PARTICIPATING IN WATER EXERCISE

by

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ABSTRACT

MUSIC’S EFFECT ON HEART RATE, RATINGS OF PERCEIVED EXERTION, AND AFFECT OF OLDER WOMEN PARTICIPATING IN WATER EXERCISE

Maureen Ann Davin

The purpose of this study was twofold: (a) to determine the effect of music on heart rate, ratings of perceived exertion (RPE), and affect of older adult female participants during water exercise and (b) to determine if exercising in the preferred music condition would produce more benefits than exercising in the nonpreferred and no-music conditions. Heart rate was measured with Polar F1 heart rate monitors. Ratings of perceived exertion was measured with Borg’s RPE Scale. Affect was measured with the Exercise-Induced Feeling Inventory. There were no significant differences in the heart rate, RPE, or affect in the 3 music conditions. Results indicate that RPE is an accurate gauge for measuring the exercise intensity of older adults participating in water exercise.

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CHAPTER I
INTRODUCTION

In the past 30 years, there has been an increased participation in activities to promote fitness. Aerobic exercise, bench step, and aquatic classes have all been created to allow people who were not interested in running or walking to participate in fitness exercise. However, fitness professionals realize that for complete benefit it is important not only to recruit these participants in recreational programs, but also to retain them. Music has been suggested as an important component of mood enhancement and may help to make the workout more enjoyable and more beneficial for these individuals (Dwyer, 1995; Tenenbaum et al., 2004; Wales, 1985). Music may aid in fostering recall of pleasurable memories and this may help to block the unpleasant feelings that could surface while working out (Gfeller, 1988).

While music may contribute to an overall sense of enjoyment while exercising, it is also important to consider the specific effects music has on exercise participants. A determination needs to be made concerning the effects of music on how hard people actually exercise, how hard they perceive the exercise to be, and how good they feel while exercising. If the research indicates that there is a significant positive difference in performance or attitude during exercise with the addition of music, then the instructors
may decide to use music during their classes. Additionally, instructors need to consider whether their choices of music make a difference on (a) how the participants feel during exercise and (b) how hard they exert themselves. If it is shown that there is not a significant difference in performance or attitude during exercise using either preferred or nonpreferred music, instructors may decide to use music that they themselves prefer and not have to worry that the class will suffer because of possibly choosing the wrong music.

More research is needed concerning the specific effects of music on exercise participants because results from previous studies are both inconclusive and conflicting. Various aspects of the use of music during exercise have been studied. Researchers have examined the use of slow music, fast music, and no music (Becker et al., 1994; Becker, Chambliss, Marsh, & Montemayor, 1995; Coutts, 1965; Ferguson, 1993; Hayakawa, Miki, Takada, & Tanaka, 2000; Lee, 2001; Pearce, 1981; Smith, 1987); the use of music and no music (Schwartz, Fernhalt, & Plowman, 1990; Uppal & Datta, 1990); the use of self-selected music and no music (Boutcher & Trenske, 1990; Crust, 2004; Markowicki, 1982; Miller, 1984; Nethery, 2002; Pates, Karageorghis, Fryer, & Maynard, 2003; Pfister, Berrol, & Caplan, 1998; Potteiger, Schroeder, & Goff, 2000; Zilonka, 1999); the use of different styles of music and no music (Tenenbaum et al., 2004); the use of continuous music, intermittent music, and no music (Beckett, 1990); and the use of familiar and preferred music and unfamiliar and nonpreferred music (Patton 1991). This study is (a) the first to investigate music’s effect on heart rate, perceived exertion, and affect during water exercise; (b) the first to examine the use of music with older adults participating in water exercise; and (c) the second to include preferred and nonpreferred music.
Significance of the Research

The number of older adults in our population is continuing to grow. It is very important to get this segment of our population exercising because exercise will help to increase their quality of life. Staying physically fit helps older adults to prevent or lessen many of the physical effects that aging has on the body (Mazzeo, 2000). Physical activity also helps to enhance the physiological, psychological, and social well-being of these individuals (World Health Organization, 1997).

Water exercise is the exercise of choice for many older adults who decide to start a fitness program (Sova, 1995). Many older adults suffer from physical impairments that limit their ability to participate in land exercise. Many suffer from knee, back, and ankle injuries. The buoyancy of the water allows older adults to experience less pressure on their joints and less strain on their body (Ekberg, 1990). In the water, older adults can perform many exercises that would be impossible for them to perform on the land. Water exercise is becoming more and more popular with this segment of the population and, in the future, as our population continues to age, many older adults will decide to join this type of fitness program.

Once older adults decide to start a fitness program, every effort needs to be made to keep them from dropping out. One way to accomplish this is to give them a workout that they enjoy and that they perceive to be beneficial to their well-being. In an aerobic exercise program, music may be a major contributor to making a workout more enjoyable. It also provides the rhythm needed to promote continual movements that may help to increase the heart rate, therefore, increasing the intensity of the workout.
Statement of the Purpose

The purpose of this study was twofold: (a) to examine music’s effect on heart rate, ratings of perceived exertion (RPE), and affect of older adult female participants during water exercise and (b) to determine whether exercising in the preferred music condition would produce more benefits (higher heart rate, lower RPE, and higher affect) than exercising in the nonpreferred and no-music conditions. The results obtained from this study will help instructors to make wise choices concerning the music that they use while conducting their classes.

Research Questions

1. Will there be a statistically significant difference in the heart rate of a group of older women participating in water exercise in the following music conditions: preferred, nonpreferred, and no music?
2. Will there be a statistically significant difference in the RPE of a group of older women participating in water exercise in the following music conditions: preferred, nonpreferred, and no music?
3. Will there be a statistically significant difference in the affect of a group of older women participating in water exercise in the following music conditions: preferred, nonpreferred, and no music?

Research Hypotheses

1. There will be no statistically significant difference in heart rate in any of the three music conditions.
2. There will be a statistically significant difference in RPE in the preferred music condition. Ratings of perceived exertion scores in the preferred music condition will be significantly lower than the RPE scores in the nonpreferred and no-music conditions.

3. There will be a statistically significant difference in affect in the preferred music condition. The scores for positive engagement, revitalization, and tranquility will be significantly higher in the preferred music condition as compared to the scores for these feeling states in the nonpreferred and no-music conditions. Scores for physical exhaustion will be significantly lower in the preferred music condition as compared to the scores for physical exhaustion in the nonpreferred and no-music conditions.

Definition of Terms

Affect. Affect is the conscious subjective aspect of emotion or feeling.

a-VO2 difference. a-VO2 difference is the difference in the oxygen content between the venous and arterial blood.

Frenetic music. Frenetic music has a very fast beat.

Mellow music. Mellow music has a slow beat.

Perceived exertion. Perceived exertion is the degree of strain and heaviness experienced during exercise as determined by the participant.

RPE scale. The Ratings of Perceived Exertion Scale, developed by Borg (1998), helps people to determine their level of exercise intensity.
Submaximal exercise performance. Submaximal exercise performance is exercising at less than your maximal effort.

Tempo. Tempo is the rate of speed at which a musical selection is played.

VO2max. VO2max is the measure of the body’s ability to use oxygen efficiently.

Water exercise. Water exercise is a workout done in the water. For this study, the exercising took place in the shallow end of a swimming pool.
CHAPTER II
REVIEW OF THE LITERATURE

Music has been used in exercise classes for many decades. With the arrival of aerobics, music took on a more important role in providing a way for people to have more fun and enjoyment while exercising. Many exercise programs today use some type of music to enhance the affective and physical responses of the participants. Music has the potential to affect people in a variety of ways. It can increase muscular energy, increase molecular energy, alter metabolism, influence heart rate, help to release emotions, relieve fatigue, speed recovery and healing after surgery, and stimulate thinking, sensitivity, and creativity (Webb & Webb, 1990).

Many studies have been conducted to determine music’s effect on people’s physical and emotional responses. These studies have had results indicate music does, indeed, have an effect on people. Music can help women who are in labor (a) with their breathing, (b) to not focus so much on their discomfort, and (c) to relax (Hanser, Larson, & O’Connell, 1983). Music can help alleviate the anxiety that dental patients experience by helping them relax during the procedures (Corah, Gale, Pace, & Seyrek, 1981). Music tempo can cause people to bite faster while eating (Roballey et al., 1985), and music can help people do better at performance tasks (Davenport, 1974; Fontaine &
Schwalm, 1979). Music can also have a negative effect on performance since it can cause students to lose their concentration while taking tests (Smith & Morris, 1977).

While music has been shown to affect people in a variety of ways, the focus of this literature review will be on how music affects people both physiologically and psychologically when exercising. I will first explain the importance of exercise for older adults. I will then describe the benefits that older adults receive from participating in a water exercise program. Next, I will examine music’s effect on performance, heart rate, perceived exertion, and affect during exercise. Finally, I will look at the importance of using familiar and preferred music during exercise.

Exercise and Older Adults

Naturally, today’s population is becoming older and by 2020 there will be an estimated 51 million older adults. This will represent 20% of the population (American Council on Exercise, 1998). There are currently over 35 million older adults in the United States and half of them are over 75 years of age; of these, 75% do not exercise at levels that will benefit them (Clark, 1992). It is important that exercise professionals provide exercise programs for this age group.

In 1997, the World Health Organization (WHO) issued guidelines for promoting physical activity among older adults. Along with these guidelines, they listed the many benefits that older adults gain from exercising. Physical activity helps older adults (a) to improve their psychological and physical health, (b) to increase their overall well-being, and (c) to live independently. It also helps in controlling obesity, stress, and hypercholesterolemia; reduces the risk of hypertension, diabetes, and coronary heart
disease (World Health Organization, 1997); helps to reverse or stop the onset of osteoporosis (Elder & Campbell, 1997); helps in the management of painful conditions; and helps to reduce complications from other diseases. The immediate benefits of physical activity are that sleep is improved, adrenaline and noradrenaline levels are stimulated, and blood glucose levels are regulated. The long-term effects are that cardiovascular endurance is improved, muscles are strengthened, flexibility is increased, and balance and coordination are improved (World Health Organization).

