EFFECTS OF RELAXATION MUSIC ON RECOVERY PERIOD

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EFFECTS OF RELAXATION MUSIC ON RECOVERY PERIOD

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ABSTRACT

During game bouts there are usually scheduled brief recovery periods for athletes to recuperate. Finding a way to decrease the recovery period is necessary for the sports field. Purpose: The aim of this study was to examine the effects of relaxation music on the recovery period. Method: 9 male and 3 female healthy young adults (Age: X = 21 yr., SD = 1.4719 yr.) who regularly exercise (3-5 times per week). Subjects were randomly assigned to treatments. There were 3 resting periods for each in 15 minute recovery periods: without music, listening to relaxation music, and listening to preferred music. Exercise by Bruce's Protocol was followed to the point of exhaustion until reaching 85-90%MaxHRR. Heart rate, blood pressure, respiratory rate, and mood were measured immediately after exhaustion from exercise. Then resting until return to ±10 RHR (recorded the recovery time). And then exercise again in second exercise by Bruce's Protocol was followed to the point of exhaustion until reaching 85-90%MaxHRR (recorded duration of the second exercise).Heart rate recovery after a 15 minutes resting period was determined by percent change. Mood was assessed by the Thai version of the Brunel mood scale. Each condition was performed for 3 weeks. ANOVA was used to analyze heart rate, blood pressure, and respiratory rate, time to ±10 RHR, Duration of second exercise, and Wilcoxon Signed Ranks test for the Fatigue mood scale. Results indicated that percent change in HRR and RR with relaxation music were higher than without music and preferred music (Mean HRR±SD=86.92±3.71, p<0.05; Mean RR ± SD= 13.42±1.01, p<0.05). Relaxation music showed a significantly decrease on fatigue mood scale (Mean±SD= 12.71 ± 0.30 min, p<0.05). Moreover relaxation music showed a significantly decrease on the time to ±10 RHR and increase the Duration of second exercise than preferred music and without music (Mean time to ±10 RHR ±SD=18.12±0.17, p<0.05; Mean Duration of second exercise ±SD=13.45±0.172, p<0.05.). As a result, it was found that relaxation music can improve recovery period by leading to more complete rest, which is the best way to encourage recovery. Therefore, it can enhance and facilitate body function via emotions (mood) or feelings by following the rhythm of the music.