Aerobic exercise helps to improve or maintain cardiac output as well as lung and heart function. People experience a 5% to 15% loss in VO2max (maximal oxygen consumption) every 10 years after age 25. By age 65, there can be up to a 40% decrease in VO2max. Maximal heart rate also decreases six to ten beats every decade. As people age, they will experience a reduction in cardiac output and stroke volume. They will also experience a reduction in a-VO2 difference and blood pressure will increase. However, exercise helps to offset some of the declines that are experienced due to aging. Older adults who exercise can experience a 10% to 30% increase in VO2max. They also can expect to experience higher levels of physical activity and a higher submaximal endurance capacity (Mazzeo, 2000).

Many older adults have health problems and are recovering from surgeries and accidents (Clark, 1994). Eighty-five percent of the older adult population suffer from at least one chronic degenerative disease. Most older adults also lead a sedentary life style. Physical inactivity is the cause of at least 50% of the reduction in functioning that older adults encounter (Elder & Campbell, 1997). Exercise can, therefore, increase the
functional capacities of older adults and can help to extend their independent living capabilities and improve their quality of life (Mazzeo, 2000).

Older adults will also experience psychological benefits from exercise. These include general well-being, reduced anxiety and stress, relaxation, less depression, mood elevation, improved performance in fine and gross motor skills, improvements in cognitive functioning, and the acquisition of new skills. Finally, physical activity promotes social benefits. These benefits include the following: they help them to live independently, play more of an active role in the community, have more of an opportunity for social interaction, and help to prevent them from withdrawing from society (World Health Organization, 1997).

Not only do the older adults benefit greatly from regular exercise, society also reaps the benefits. Since physical activity helps to reduce or delay the onset of many chronic diseases and frailty, health care and social care costs are greatly reduced. Older adults also feel better and are healthier. This allows them to contribute more to society and better enables them to share with the rest of society the wisdom and wealth of experiences that they have gained over their lifetime (World Health Organization, 1997).

*Water Exercise*

Water exercise is one of older adults’ most preferred methods of exercise. This is a form of exercise that is done in the water and involves using rhythmic movement performed at different levels of intensity or difficulty. The exercises are often done to music (Clark, 1994). Water exercise increases cardiovascular conditioning and, at the same time, helps to tone muscles in the body. Today women and older adults make up the
majority of water exercise participants. It is the older adult population’s increased interest in this form of exercise that has caused the greatest growth in water exercise fitness programs (Midtlying, 1990).

Water exercise is a good exercise choice for older adults. Many older adults refrain from physical activity because they are afraid of injury. The aging process causes the deterioration of bones and muscles that can increase the risk of injury caused by stress placed on the body. There is less chance for injuries to occur when exercising in the water. A water exercise workout causes less compression on the joints than is experienced during land exercise (Evenbeck, 1986). The buoyancy of the water reduces the muscular-skeletal stress put on the body (Chu & Rhodes, 2001).

The buoyancy that the water offers can benefit people who are suffering from knee, back, and ankle injuries (Ekberg, 1990). Buoyancy also helps to protect people from dynamic and fast movements. It puts less strain on the body and helps to prevent many of the injuries that people receive during land aerobics that produce jarring and bumping movement. Buoyancy also allows for strengthening and toning in muscles with less fatigue and soreness. People must constantly try to stabilize themselves when they are exercising in the water. This results in the use of all the major muscles in the body. The buoyancy of the water also helps to support the limbs and causes the range of motion in the limbs to increase (Bayne, 1987).

Several studies have been conducted to determine whether water exercise produces benefits for the older adult participants. Takeshima et al. (2002) conducted a study on older adult women and reported that water exercise helped to improve the cardiovascular fitness, muscle strength, power, agility, flexibility, pulmonary functions,
and blood lipids of the women. Wininger (2002a) and Wantanabe, Takeshima, Okada, and Inomata (2000) conducted studies on older adults in water exercise programs and concluded that water exercise helped to reduce the rate of state anxiety among the participants.

In conclusion, water exercise appears to be a good workout choice for older adults. There are many positive outcomes that can be attained from this form of exercise, including physiological, psychological, and social benefits. Water exercise also provides a rehabilitation method for older adults who have chronic medical problems and is a form of exercise that helps to increase strength, endurance, flexibility, and fitness levels. This is oftentimes accomplished without having to experience pain (Clark, 1994). As our population continues to age, more of these programs must be implemented to accommodate the great need for older adults to exercise and stay fit.

Music’s Effect on Exercise Performance

Numerous studies have been conducted that focus on whether the use of music has an effect on aspects of exercise such as performance, heart rate, perceived exertion, and affect. The first area that will be examined is music’s effect on performance. There have been many studies conducted to determine whether music helps to improve performance. Some studies have had results that indicated performance was enhanced with the use of music. Becker et al. (1994) found that, overall, both frenetic and mellow music equally increased the performance levels of the participants on stationary bikes, whereas older adults showed no improvement in performance with the use of music. The researchers concluded it was nonpreferred music that was a major factor as to why the older adults
did not make any improvements. Therefore, in their study a year later on walking exercises for older adults, Becker et al. (1995) used music that the older adults enjoyed. This study had results that indicated that frenetic music significantly increased the distance that older adults walked and mellow music had a negative effect.

Beckett (1990) conducted a study to determine whether exercising to continuous and intermittent music on a favorite radio station increased the walking performance of students ages 18 to 22. The results of this study showed that the students in the music condition walked significantly farther than when they walked in the no-music condition. Markowicki (1982) conducted a study on college students running on a treadmill and reported that exercising to favorite and chosen music significantly enabled them to perform the task for a longer period of time. The participants in that study were able to bring a cassette of their favorite music to use during the music condition.

In another study conducted by Szabo, Small, and Leigh (1999), university students were tested while exercising on stationary bikes to no music, slow music, fast music, slow-to-fast music, and fast-to-slow music. The results of that study indicated that a significantly higher workload was accomplished in the slow-to-fast music condition. It was hypothesized that the increased workload was due to the temporary distraction that occurred when the tempo of the music increased. Music has also had a positive effect on exercise performance among high school girls. Ward and Dunaway (1995) discovered that contingent music (the music would stop if the girls stopped running) helped the girls to increase the number of laps from one to three per minute.
Music also helped to increase grip strength. Karageorghis, Drew, and Terry (1996) reported that both male and female college students evidenced significantly higher grip strength after listening to fast music as compared to the grip strength reported in the slow-music and no-music conditions. Crust (2004) concluded that self-selected music helped the college participants to increase the time they were able to suspend a weight during a muscular endurance task. Ferguson, Carbonneau, and Chambliss (1994) concluded that music was more beneficial than no music at increasing the performance of a karate drill. Pates et al. (2003) reported that the three collegiate netball players in their study improved their shooting performance in the self-selected music condition. Anshel and Marisi (1978) concluded that music synchronized with desired movements significantly increased the ability of college-age students to endure an exercise task. Johnson, Otto, and Clair (2001) reported that instrumental music was more effective than no music at improving older adults’ movements during a physical therapy program. The movements that were performed without music were less fluid.

The use of music has also shown positive effects on swimming performance. Dillon (1952) reported that music improved the swimming speed and form of intermediate swimmers. Hume and Crossman (1992) concluded that music helped competitive swimmers have better on-land practice behaviors. As one can see, many studies indicated that performance was enhanced with the use of music—especially fast music. There are, however, many studies that have indicated the opposite results.

Dorney, Goh, and Lee (1992) described how dart-throwing performance was not enhanced by listening to classical music or fast music before the event. Pearce (1981) reported that listening to frenetic music had no effect on grip strength, while listening to
mellow music decreased strength. Little (1982) found that the different rhythms of rock,
waltz, and shuffle music made no difference in the strength that college students
demonstrated using their forearm muscles. Geisler and Leith (2000) reported that female
college students showed no improvement in shooting foul shots with the use of music.
Leslie (1967) concluded that music did not increase the running speed of 7th-grade girls.

Nelson (1963) described how different styles of music had no effect on increasing
the performance of college students performing a bicycle egometer task. The styles of
music included marching, mellow, and white sound. The music had fast or slow rhythm
with either low or low-to-high intensity. Schwartz et al. (1990) also measured music’s
effect on young adults in their early twenties performing bicycle ergometer exercise.
They reported that music did not have an effect on the submaximal exercise performance
of the participants. Pujol and Langenfeld (1999) conducted a study that included
exercising done at three levels: maximum, mean, and minimal. The college students
performed the exercises on a cycle ergometer--once with music and once without music.
The researchers concluded that music had no effect on the exercise performance at any of
the levels.

Studies have also been conducted to determine whether music affects walking
performance. Lee (2001) conducted a study on older adults in a walking activity. He used
different types of music: slow, fast, and natural. He concluded that the participants
walked further in the setting with no music. Zilonka (1999) conducted her walking study
using college students. They were able to choose either classical, Broadway, or march
music. Zilonka found that the walking tapes did not elicit the speeds that the makers of
the tapes purported. Finally, Pfister et al. (1998) found no difference in treadmill walking
performance of patients with chronic obstructive pulmonary disease in the control walk and the chosen-music walk conditions. The combined results of the studies measuring performance gains are conflicting--14 studies indicated that performance was enhanced in the music condition and 11 studies indicated that performance was not affected in the music condition.

Music’s Effect on Heart Rate

Studies have also been conducted in an attempt to find out whether heart rate is affected by music. Once again, there have been conflicting results concerning this issue. Beckett (1990) pointed out that music during walking had a significant effect on college students’ recovery heart rate. The three music conditions were no music, continuous music, and intermittent music. The results from this study showed that music could help to improve recovery heart rate. Uppal and Datta (1990) conducted a study on junior high school girls to determine whether music had an effect on increasing heart rate while exercising. Since it is important for the heart rate to be raised during exercise to get the maximum benefit, this factor is an important one to consider. The results of the study indicated that music was significantly effective at increasing heart rate. Smith (1987) conducted a study on female college students performing treadmill exercise and reported that heart rate was significantly higher in the fast-music condition; however, heart rate was significantly lower during the second and fifth stages of the workout in the slow-music condition as compared to the no-music and fast-music condition.

Other studies have had results that showed that heart rate was lower with the use of music. Szmedra and Bacharach (1998) conducted study on men, ages 19 to 32,
performing a treadmill exercise and concluded that exercising to headphone music significantly lowered the heart rate of the participants. Copeland and Frank (1991) conducted a study on college students exercising on treadmills and reported that heart rate was significantly lower in the music condition (headphone music) as compared to heart rate in the no-music condition.

Other studies indicated that music did not affect heart rate. Boutcher and Trenske (1990) concluded that there were no significant differences in the heart rate of the college students when exercising on a cycle ergometer with or without music. The three conditions used in this study included favorite music, no music, and a control group. Coutts (1965) also found that male college students, exercising on cycle ergometers to the conditions of fast, slow, and no music, had no difference in heart rate among the three conditions. Ferguson (1993) discovered that there were no significant differences in the heart rate of the college students exercising on cycle ergometers to fast rock music, slow classical music, and no music. Potteiger et al. (2000) found no difference in the heart rate of the physically active subjects ages 18 to 30 exercising on a cycle ergometer in the following music conditions: no music, fast music, classical music, and self-selected music.

Szabo et al. (1999) found no difference in the heart rate among university students exercising to no music, slow music, fast music, slow-to-fast music, and fast-to-slow music. Patton (1991) conducted a study on participants in an aerobic dance class, finding no significant difference between the heart rate during familiar and preferred music and unfamiliar and nonpreferred music. Abraham and Thomas (1999) concluded that there were no significant differences in the heart rate of the female college students performing
a maximal graded treadmill walking exercise to fast tempo music, slow tempo music, and no music. Finally, in a series of three studies, Tenenbaum et al. (2004) reported that the university students running in two different conditions (on treadmills and outside in a natural setting) had no significant differences in heart rate when exercising in the music conditions (rock, dance, and inspirational) and the no-music condition. These researchers chose music selections that had melodies and rhythms that young adults view as being motivating. The combined results of all the studies that examined music’s effect on heart rate were conflicting. Two studies indicated that heart rate was higher, two studies indicated that heart rate was lower, and eight studies indicated no significant differences in heart rate in the music conditions as compared to the no-music condition.

Music’s Effect on Ratings of Perceived Exertion

Another factor that may be affected by including music in an exercise routine is perceived exertion, or the amount of strain and heaviness that a person feels during physical work. This is measured by a specific rating method such as Borg’s Ratings of Perceived Exertion (RPE) Scale (Borg, 1998). Borg’s RPE scale has become a common measure in the area of exercise training and testing. It is very popular because it is easy to understand and use. In the exercise setting, ratings of exertion, breathlessness, and muscle fatigue are determined by using the RPE scale. The RPE scale reflects various signals that the body processes while exercising, such as signals received from the peripheral joints and muscles and signals received from the respiratory, cardiovascular, and central nervous system. Therefore, perceived exertion may be the best way to indicate the amount of physical effort that a person exerts during exercise (Borg, 1982).
The RPE scale is recognized as being an easy way to monitor exercise intensity. It is thought to be a safe method to use because it makes no assumptions about the health or fitness of the person using the scale (Eston & Williams, 1988). The RPE scale is perhaps the most accepted subjective measure of perceived exertion (Ceci & Hassmēn, 1991).

Borg (1998) initially used simple scales to rate exertion while exercising. The first scale included seven levels and had simple verbal expressions such as number 1 corresponding to a perceived effort of \textit{very, very light} to number 7 corresponding to a perceived exertion of \textit{very, very hard}. The first RPE scale, which was developed in the 1960s, had 21 levels with wording that is similar to the present Borg scales (Borg, 1982). Borg’s (1998) new revised scale has 15 levels, starting with number 6, which corresponds to \textit{no exertion}, ending with number 20, corresponding to \textit{maximum exertion} (see Appendix A). Borg believes that the scale of 6 to 20 should be used when performing exercise testing (Borg, 1982).

The RPE scale has been reported to have high validity and reliability. Eston and Williams (1988) determined that the RPE scale was a useful measure for determining exercise intensity during cycling. They reported that reliability increases as the intensity increases and as the participants become familiar with the task and the Borg scale. Dunbar et al. (1991) concluded that the RPE measure is more reliable during cycle exercise than during treadmill exercise. Their findings indicated that the RPE provides a physiologically valid and simple method to gauge exercise intensity. Overall, studies on the Borg scale have shown validity and reliability rates in the range of .80 to .90 (Borg & Noble, 1974; Borg, 1998). Thus, it appears that the RPE scale is a good measure to use in exercise training and prescription.
When using RPE, there is a question as to whether or not external environmental cues can result in a rating that is either too low or too high. Borg acknowledges that factors such as heat, music, and social interactions may affect a person’s ability to correctly determine ratings of perceived exertion (Borg, 1998). Pennebaker and Lightner (1980) reported that environmental factors that focus a person’s attention away from the body could cause a person to rate their perception of physical symptoms and fatigue lower than they would if they were not focusing on external environmental cues.

There have been several studies that have been conducted to determine whether the external environmental factor of music has an effect on a person’s perceived exertion. Many of these studies have had results that indicated music can make participants feel so good that they may rate their exertion at a lower level than they are really experiencing. This may have an effect on adherence to exercise programs, because people may enjoy and continue to come back to exercise classes more frequently if they perceive that they are not exerting much effort and still feel they are reaping the benefits from the exercise (Johnson & Siegel, 1992).

Many people rate their RPE lower in music conditions compared to no-music conditions. Boutcher and Trenske (1990) found that the female college students exercising to music on a cycle ergometer at a low level of intensity rated their RPE at a lower level than those exercising in the no-music condition. However, exercising with music at moderate and higher levels of intensity did not affect the RPE level. In this study, the participants in the music condition were able to bring their own favorite music on a cassette tape. Nethery (2002) conducted a study on young adult males performing a cycling exercise and reported that RPE was significantly lower during the high-and
low-intensity bouts of exercise when self-selected upbeat music was used, as compared to
the condition in which no music was used. Potteiger et al. (2000) conducted a study on
physically active young adults exercising on a cycle ergometer and reported that RPE was
significantly lower in the music conditions (fast, classical, and self-selected) as compared
with the no-music condition.

Markowicki (1982) conducted a study on college students performing treadmill
exercises. Ratings of perceived exertion was significantly lower in the chosen-music
condition as compared to the no-music condition. Szmedra and Bacharach (1998)
conducted a study using men performing treadmill running and reported that exercising to
headphone music significantly lowered the RPE that was reported when they had
exercised with no music. Finally, Miller (1984) conducted a study on healthy males, ages
19 to 30, who performed treadmill running, and concluded that the RPE was significantly
lower exercising to headphone music as compared to exercising to no music.

Hayakawa et al. (2000) had opposite results than these previously mentioned
studies. In their study, conducted on a bench stepping exercise session, these researchers
reported that the RPE of the middle-aged women was significantly higher when
exercising to synchronous music as compared to exercising to no music.

Many studies have had results that indicated that music did not affect RPE. During
a bicycle ergometer test, Schwartz et al. (1990) reported that the RPE of the 20 men and
women, ages 18 to 26, was not affected by the use of music during exercise. Even though
the participants said that they perceived the exercise was easier in the music condition, as
compared to the no-music condition, the RPE was not significantly different between
conditions. Wales (1985) conducted a study on men, ages 18 to 28, who exercised on a
bicycle ergometer. The results of that study indicated there were no significant
differences in the RPE exercising to fast rock and roll music, slow classical music, and no
music.

Lee (1989) conducted a study on male college students who performed treadmill
running and found no significant differences in the conditions of slow (baroque) music,
upbeat music, and no music. Abraham and Thomas (1999) conducted a study on female
college students who performed treadmill exercise and reported no significant differences
in RPE in the following conditions: fast tempo, slow tempo, and no music. Tenenbaum et
al. (2004) reported that the RPE of the college students, running in three separate studies,
were not affected when music (rock, dance, and inspirational) was used during their
performance task. Pfister et al. (1998) conducted a study on patients with chronic
obstructive pulmonary disease who performed a treadmill-walking task and reported
results that showed that RPE was not affected by the use of chosen music. Smith (1987)
concluded that there were no significant differences in the RPE of the female college
students exercising at a submaximal level on a treadmill to fast music, slow music, and no
music. Zilonka (1999) also concluded that music did not have a significant effect on the
RPE of college students during a walking program. Finally, Patton (1991) reported no
significant difference between RPE of a group of female aerobic dance students who
exercised to unfamiliar and nonpreferred music and the same group of aerobic dance
students who exercised to familiar and preferred music.

In conclusion, six studies indicated that RPE was significantly lower with the use
of music. One study showed that RPE was significantly higher with the use of music, and
nine studies indicated that there was no significant difference in RPE with the use of
Music. These results are once again conflicting. Ratings of perceived exertion are closely related to affect which is the next factor that will be examined.

**Music’s Effect on Affect**

There have been several studies that have been conducted to determine whether music has a positive effect on affect. Many of these studies have indicated that music does indeed have a positive effect on affect. Gauvin and Rejeski (1993) developed an instrument to measure feeling states during exercise. This instrument is the Exercise-Induced Feeling Inventory (EFI; see Appendix B). They developed the EFI to assess both positive and negative feeling states that are experienced while exercising. Other measures have concentrated on assessing negative feeling states. A popular measure, the Profile of Mood States Inventory, included only one positive mood scale--the vigor subscale (Gauvin & Rejeski).

The EFI was developed to measure feeling states that directly relate to physical activity. Gauvin and Rejeski (1993) conducted five separate studies that described methods and produced data that helped to provide evidence that the feeling scale has reliability, content validity, and construct validity. The first study was conducted in order to decide which adjectives should be included in the EFI. Previous measures used phrases, but the researchers in this study decided to use one-word adjectives instead. The adjectives were narrowed down to the 12 items that are currently used to measure the four feeling states that include positive engagement, revitalization, tranquility, and physical exhaustion. The items for the subscales are enthusiastic, happy, and upbeat (positive engagement); refreshed, energetic, and revived (revitalization); calm, enthusiastic, and
peaceful (tranquility); and fatigued, tired, and worn-out (physical exhaustion). “The subscales have good internal consistency, share expected variance with related constructs, are sensitive to exercise interventions, and appear responsive to the different social contexts in which activity may occur” (Gauvin & Rejeski, p. 403).