KEY WORDS: RELAXATION MUSIC / RECOVERY PERIOD / WITHOUT MUSIC / PREFERRED MUSIC / SECOND PERIOD OF EXERCISE

106 pages

ผลของเพลงผ่อนคลายต่อช่วงการฟื้นตัว

EFFECTS OF RELAXATION MUSIC ON RECOVERY PERIOD

พรหมภัสสร พัฒนาพรชัย 5136967 SPSS/M

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บทคัดย่อ

การฟื้นตัวที่สมบูรณ์หรือการพักอย่างแท้จริง (การฟื้นตัวที่มีประสิทธิภาพในระยะเวลาพักสั้นๆ) เป็นสิ่งที่จำเป็นอย่างยิ่งในระหว่างเกมการแข่งขัน หรือการออกกำลังกายที่ต้องทำซ้ำๆจุดประสงค์การวิจัยครั้งนี้ เพื่อศึกษาผลของดนตรีผ่อนคลายต่อช่วงการฟื้นตัวและกลับคืนสู่ภาวะปกติ ของอัตราการเต้นของหัวใจ อัตราการหายใจ ความดันโลหิต สภาวะอารมณ์ และประสิทธิภาพของการออกกำลังกายจนล้าในครั้งที่2 ทดสอบในผู้ที่มีสุขภาพสมบูรณ์แข็งแรงและมีการออกกำลังกายอย่างสม่ำเสมอ (3-5 ครั้ง/สัปดาห์) ทั้งชายและหญิง จำนวน 12 คน ซึ่งสมัครใจเข้าร่วมการวิจัย โดยแบ่งการทดลองออกเป็น 3สภาวะของช่วงการฟื้นตัว 15 นาที (โดยวิธีการสุ่มเลือก) คือ พักพร้อมกับฟังเพลงผ่อนคลายที่ให้ผลของเพลงผ่อนคลายหลังจากการออกกำลังกายจนล้า พักพร้อมกับฟังเพลงที่ชอบหลังจากการออกกำลังกายจนล้าและพักโดยไม่ฟังเพลงหลังหารออกกำลังกายจนล้า โดยพัก 15 นาที ทั้ง 3 สภาวะ; ออกกำลังกายด้วยบรูเนลจนกระทั่งล้าที่ 85-90 เปอร์เซ็นต์ของอัตราการเต้นหัวใจสูงสุด วัดและพิจารณาค่าของอัตราการเต้นหัวใจ ความดันโลหิต อัตราการหายใจ และสภาวะทางอารมณ์ทันทีหลังจากการออกกำลังกายจนล้าและวัดค่าอีกครั้งหลังจากฟังเพลงทั้ง 3 ชนิด จากนั้นให้นั่งพักจนกระทั่งอัตราการเต้นของหัวใจกลับมาสู่±10 RHR (บันทึกเวลาโดยเปรียบเทียบทั้ง3สภาวะ) หลังจากนั้นให้ออกกำลังกายในครั้งที่2 ด้วยบรูเนลจนกระทั่งล้าที่ 85-90 เปอร์เซ็นต์ของอัตราการเต้นหัวใจสูงสุด (บันทึกเวลาโดยเปรียบเทียบทั้ง3สภาวะ) โดยอัตราการเต้นของหัวใจ ความดันเลือด อัตราการหายใจ สภาวะทางอามรมณ์ ในช่วงพัก15 นาที พิจารณาจากค่าเปอร์เซ็นต์ของอัตราการเปลี่ยนแปลงไปจากเดิมของอัตราการเต้นของหัวใจ ความดันเลือด อัตราการหายใจ สภาวะอารมณ์วัดโดยแบบวัดทางอารมณ์ของบรูเนล (พิจารณาความล้า) แต่ละสภาวะทำอาทิตย์ละครั้ง ANOVA วิเคราะห์อัตราการเต้นของหัวใจ ความดันเลือด อัตราการหายใจ ช่วงระยะเวลาการฟื้นตัว ระยะเวลาของการออกกำลังกายครั้งที่2 และ Wilcoxon Signed Rank Test วิเคราะห์สภาวะทางอารมณ์ จากการสรุปและอภิปรายผลแสดงว่าเปอร์เซ็นต์การเปลี่ยนแปลงของอัตราการเต้นของหัวใจอัตราการหายใจ และความล้าเมื่อวัดด้วยแบบทดสอบทางอารมณ์มีค่าสูงขึ้นเมื่อได้รับเพลงผ่อนคลาย ซึ่งมีค่ามากกว่าการไม่ฟังเพลง และการฟังเพลงที่ชอบ ได้อย่างมีนัยสำคัญทางสถิติ ($p<0.05$; Mean HRR ± SD =86.92±3.71, $p<0.05$; Mean RR ± SD =13.42±1.01, $p<0.05$; Mean Fatigue ± SD =12.71 ± 0.3 min) เพลงผ่อนคลายทำให้ช่วงการฟื้นตัวใช้เวลาสั้นกว่าการไม่ฟังเพลงและการฟังเพลงที่ชอบ และเพลงผ่อนคลายยังทำให้ระยะเวลาของการออกกำลังกายครั้งที่ 2 จนล้า ออกกำลังกายได้นานกว่าการออกกำลังกายในครั้งที่ 1 จนล้า ($p<0.05$; Mean time to ±10 RHR ± SD =18.12±0.17, $p<0.05$; Mean Duration of second exercise ± SD = 13.45±0.172) จากงานวิจัยสนับสนุนว่าเพลงผ่อนคลายเป็นตัวการสำคัญที่ช่วยในการฟื้นตัวให้เกิดการฟื้นตัวที่มีการพักฟื้นอย่างแท้จริง ทำให้เกิดการหายล้าอย่างสมบูรณ์อีกวิธีการหนึ่ง เป็นตัวเพิ่ม ส่งเสริม และสนับสนุการฟื้นตัวของระบบต่างๆของร่างกายจากความล้าความโดยผ่านทางอารมณ์หรือความรู้สึกที่เกิดขึ้นคล้อยตามทำนองและจังหวะของเพลงที่ฟัง