Bozoian, Rejeski, and McAuley (1994) conducted a study a year after the EFI was developed in order to give further evidence to the construct validity of the feeling scale when used in a controlled laboratory setting. The study was conducted using female college students who recorded their responses to the EFI before, during, and after exercising. The results of that study provided further evidence to support the validity and reliability of the EFI.

Boutcher and Trenske (1990) used Rejeski, Best, Griffith, and Kenney’s (1987) Feeling Scale in their study. Rejeski et al. had developed an earlier version of the present EFI in order to assess the affective responses that people experience while exercising. They concluded that participants exercising on cycle ergometers at medium and high intensity had a significantly higher affect when music was playing than when there was no music playing. They concluded that the music may have created upbeat emotional states. The music may have reminded the participants of good memories and helped them fantasize and think about good things that may happen in the future.

Using an abbreviated version of the Profile of Mood Scales, Hayakawa et al. (2000) reported that the mood state of the participants was much more positive when music was played during the bench-stepping exercise. The participants exercising to aerobic dance music and Japanese folk music felt significantly less fatigued and had a more positive mood state than they experienced when they exercised to no music. Using a
survey with a Likert-type scaling, Zilonka (1999) indicated that music during a walking activity allowed the participants to experience more enjoyment while exercising. Tenenbaum et al. (2004) reported that the college runners believed that music (rock, dance, and inspirational) helped them feel better and more motivated during the beginning of the run. As the workload increased, however, music was not as effective as acting as a distracter to the pain, exertion, and fatigue that the runners were experiencing. Wales (1985) used the Profile of Moods States Inventory to measure affect. The results of his study showed that the individuals who exercised to fast music, as compared to slow music, had lower levels of fatigue, anger, and depression. There were, however, no differences found in the categories of confusion, vigor, and tension between the two conditions.

Brownley, McMurray, and Hackney (1995) concluded that the untrained runners, compared to trained runners, experienced more positive affect when running at low and high intensity levels while listening to fast music as compared to listening to slow and no music. The trained runners, however, reported that their affect was lowest during the music conditions. Finally, Dwyer (1995) conducted a study on female aerobic dance participants who exercised by themselves to an aerobic videocassette. The experimental group was led to believe that the music that was used was selected from a survey of their preferred music. The control group was not surveyed about their preferred music. The results from this study showed that the experimental group had significantly higher enjoyment and higher interest than the control group. The experimental group also had significantly increased intrinsic motivation. The results of this study indicate that familiar and chosen music may help to enhance a workout.
There have been other studies that indicated music did not enhance the affect of the participants during exercise. Using the EFI to measure affect, Lee (2001) conducted a study that used fast, slow, and natural music and reported that the no-music condition had a more positive effect on the feeling states of the older adult participants. Patton (1991) conducted a study using the revised Multiple Affect Adjective Checklist and reported no significant difference of affect between the group of aerobic students exercising to familiar and preferred music and the group of aerobic students exercising to unfamiliar and nonpreferred music. Little (1982) conducted a study on college students participating in strength training and concluded that music did not affect the mood activation level as measured by Thayer’s Activation-Deactivation Adjective Checklist. Once again, there are conflicting results related to whether or not music has an effect on affect while exercising. Seven studies indicated that there was a significant positive effect in the music condition as compared to the no-music condition, two studies indicated that there was no significant difference in the music conditions, and one study indicated that there was a significant positive effect in the no-music condition as compared to the music conditions.

Familiarity and Preference of Music

Music is used in the majority of group exercise classes. The main reason that music is used is to provide a rhythmic pattern that encourages participants to work at a particular cadence. It also provides the motivation that will help the participants work at an intensity that is high enough to produce cardiovascular benefit (Ivens & Hudspeth, 2003). This motivation to work hard is especially needed in the water environment in which the water temperature may be cool. In cool water conditions, the participants may
need to move quickly as soon as they enter the water in order for them to warm up (Ivens, 1998).

When instructors of exercise classes are choosing music for their classes, they need to consider what types of music will be best for the population at hand. Instructors should be aware of the type and style of music that the participants enjoy. The participants will usually prefer to listen to music that addresses their personal likes (Sariscsany, 1991). Wininger and Pargman (2003) noted the most important factors that helped students enjoy exercise classes were the instructor and the music. The researchers indicated that exercise instructors should focus on the tempo and beat of the music when deciding what music to use in their classes. They also suggested that instructors should get feedback from students regarding how they feel about the music that is being used.

Gfeller (1988) also concluded that instructors should find out what musical styles the participants enjoy and prefer. She suggested instructors use music that fits with the participants’ musical taste and should use the preferred music in their classes. Gfeller discovered that the university students in her study enjoyed the following types of music while exercising and listening: rock, pop, new wave, songs from the 1950s and 1960s, jazz, punk, easy listening, and soul. She also suggested that instructors should consider choosing songs that have the ability to call to mind pleasing extracurricular associations. Ivens (1998) believes that pop music is a favorite in aerobics classes because it has a continuous and consistent beat. This beat matches the exercise format in which instructors use a repetition format that has multiples of 4, 8, 16, and 32.
Summary

It is indicated by the research included in this review that there are conflicting results in regard to music’s effect on the variables of performance, heart rate, perceived exertion, and affect. Some studies indicated that music had a significantly positive effect on one or more of these variables, some studies indicated that music had a significantly negative effect on one or more of these variables, and other studies have indicated that music had no significant effect on one or more of these variables.

It appears, however, that when participants were either given a choice of music or were able to exercise to preferred music, the results indicated that music had a favorable effect on one or more of these variables: performance, heart rate, RPE, and affect. Only two studies (Patton, 1991; Pfister et al., 1998) had results that indicated preferred music had no positive effect on any of these variables.

Could it be possible that many of the results of the other studies that have been included in this literature review would have had different results if the participants had been able to choose the music they preferred? Could it be possible that the results would have indicated that music had a positive effect on one of the following variables: performance, heart rate, RPE, or affect—just like the other studies that had included this choice? Additional research is needed in order to examine the possibility that the key to music’s positive effect on a workout is correlated to the choices of music used during that workout. Preferred music may be a major factor in contributing to positive gains made while exercising.
CHAPTER III

METHOD

The purpose of this investigation was to determine music’s effect on heart rate, perceived exertion, and affect of older women participating in a water exercise program. The independent variable was music and the three music conditions were (a) preferred music, (b) nonpreferred music, and (c) no music. The dependant variables were the following: (a) heart rate, which was measured with the use of Polar F1 heart rate monitors; (b) perceived exertion, which was measured with the 15-point Borg’s Ratings of Perceived Exertion (RPE) Scale (Borg, 1998); and (c) the four feeling states of positive engagement, revitalization, tranquility, and physical exhaustion, which were measured with Rejeski’s Exercise-Induced Feeling Inventory (EFI; Gauvin & Rejeski, 1993). A determination was made as to music’s effect on these three variables.

Participants

The participants, ages 63 and older, were female students in a water exercise class. All the participants were informed of their rights to anonymity and confidentiality. The Institutional Review Board for Human Subjects at The University of West Florida approved this study in October 2004 (see Appendix C). In order to participate in the study
the subjects signed an informed consent form (see Appendix D). At the onset of the study, the women were not informed about the purpose of the study; they were only told that the results would help instructors to develop better strategies for improving methods of instruction.

The research study was conducted at a local indoor swimming pool during the spring of 2005. The participants were enrolled in three sections of an aquatic exercise class. Data was collected from each section during four class sessions over a 2-week period. There were a total of 27 women who participated from the three classes. Of these 27 women, the data obtained from 2 women were eliminated from the analysis due to the choice of music preference that they made. The most preferred music selection from their class section was not the first or second choice of their preferred music.

Data Collection

Before the testing began, the participants filled out a survey containing a list of six groups of music selections--music from the 1940s, 1950s, 1960s, 1970s, 1980s, and today’s alternative rock music (see Appendix E). They were asked to rate these groups of music from 1 (most preferred) to 6 (least preferred). The music used in the nonpreferred music and the preferred music conditions was determined by using a number scale. If a participant rated a music group selection as 1 (most preferred), a score of 1 was given; for a rating of 2, a score of 2 was given; for a rating of 6 (least preferred), a score of 6 was given. The participants’ scores from each separate section were added together. The music group selection that received the lowest score was used for the preferred music
condition and the music group selection that received the highest score was used for the nonpreferred music condition for that section.

During the first class session of the study, the participants learned how to use the heart rate monitors and how to determine RPE. While determining the heart rate and RPE during this class session, music was not used. During this session, the participants also practiced completing the EFI and recording heart rate and RPE scores.

During the next three class sessions, three music conditions were used. During one of the sessions, the selection of music rated number 1 (most preferred) as determined by the overall preference of the entire group was used. The first and second group chose music from the 1940s as their most preferred music. The third group chose music from the 1950s as their most preferred music. During one of the sessions, selections rated number 6 (least preferred) as determined by the overall preference of the entire group was used. All three groups chose today’s alternative rock music as their least preferred music. Finally, during one of the sessions no music was used.

It was predetermined that the scores of the participants who did not rate the group’s overall most preferred selection as 1 or 2 and the group’s overall least preferred selection as 5 or 6 would not be included in the analysis. However, the scores of the participants who rated the group’s most preferred selection as 5 or 6 and rated the group’s least preferred selection as 1 or 2 would be included in the analysis. The data of two participants could not be included in the study, because the group’s choice of most preferred music was not their first or second selection of preferred music.

The order of the three music conditions was different for each class section. For example, the order for one section was no music, most preferred music, and least
preferred music. The order for another section was least preferred music, no music, and most preferred music. During the two music conditions, the specific selection played had a BPM (beats per minute) of 125 to 130. The exercises and order of exercise in each class session was consistent (see Appendix F). All subjects participated in all three conditions (preferred music, nonpreferred music, and no music). There were make-up classes provided for those individuals who were absent for any of the music conditions.

Heart rate and RPE were taken at 5, 10, 15, and 20 minutes into the aerobic segment of the workout. The participants used china markers to record their scores on a clipboard that was on the side of the pool in close proximity to them. In order to determine if music had an effect on the participants’ feeling states, immediately before and after class the participants filled out the EFI. The EFI is a 12-item tool that requires the participants to rate on a scale of 5 points, ranging from 0 (do not feel at all) to 4 (feel very strongly), the degree to which they experience the 4 affective states.

Instruments

*Polar F1 Heart Rate Monitors*

Polar heart rate monitors are very accurate (Heart-Rate Monitors, 2003). Compared to the other available brands of heart rate monitors that can be used in the water, Polar is the most popular and widely used monitor.

*Borg’s Ratings of Perceived Exertion Scale*

Perceived exertion was measured using Borg’s Ratings of Perceived Exertion (RPE) Scale. The scale of 6 to 20 was used for this study inasmuch as Borg suggests that...
this scale be used when doing exercise testing (Borg, 1982). Studies have shown reliability of this instrument in the range of .80 to .90 (Borg & Noble, 1974).

*Exercise-Induced Feeling Inventory*

Affect was measured by using the EFI. This instrument includes 12 items that measure the following four feeling states: positive engagement, revitalization, tranquility, and physical exhaustion (Gauvin & Rejeski, 1993).

**Analysis**

A one-way ANOVA was used to determine whether there were any statistically significant differences at the .05 alpha level in the heart rates of older female water exercise participants exercising to preferred music, nonpreferred music, and no music. A one-way ANOVA was also used to determine whether there were any statistically significant differences at the .05 alpha level in the RPE of older female water exercise participants exercising to preferred music, nonpreferred music, and no music.

In order to determine whether there were any statistically significant differences in the feeling states of older women during water exercise, the subscale scores of the 4 feeling states of the EFI served as the dependent variables. The scores on the inventory were determined by subtracting the EFI pretest scores from the EFI posttest scores. Four separate ANOVA were conducted using the scores obtained for each of the four separate feeling states: positive engagement, revitalization, tranquility, and physical exhaustion.
Pilot Study

A pilot study was conducted at a local recreation club. The study yielded valuable information regarding changes that needed to be made in the methodology used during this research study. Specific changes were made in response to the pilot study. Instead of two preliminary sessions, in which the older adults become familiar with the instruments, there was only one session. It was apparent that the participants were able to understand how to use these instruments in just one session. Instead of one poster of the Borg’s RPE scale, there were three and they were a much larger size so the older adults were better able to see the scale. China markers were used instead of waterproof markers to record heart rate and RPE because the lead did not smear on contact with water. Finally, a clearer and more in-depth explanation was given regarding how to complete the EFI.
CHAPTER IV

RESULTS

The purpose of this study was to determine music’s effect on heart rate, ratings of perceived exertion (RPE), and affect of older women during water exercise. Each participant exercised to the following music conditions: no music, nonpreferred music, and preferred music. Heart rate and RPE were recorded at 5, 10, 15, and 20 minutes into the aerobic segment of the workout. Heart rate was measured with the use of Polar F1 heart rate monitors and RPE was measured with Borg’s Ratings of Perceived Exertion Scale. Affect was measured by using the Exercise Induced Feeling Inventory (EFI). This scale was used to determine music’s effect on the following feeling states: positive engagement, revitalization, tranquility, and physical exhaustion. The participants completed the inventory before and after the exercise session. The EFI pretest scores were subtracted from the EFI posttest scores to determine the participants’ scores for each of the four subscales. The purpose of this chapter is to present the results of the study. The results of the one-way analysis of variance (ANOVA) test as well as descriptive statistics will be presented for heart rate, RPE, and the four feeling states.
Participants

The participants in this study were women ages 63 to 87. The average age of the women was 74.6, with a standard deviation of 6.31. They were all students in three separate continuing education classes that were offered through a local junior college. Data of 25 of the participants were used to examine heart rate and RPE. Although there were 27 participants at the onset of the study, the data of 2 of the women had to be eliminated from the analysis because their choice of music did not concur with the group’s overall first or second choice for preferred music. The analysis of the EFI included only 20 of the participants because 5 participants failed to correctly complete one or more of the six inventory forms.

Data Analysis

The data for heart rate, RPE, and the four separate feeling states of positive engagement, revitalization, tranquility, and physical exhaustion were each analyzed separately by using a one-way ANOVA. Descriptive statistics were also calculated for each of these variables.

Heart Rate

It was hypothesized that there would be no significant differences in heart rate in the three music conditions. The overall mean heart rate score for the three music conditions was 92.79. The mean heart rate score for the no-music condition was 92.06, the mean heart rate score for the nonpreferred music condition was 92.91, and the mean heart rate score for the preferred music condition was 93.39 (see Table 1). A one-way
ANOVA indicated no significant differences in the heart rate scores in the three music conditions at the .05 level of significance (see Table 2). Therefore, the hypothesis for heart rate was supported.

Table 1

Means, Standard Deviation, and Minimum and Maximum Heart Rate Results of 25 Women Exercising to Three Different Music Conditions

<table>
<thead>
<tr>
<th>Music condition</th>
<th>M</th>
<th>SD</th>
<th>Minimum HR</th>
<th>Maximum HR</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-music</td>
<td>92.06</td>
<td>12.43</td>
<td>70.75</td>
<td>115.25</td>
</tr>
<tr>
<td>Nonpreferred</td>
<td>92.91</td>
<td>14.42</td>
<td>68.75</td>
<td>121.25</td>
</tr>
<tr>
<td>Preferred</td>
<td>93.40</td>
<td>13.94</td>
<td>67.50</td>
<td>119.50</td>
</tr>
<tr>
<td>Average</td>
<td>92.79</td>
<td>13.45</td>
<td>67.50</td>
<td>121.25</td>
</tr>
</tbody>
</table>

*Note.* HR = heart rate.

Table 2

One-Way Analysis of Variance Summary for the Heart Rate of 25 Women Exercising to Three Different Music Conditions

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>2</td>
<td>22.86</td>
<td>11.43</td>
<td>.06</td>
</tr>
<tr>
<td>Within groups</td>
<td>72</td>
<td>13362.39</td>
<td>185.59</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>74</td>
<td>13385.25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ratings of Perceived Exertion

It was hypothesized that RPE scores would be significantly lower in the preferred music condition as compared to the nonpreferred and no-music conditions. The overall mean RPE score for the three music conditions was 12.35. The mean RPE score for the no-music condition was 12.36, the mean RPE score for the nonpreferred music condition
was 12.35, and the mean RPE score for the preferred music condition was 12.3 (see Table 3). A one-way ANOVA indicated no significant differences in the RPE scores in the music conditions at the .05 level of significance (see Table 4). Therefore, the hypothesis for RPE was not supported.

Table 3

Means, Standard Deviation, and Minimum and Maximum RPE Results of 25 Women Exercising to Three Different Music Conditions

<table>
<thead>
<tr>
<th>Music condition</th>
<th>M</th>
<th>SD</th>
<th>Minimum RPE</th>
<th>Maximum RPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-music</td>
<td>12.36</td>
<td>1.42</td>
<td>9.00</td>
<td>14.00</td>
</tr>
<tr>
<td>Nonpreferred</td>
<td>12.35</td>
<td>1.44</td>
<td>9.25</td>
<td>14.50</td>
</tr>
<tr>
<td>Preferred</td>
<td>12.34</td>
<td>1.41</td>
<td>9.25</td>
<td>14.50</td>
</tr>
<tr>
<td>Average</td>
<td>12.35</td>
<td>1.41</td>
<td>9.00</td>
<td>14.50</td>
</tr>
</tbody>
</table>

Note. RPE = ratings of perceived exertion.

Table 4

One-Way Analysis of Variance Summary for the RPE of 25 Women Exercising to Three Different Music Conditions

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>2</td>
<td>.01</td>
<td>.002</td>
<td>.001</td>
</tr>
<tr>
<td>Within groups</td>
<td>72</td>
<td>146.12</td>
<td>2.029</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>74</td>
<td>146.13</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. RPE = ratings of perceived exertion.

Positive Engagement

Positive engagement was determined with the use of the EFI. The three adjectives used in this study were enthusiastic, happy, and upbeat. The participants indicated the extent to which they experienced the feelings before and after exercise. A scale of 0 (do
not feel at all) to 4 (feel very strongly) was used. The scores for this subscale were determined by subtracting the EFI pretest scores from the EFI posttest scores.

It was hypothesized that the scores for positive engagement would be significantly higher in the preferred music condition as compared to the nonpreferred and no-music conditions. The mean score for all three music conditions was .40. The mean score for the no-music condition was .40, the mean score for the nonpreferred music condition was .52, and the mean score for the preferred music condition was .28 (see Table 5). A one-way ANOVA indicated no significant differences in the scores for positive engagement in the music conditions at the .05 level of significance (see Table 6). Therefore, the hypothesis for positive engagement was not supported.

Table 5

Means, Standard Deviation, and Minimum and Maximum Scores for the Positive Engagement Feeling State of 20 Women Exercising to Three Different Music Conditions

<table>
<thead>
<tr>
<th>Music condition</th>
<th>M</th>
<th>SD</th>
<th>Minimum score</th>
<th>Maximum score</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-music</td>
<td>.40</td>
<td>1.01</td>
<td>-2.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Nonpreferred</td>
<td>.52</td>
<td>.85</td>
<td>-3.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Preferred</td>
<td>.28</td>
<td>.76</td>
<td>-2.00</td>
<td>3.00</td>
</tr>
<tr>
<td>Average</td>
<td>.40</td>
<td>.88</td>
<td>-3.00</td>
<td>4.00</td>
</tr>
</tbody>
</table>

Table 6

One-Way Analysis of Variance Summary for the Positive Engagement Feeling State of 20 Women Exercising to Three Different Music Conditions

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>2</td>
<td>1.63</td>
<td>.82</td>
<td>1.05</td>
</tr>
<tr>
<td>Within groups</td>
<td>177</td>
<td>137.57</td>
<td>.78</td>
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<tr>
<td>Average</td>
<td>179</td>
<td>139.20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Revitalization

Revitalization was determined with the use of the EFI. The three adjectives used in this subscale were refreshed, energetic, and revived. The participants indicated the extent to which they experienced each of the feelings before and after exercise. A scale of 0 (do not feel at all) to 4 (feel very strongly) was used. The scores for the subscale were determined by subtracting the EFI pretest scores from the EFI posttest scores.

It was hypothesized that the scores for revitalization would be significantly higher in the preferred music condition as compared to the nonpreferred and no-music conditions. The overall mean score for revitalization for all three music conditions was .78. The mean score for the no-music condition was .67, the mean score for the nonpreferred music condition was .82, and the mean score for the preferred music condition was .87 (see Table 7). A one-way ANOVA indicated no significant differences in revitalization in the music conditions at the .05 level of significance (see Table 8). Therefore, the hypothesis for revitalization was not supported.

Table 7

Means, Standard Deviation, and Minimum and Maximum Scores for the Revitalization Feeling State of 20 Women Exercising to Three Different Music Conditions

<table>
<thead>
<tr>
<th>Music condition</th>
<th>M</th>
<th>SD</th>
<th>Minimum score</th>
<th>Maximum score</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-music</td>
<td>.67</td>
<td>1.05</td>
<td>-1.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Nonpreferred</td>
<td>.82</td>
<td>1.19</td>
<td>-1.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Preferred</td>
<td>.87</td>
<td>1.05</td>
<td>-1.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Average</td>
<td>.78</td>
<td>1.09</td>
<td>-1.00</td>
<td>4.00</td>
</tr>
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</table>
Table 8

One-Way Analysis of Variance Summary for the Revitalization Feeling State of 20 Women Exercising to Three Different Music Conditions

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>2</td>
<td>1.3</td>
<td>.65</td>
<td>.54</td>
</tr>
<tr>
<td>Within groups</td>
<td>177</td>
<td>213.25</td>
<td>1.21</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>179</td>
<td>214.55</td>
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<td></td>
</tr>
</tbody>
</table>

Tranquility

Tranquility was determined with the use of the EFI. The three adjectives used in this subscale were calm, relaxed, and peaceful. The participants indicated the extent to which they experienced each of the feelings before and after exercise. A scale of 0 (do not feel at all) to 4 (feel very strongly) was used. The scores for this subscale were determined by subtracting the EFI pretest scores from the EFI posttest scores.

It was hypothesized that scores for tranquility would be significantly higher in the preferred music condition as compared to the nonpreferred and no-music conditions. The overall mean score of all three music conditions was .41. The mean score for the no-music condition was .35, the mean score for the nonpreferred music condition was .54, the mean score for the preferred music condition was .33 (see Table 9). A one-way ANOVA indicated no significant differences in the scores for tranquility in the music conditions at the .05 level of significance (see Table 10). Therefore, the hypothesis for tranquility was not supported.
Table 9

Means, Standard Deviation, and Minimum and Maximum Scores of the Tranquility Feeling State of 20 Women Exercising to Three Different Music Conditions

<table>
<thead>
<tr>
<th>Music condition</th>
<th>M</th>
<th>SD</th>
<th>Minimum score</th>
<th>Maximum score</th>
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</thead>
<tbody>
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<td>No-music</td>
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<td>1.17</td>
<td>-4.00</td>
<td>3.00</td>
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<td>Nonpreferred</td>
<td>.53</td>
<td>1.03</td>
<td>-2.00</td>
<td>3.00</td>
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<tr>
<td>Preferred</td>
<td>.33</td>
<td>.97</td>
<td>-3.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Average</td>
<td>.41</td>
<td>1.04</td>
<td>-4.00</td>
<td>3.00</td>
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</tbody>
</table>

Table 10

One-Way Analysis of Variance Summary for the Tranquility Feeling State of 20 Women Exercising to Three Different Music Conditions

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<th>Source</th>
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<th>SS</th>
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<th>F</th>
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</thead>
<tbody>
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<td>Between groups</td>
<td>2</td>
<td>1.48</td>
<td>7.39</td>
<td>.68</td>
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<tr>
<td>Within groups</td>
<td>177</td>
<td>191.92</td>
<td>1.08</td>
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<tr>
<td>Average</td>
<td>179</td>
<td>193.40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Physical Exhaustion

Physical exhaustion was determined with the use of the EFI. The three adjectives used in this subscale were fatigued, tired, and worn out. The participants indicated the extent to which they experienced each of the feelings before and after exercise. A scale of 0 (do not feel at all) to 4 (feel very strongly) was used. The scores for this subscale were determined by subtracting the EFI pretest scores from the EFI posttest scores.
It was hypothesized that the scores for physical exhaustion would be significantly lower in the preferred music condition as compared to the nonpreferred and no-music conditions. The overall mean score in the three music conditions was -.20. The mean score for the no-music condition was .00, the mean score for the nonpreferred music condition was -.47, and the mean score for the preferred music condition was -.13 (see Table 11). A one-way ANOVA indicated no significant differences in physical exhaustion in the music conditions at the .05 level of significance (see Table 12). Therefore, the hypothesis for physical exhaustion was not supported.

Table 11

Means, Standard Deviation, and Minimum and Maximum Scores of the Physical Exhaustion Feeling State of 20 Women Exercising to Three Different Music Conditions

<table>
<thead>
<tr>
<th>Music condition</th>
<th>M</th>
<th>SD</th>
<th>Minimum score</th>
<th>Maximum score</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-music</td>
<td>.00</td>
<td>.92</td>
<td>-3.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Nonpreferred</td>
<td>-.47</td>
<td>1.38</td>
<td>-4.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Preferred</td>
<td>-.13</td>
<td>1.24</td>
<td>-3.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Average</td>
<td>-.20</td>
<td>1.21</td>
<td>-4.00</td>
<td>2.00</td>
</tr>
</tbody>
</table>

Table 12

One-Way Analysis of Variance Summary for the Physical Exhaustion Feeling State of 20 Women Exercising to Three Different Music Conditions

<table>
<thead>
<tr>
<th>Source</th>
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<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>2</td>
<td>6.93</td>
<td>3.47</td>
<td>2.42</td>
</tr>
<tr>
<td>Within groups</td>
<td>177</td>
<td>253.87</td>
<td>1.43</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>179</td>
<td>260.80</td>
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</table>
CHAPTER V

CONCLUSIONS

Introduction

The purpose of this study was to determine the effect that music has on the heart rate, perceived exertion, and affect of older adult participants in a water exercise program. The review of the literature indicated that when preferred music was used, there was usually a positive effect on one of the following: performance, ratings of perceived exertion (RPE), or affect. However, several studies found no significant difference in heart rate with the use of preferred music. While this study included unique participants (older women), it was expected that the results would indicate that the use of preferred music would have a positive effect on both RPE and affect. However, results of this study did not show a significant positive effect on either RPE or affect. In this chapter, a discussion of these results is outlined. Also included are limitations of this study, conclusions, and recommendations for future research on this topic.

Discussion of Findings

The participants in this study showed no significant differences in heart rate, RPE, or affect when exercising to the following three different music conditions: no music,
nonpreferred music, and preferred music. Even though no significance was found in the results, there are important implications from this study. Addressed in the following sections are RPE and older adults and affect and older adults and their implications.

*Ratings of Perceived Exertion and Older Adults*

Some researchers believe that older adults may not rate their RPE as accurately as younger adults may. The results of previous studies have indicated that the RPE scale is a very reliable and valid instrument in measuring the exercise intensity of young, healthy adults (Borg, 1973). There has been concern, however, that age may affect the RPE results (Borg, 1998). For example, Bar-Or (1977) suggested that as age increased, the correlation between heart rate and RPE decreased. One possible reason for this may be that many older adults suffer with physical ailments. In fact, 85% of older adults suffer from at least one chronic degenerative disease (Elder & Campbell, 1997). Even Borg (1998) warns that people with diseases may not accurately rate RPE because they may focus too much attention on the pain they are suffering because of their physical conditions. Borg and Linderholm (as cited in Borg, 1998) determined that when people with diseases were included in studies, the correlation between heart rate and RPE went from .85 to .50 or .70.

The results of the present study contradict these findings, for age did not affect the ability of the older women to rate their RPE during water exercise and they correctly measured exercise intensity by using the RPE scale. The average heart rate of the participants exercising in all three conditions was 92.79 and the average RPE was 12.35. The heart rate of 92.79 would, therefore, indicate that the participants were exercising at
an intensity that was about 63% of the maximal training heart rate for people who are 75 years old. The RPE of 12.35 would indicate that the participants were rating their exertion correctly for the exercise intensity indicated, for the number 12.35 on Borg’s RPE scale does correlate to 63% on the target heart rate range (American College of Sports Medicine, 1998). It appears that the RPE scale is, therefore, a good gauge of exercise exertion for older women during water exercise. This is especially true for women who are experienced water exercisers.

There has also been concern that the RPE scale may not be accurate when used in a setting where there is social interaction or where music is used. Borg, who developed the RPE scale, stated that “factors in the environment, such as music, heat, and social context, may distract or cause them to attend to special cues, resulting in their selection of a rating that is too high or too low” (Borg, 1998, p. 38). The results of this study are contrary to this concern, for they indicated that using music in an environment where there is social interaction did not affect the ability of older women to accurately rate RPE during water exercise.

These results give further evidence that water exercise is a good choice of exercise for older women. It appears that older women can exercise at an exercise intensity that is perfect for attaining positive physiological benefits during water exercise. The results of this study demonstrated that older women consistently did not overexert themselves in the water environment. They also did not underestimate or overestimate their effort.
The results from this present study indicated no significant differences in the four feeling states (positive engagement, revitalization, tranquility, and physical exhaustion) while exercising in all three music conditions. These results are consistent with Patton’s (1991) study that used preferred and nonpreferred music in a group exercise setting. Patton concluded that the participants were more focused on the instructor than the music. She interviewed some of the college women who participated in her study and relayed the following information:

At the conclusion of this study, subjects were asked about their feelings regarding the music and if there was a preference of one aerobic tape or the other used in this study. Subject response indicated that music was incidental to the class and very little attention was given during class. Instead, the subjects commented that instructor enthusiasm and personality were more important (Patton, 1991, p. 108).

The social setting in the present study and in Patton’s study could have been a factor in obtaining no significant differences in affect. In a group exercise setting, it may be possible that the main external source of information is not the music but is, instead, the interaction with the instructor and the participants. This social interaction may be such a distraction to the participants that they may not focus their main attention on the music. This may have been the reason that affect was the same in each music condition and was not higher in the preferred music condition as predicted based on past studies that used preferred music. Affect may have been equally enhanced because of the social factor that became an environmental distraction helping the participants to focus less on the physical discomfort they were feeling during exercise.
Instructor factor. The instructor can become the external source of information on which the participants focus their attention during group exercise sessions. The enthusiasm of the instructor may affect the extent to which he or she becomes an external distraction to the participants. Studies have indicated that the enthusiasm of the instructor is an important factor in determining participant enjoyment and improved performance (Wankel, 1985; Westcott, 1991; Wininger, 2002b). If instructors display enthusiasm when conducting a class, they can become more of an environmental distraction than the music, having the same effect that music has had in previous studies, causing the participants to focus less on the discomfort that is felt while exercising, thus increasing affect during exercise.

In this study, the participants in all the class sections were very attentive to the instructor while she was leading them in the workout. They appeared to concentrate on performing the exercising properly and kept good eye contact with the instructor throughout each class. This was the first time that they had this instructor, so this may have enhanced the amount of attention that they gave to her, for they were not familiar with the exercises that she introduced to them. This may have further added to the environmental distraction that she created as the new instructor. The need for the participants to concentrate on the instructor’s actions and commands may have contributed to diverting the participants’ attention away from the music, thus causing no significant differences in affect in the music conditions.

Social interaction factor. The participants in a group exercise setting can also become an external source of information. The social interaction with the other participants in an exercise setting adds to enjoyment during exercise (Wininger, 2002b).
Finkenberg, DiNucci, McCune, and McCune (1994) found that social recognition rated high on college students’ list of personal incentives to participate in exercise. In a study conducted by Wankel (1985), participants who continued in an exercise program gave a higher rating to the level of friendship with other members of the exercise class than the rating given by those participants who dropped out of the exercise program. It appears that social interaction in a group exercise setting is very important to the participants and may also be an environmental factor, such as music that helps to distract the participants from the discomfort that is felt while exercising, once again increasing affect.

Several studies have been conducted to examine the effect that environmental distractions such as social interaction have on perception of exertion and affect. Pennebaker and Lightner (1980) concluded that in an exercise setting that has available both external sources of information such as music, noise, and social interaction and internal sources of information such as fatigue and physical pain, a person will process one source of information while the processing of the other source will be restricted. Other studies have indicated that when people who were exercising focused their attention to cognitive tasks, they rated their perception of effort lower than when they were only focusing their attention on internal sources of information (Johnson & Siegel, 1987; Johnson & Siegel, 1992; Siegel, Johnson, & Kline, 1984). Focusing on the social interaction and not the music could have distracted the participants from the fatigue and physical pain they were experiencing and could have been a factor in the participants’ experiencing equal enhancement of affect in each of the music conditions.

During this study, the participants in the first two class sections were very social with one another before, during, and after each class. They laughed a lot, at times would
talk to each other while they were exercising, and would make comments to the instructor throughout most classes. The participants in the third class section, however, were very quiet. They rarely talked to one another and rarely interacted with the instructor during the classes, but were very interactive with each other and the instructor--both before and after the classes. It was apparent that the social aspect played a role in increasing the enjoyment and affect of the participants in all three class sections, even though the third class section had most of their interactions with each other and the instructor when they were not exercising.

Limitations of the Study

There were several limitations of this study. The first was the fact that the water temperature was not consistent throughout the study. Cooler water may have had an impact on the feeling states of the participants. The second limitation was due to the participants being unable to listen to the music selections before rating them on a scale of 1 (most preferred) to 6 (least preferred). Time constraints made it impossible for the participants to listen to all the music selections before the study began. The participants may not have been familiar with the names of the songs listed for each music group and, therefore, may not have been able to correctly rate the music group selections.

The third limitation of the study had to do with not being able to get an accurate resting heart rate before the participants entered the water. Obtaining an accurate resting heart rate would have helped to determine the actual increase of heart rate due to exercise. Because of the large number of participants in the class, it was difficult to get the participants to stop long enough to get an accurate resting heart rate. The fourth limitation
was not requiring the women to complete a medical history before beginning the study. Even though the participants provided the instructor with a list of the medications that would affect their heart rate, a complete medical history would have added evidence that having chronic diseases does not affect the ability of older women to accurately rate RPE during water exercise. The fifth limitation was having an instructor that the women were not familiar with conducting the study. The women may have focused more of their attention to the music if an instructor who used exercises and routines that they were familiar with and comfortable performing had been leading them.

Finally, the affect of the participants in this study may have been affected by a recent hurricane that swept through this city. Even though it had been several months since the initial devastation occurred, many of the participants were still affected by the aftermath of this disaster. Many participants were still displaced from their homes or were still waiting for repairs to their homes. Also, many were also not used to the facility where this study was conducted because the facility that they were used to going to was damaged by the hurricane. These factors could have had an effect on the ratings of affect given on the EFI.

Conclusion

The results of this study do indicate that RPE is an accurate measure of exercise intensity during water exercise when exercising both with and without music. Instructors of water exercise classes may confidently decide to use RPE as a measure of exercise intensity, knowing that the participants will accurately rate their effort. This, however,
may only be true for women who are experienced in this type of exercise. Future studies may shed more light on this issue.

The overall results of this study also indicate that preferred music, nonpreferred music, and no music have the same impact on the heart rate, perceived exertion, and affect of older adult women during water exercise. In a group setting, therefore, music may not play a major role in distracting participants from thinking about the pain, fatigue, and bodily discomfort that they are experiencing while exercising. Instead, the interaction with the instructor and the other participants may be the main distracter during group exercise that may help to increase affect.

The results from this study indicate that instructor choice of music may not affect participant gains (higher heart rate, lower RPE, and higher affect). Therefore, since research indicates that instructor enthusiasm is a very important element in enhancing participants’ workouts, it may be more beneficial for instructors to choose music that motivates themselves than choosing music that they feel the participants would enjoy. Because little research has been conducted on this topic to support this belief, the best scenario would be for instructors to choose music that both they and their participants enjoy.

Recommendations for Future Studies

The review of the literature indicates that exercising to preferred music may have a more positive effect on performance, heart rate, RPE, and affect than using no music. Even though the results of this study do not support this belief, it is important to continue to conduct studies in order to examine this issue further. There have only been two studies
conducted using preferred and nonpreferred music--this study and the study conducted by Patton (1991). Both of these studies were conducted in a group exercise setting. The phenomenon of the preferred music not making a significant difference in any of the variables may be related to the group effect. Additional studies should be conducted with individuals exercising on their own using headphone music. Preferred, nonpreferred, and no-music conditions should be used to add evidence that preferred music is the key to enhancing a workout (higher heart rate, lower RPE, and higher affect) in a nongroup exercise setting.

In order to further investigate the extent to which the instructor is an external source of information that may distract participants from the internal sources of information (bodily pain and discomfort) while exercising, studies should be conducted with participants exercising in a group setting to the following conditions: preferred music, nonpreferred music, and no music. The participants would then exercise alone to the same music conditions. If the results indicate (a) higher affect in the preferred music condition as compared to the other music conditions when exercising alone and (b) no change in affect in any of the music conditions when exercising in a group setting, evidence would be gained to support the notion that the instructor and the other participants may be more of a distraction than the music. The participants, therefore, would focus less on the fatigue and physical pain or discomfort that their bodies may be experiencing, thus increasing affect in all music conditions.

The results from this study do not add evidence that music has a significant positive effect on affect during exercise. The reason for this may be that the enjoyment that is experienced while exercising did not show up in the results from the EFI but, in
actuality, music may have indeed helped to lift the spirits of the participants. A mixed-method research study that consists of both quantitative and qualitative methodology may better help to understand the extent to which music actually enhances participant benefits while exercising. Individual interviews after the exercise session, focus group discussions, and observations of participants while exercising may help to shed light regarding the affect that music has during exercise. Including qualitative research in future studies on this topic may also be used to help to determine the extent that participant interaction with both the instructor and the other participants affects perceived exertion and affect.

Future studies may add evidence to the belief that exercise environments that help the participants to focus less on their internal feelings of fatigue, physical pain, or discomfort, such as an enthusiastic instructor or music, may help to increase participants’ psychological and physical well-being (Pennebaker & Lightner, 1980), thereby helping to keep participants enjoying exercise and adhering to exercise programs.
REFERENCES


APPENDIXES
Appendix A

Borg’s Ratings of Perceived Exertion Scale
Borg’s Ratings of Perceived Exertion Scale

6  No exertion at all
7  Extremely light
8  Very light
10 Light
11 Somewhat hard
12
13 Hard (heavy)
14
15 Very hard
16
17
18
19 Extremely hard
20 Maximal exertion

Appendix B

Exercise-Induced Feeling Inventory
Exercise-Induced Feeling Inventory

Instructions: Please use the following scale to indicate the extent to which each word below describes how you feel at this moment in time. Record your responses by placing an X in the appropriate box.

0 = Do not feel [DNF]
1 = Feel slightly
2 = Feel moderately
3 = Feel strongly
4 = Feel very strongly [FVS]

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<th></th>
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<tr>
<td>2. Calm</td>
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<td>3. Fatigued</td>
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<td>4. Enthusiastic</td>
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<td></td>
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<td>5. Relaxed</td>
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<td>6. Energetic</td>
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<td>7. Happy</td>
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<td>8. Tired</td>
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<td>11. Worn-out</td>
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From Gauvin & Rejeski’s (1993) article entitled “The exercise-induced feeling inventory: Development and initial validation” from the *Journal of Sport & Exercise Psychology, 15*, 403-423. Reprinted with permission from the author.

Scoring

The EFI consists of 4 distinct subscales. Subscale scores are obtained by summing or averaging the numerical values chosen for the adjectives within a particular subscale.

The four subscales include: (1) positive engagement (items 4, 7, & 12), (2) revitalization (items 1, 6, & 9), (3) tranquility (items 2, 5, & 10) and (4) physical exhaustion (items 3, 8, & 11).
Appendix C

IRB Approval Letter
October 15, 2004

Ms. Maureen Davin
1534 Sandcliff Dr.
Pensacola FL 32507

Dear Ms. Davin:

The Institutional Review Board (IRB) for Human Research Participant Protection has completed its review of your proposal titled “Music’s Effect on the Heart Rate, Perceived Exertion, and Affect of Older Adult Participants of Water Exercise” as it relates to the protection of human participants used in research, and has granted approval for you to proceed with your study. As a research investigator, please be aware of the following:

- You acknowledge and accept your responsibility for protecting the rights and welfare of human research participants and for complying with all parts of 45 CFR Part 46, the UWF IRB Policy and Procedures, and the decisions of the IRB. You may view these documents on the Office of Research web page at: http://research.uwf.edu/boards-committees/irb/irb.htm. You acknowledge completion of the IRB ethical training requirements for researchers as attested in the IRB application.

- You will ensure that legally effective informed consent is obtained and documented. If written consent is required, the consent form must be signed by the participant or the participant’s legally authorized representative. A copy is to be given to the person signing the form and a copy kept for your file.

- You will promptly report any proposed changes in previously approved human participant research activities to the Office of Research and Graduate Studies. The proposed changes will not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the participants.

- You are responsible for reporting progress of approved research to the Office of Research and Graduate Studies at the end of the project period. Approval for this project is valid for one year. If the data phase of your project continues beyond one year, you must request a renewal by the IRB before approval of the first year lapses. Project Directors of research requiring full committee review should notify the IRB when data collection is completed.
• You will immediately report to the IRB any injuries or other unanticipated problems involving risks to human participants.

Good luck in your research endeavors. If you have any questions or need assistance, please contact the Office of Research and Graduate Studies at 857-6378.

Sincerely,

Dr. Karen Rasmussen, Chair
IRB for Human Research
Participant Protection

Ms. Sandra VanderHeyden
Director of Sponsored Research
Research and Graduate Studies

cc: Dr. Kathleen Heubach
Dr. Joseph Peters
Appendix D

Informed Consent Form
Informed Consent Form

Federal and university regulations require us to obtain signed consent for participation in research involving human participants. After reading the statements in section II through IV below, please indicate your consent by signing and dating this form.

Statement of Procedure: Thank you for your interest in this research project being conducted by Maureen Davin, water exercise instructor and doctoral student at the University of West Florida.

I give my informed consent to participate in a research study that will be conducted during seven classes of the water exercise session.

I understand that:

(1) The purpose of this research study is to determine my heart rate, perceived exertion, and affect during each of the seven classes that will be included in this study.

(2) This study will require that I fill out a short questionnaire before and after the seven exercise sessions. I will also have to record a score for perceived exertion and heart rate at 5, 10, 15, and 20 minutes into the aerobic segment of the workout.

(3) I will have to wear a heart monitor chest strap that may be slightly uncomfortable at first, but will not harm me in any way.

(4) The results of this study will be kept confidential and my name will not be recorded in the research findings. I have been told that I will be given a number that will correspond with my age and gender.

Potential Risks of this study:

There are no additional risks involved in this study than are already encountered from participating in an exercise class.

Potential Benefits of the Study:

I understand that the results from this study may help instructors to develop better strategies for improving methods of instruction which may in turn help to improve water exercise participants’ workouts.

Statement of Consent:

I certify that I have read and fully understand the Statement of procedure given above and agree to participate in the research described therein. Permission is given voluntarily and without coercion or undue influence. It is understood that I may discontinue participation at any time. I will be provided a signed copy of this consent form.

If you have any questions or concerns, please call Maureen Davin, the researcher, at (850) 497-8660.

____________________________ ___________________
Participant’s name (Please print) Date

____________________________ ___________________
Participant’s signature Date
Appendix E

Music Preference Survey
Music Preference Survey

Rate each of the following groups of music selections from 1–6 with one being the one that you would prefer the most during exercise and 6 being the one that you would least prefer during exercise.

_____ 1940s Music
1. Sunny Side of the Street
2. At Last
3. Fly Me to the Moon
4. Volaré
5. I Get A Kick Out of You
6. Let’s Fall In Love
7. Ain’t Love a Kick in the Head
8. Night and Day
9. That’s All
10. More

From: Big Band, MUSICFLEX, INC.

_____ 1970s Music
1. On the Radio
2. Date With the Rain
3. Deputy of Love
4. Ain’t No Stopping Us Now
5. Bad Girls
6. You Should Be Dancing
7. Boogie Oogie Oogie
8. Bad Luck

From: Disco 3, MUSICFLEX, INC.

_____ 1950s Music
1. Kansas City
2. That’ll Be the Day
3. Blueberry Hill
4. Breaking Up is Hard to Do
5. All I Have to Do is Dream
6. Chain Gang
7. Johnny Angel
8. Banana Boat (Day-O)
9. There Goes My Baby

From: 50s Workout, POWER MUSIC, INC.

_____ 1980s Music
1. Magic
2. Hurts So Good
3. Addicted to Love
4. New Sensation
5. Turn Up the Radio
6. Everybody Wants You
7. Some Like It Hot
8. Tuff Enough
9. She’s a Beauty
10. There Goes My Baby

From: 80s Radio Rock, POWER MUSIC, INC.

_____ 1960s Music
1. Leader of the Pack
2. Do Wah Diddy Diddy
3. I Only Want To Be With You
4. Blue Moon
5. Then He Kissed Me
6. Duke of Earl
7. Sherry
8. Stand By Me
9. Chapel of Love
10. Oh, Pretty Woman
11. Soul Man

From: 60s Pop Power Mix, POWER MUSIC, INC.

_____ Today’s Alternative Rock Music
1. I’m Free
2. Wishing I Was There
3. Semi-Charmed Life
4. Two Princes
5. Tones of Home
6. Closing Time
7. Stand
8. Aeroplane
9. Everyday

From: Alternative Rock Workout, POWER MUSIC, INC.
Appendix F

45-Minute Water Exercise Workout
45-Minute Water Exercise Workout

WARM-UP:
Jog-Front crawl stroke
Jog-Push arms forward and backwards
Jog-Paddle wheel
Jog-Breaststroke arms
Repeat all arm exercises
Soccer kicks
Soccer kicks with arm swing
Half jacks-knee bent
Half jacks-legs straight
Ice-skating-heel behind, sweep arms side to side
Repeat all leg exercises
STRETCHING:
Neck stretches
Cross-chest stretch
Overhead arm stretch
Hand behind backstretch
Back lift
Hamstring stretch
Foot above knee stretch
Knee to chest stretch
Quadriceps stretch
AEROBIC SEGMENT: (see illustrations on pages 81-82)
High-knee jog
Pendulum
Alternate leg lifts
Side-to-side lunges
High-knee jog-fan arms
Jumping jacks
High-knee jog-rotary cuff pull
Rocking horse
Hitchhiker
Cross-country skiing-alternate arm scoops
Cross-country skiing-wiper arms
Alternate cuff sweeps
Forward kicks
Straddle jog
Half jacks right and left
High-knee jog-chest press
Tire pumps-Torso tick tock
Cross-country skiing-unison sweeps front and back
Steep climb-alternating plant poles
High-knee jog-tricep press
WATER WEIGHTS:
Jogging in place with jogging arm motion
Jogging in place while pushing down weights (parallel and slightly in front of body) in an alternating motion
Cross-country skiing
Jumping jacks
Jogging in place-rest arms
Under one leg-then the other
Opposite ankle reaches
Opposite heel reaches
Jogging in place-rest arms
Repeat all the above water weight exercises
Standing in place, perform the following strength training exercises:
Bicep curls
Tricep curls
Figure eight with each arm
Circle forward in front of body-alternative rowing motion
Circle forward and back on sides of body with weights close to and parallel to the body
Push downs behind back
WALL EXERCISES:
Side to wall
Leg out to side and back to wall
Bent leg out to side and back to wall
Leg forward and back
Leg circle forward
Leg circle back
Switch sides-Do same exercises with other leg
COOL-DOWN:
Figure eights each arm
Hands together figure eight
Hands together golf swings
Interlock thumbs-sweep arms side-to-side
Palms together-separate arms and bring back together
Palms away from each other-separate arms and bring back together
Palms facing body-arm lifts out of water
STRETCHING:
Neck stretches
Cross-chest stretch
Overhead arm stretch
Hand behind back stretch
Back lift
Hamstring stretch
Foot above knee stretch
Knee to chest stretch
Quadriceps stretch
The following is a list of exercises that will be used during the 20-minute aerobic segment of the workout in which the testing will be done on heart rate and ratings of perceived exertion.

- High-Knee Jog
- Pendulum
- Alternate Leg Lift

- Side-to-Side Lunges
- High-Knee Jog–Fan Arms

- Jumping Jacks
- High-Knee Jog/Rotary Cuff Pull
- Rocking Horse

- Hitch Hiker
- Cross-Country Skiing Alternate Arm Scoops
- Cross-Country Skiing Wiper Arms

Illustrations have been used with the permission from HYDRO-FIT, Inc.
160 Madison St. Eugene, OR 97402 1-800-3467295, www.hydrofit.com
Alternate Cuff Sweeps  
Forward Kicks  
Straddle Jog  

Half Jacks Right and Left  
High Knee Jog  
Tire Pumps–Torso Tick Tock  

Cross-Country Skiing  
Front & Back  

Steep Climb  
Alternating Plant Poles  
High-Knee Jog Unison Sweeps  
Tricep Press  

*The participants in this study will not be wearing the gloves and weights that are shown in these illustrations. Illustrations have been used with the permission from HYDRO-FIT, Inc. 160 Madison St. Eugene, OR 97402  
1-800-346-7295, www.hydrofit.com