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CHAPTER I

INTRODUCTION

Music is one of the most effective way to reduce working stress (Bradt and Dileo 2009; Moradipanah, Mohammadi et al. 2009) and also to improve working performance mind and muscle relaxation (Dave, Sam et al. 2004; Evridiki, Aggeliki et al. 2004). It has direct influence on emotion (Kendall, Dimsdale et al. 1998), for example, listen to rock music, heart beat increases, listen to calm or classic music, muscle relaxes (Elise, Nicholas et al. 2007), stress and anxiety reduces (Linda L. Chlan, Engeland C. William et al. 2007; Suda, Morimoto et al. 2008), pains relief (Michael, 2008). Music also has effects on utility to reduce depressive symptoms and supportive source that increases relaxation, as in nursing homes not only makes people feel better, but also makes them heal faster (Charles, Evana et al. 2003; Michael, 2005; HJ, 2009).

The American Music Therapy Organization claims music therapy may allow for "emotional intimacy with families and care givers, relaxation for the entire family, and meaningful time spent together in a positive, creative way" (Michael, 2010). Prensner.,el al (2001) revealed that music has been helpful in assisting patients with pain management in a variety of medical settings. Music is an element of normal life that can be easily adapted for the needs of individual patients and their current environment while providing a means for self expression and for normalizing the environment. Listening to music also has effects to facilitate relaxation and promote wellness (Robert & B, 2006). Moreover music also has effect on children or aging who have brain disease or disability (Neurophysiological & Sensory Disorders such as for hyperactive, autistic kids, people with learning difficulties or Alzheimer’s) and on changing behavior as decreasing aggressive behavior in childhood (Linda 2000; R. Mark Mathews, Alicia A. Clair et al. 2001; Robert 2004).

Tempo is considered to be the most significant determinant of musical response to stimulate brain to release “Endophin” more and reduce Cortisol (Cathy H.

Mckinney, Michael H. Antoni et al. 1997; Linda L. Chlan, Engeland C. William et al. 2007). Endorphin is the brain's painkiller, and it is 3 times more potent than morphine. The brain also makes Dopamine, which makes people more talkative and excited. It affects brain processes that control movement, emotional response, and ability to experience pleasure and pain. All of these chemicals are natural chemicals that affect our bodily processes (Brown, 1979; Budd, 1985; Hevner, 1935; Karageorghis et al., 1999). Music has effects on concentration and memory. So the exercise part, music influenced on physical and mental states.

Many researchers studied the effect of music on exercise. The rhythm that provided the physical and psychological differences between cardiovascular training or resistance training, such as the using music (fast music) in progressive exercise would have a position effect in terms of performance and the psychological state of the athlete, regardless of the level of fitness (Mohammadzadeh, Tartibiyar, & Ahmadi, 2008). Listening to motivational music had a greater ergogenic effect than did oudeterous music during walk to exhaustion at 75% maxHRR (Costas I. Karageorghis, et al., 2009). The effect of music on performance, interaction of emotions, and properties of sedative music in reducing the decremental on performance (Caspy, Peleg, Schlam, & Goldberg, 1998) music could be used for both training and competition, so the selected music is very important because it is benefit to be considered the components of music such as tempo, loud, rhythm etc. or preferences of each individual in style and should choose to listen to rhythm and tempo of the music to match the activity should do to relax listening to music beats like Jazz, Classic, or music played. To stimulate the warm up should be fast rhythm music, such as Rock, Hip-Hop or Dance because humans responded to the rhythmical qualities of music by synchronizing movement patterns to tempo (Karageorghis et al., 1999; Bishop, D. T. 2007). The results of the research showed that most of Synchronous music could produce an ergogenic effect (Karageorghis et al., 2009; Simpson & Karageorghis, 2005). In addition music had positive effect on sport and exercise performance by improving the athlete's physiological and psychological state of the athlete (Karageorghis & Terry, 1997). There were mainly 4 ways which music could aid in improving sport performance. First during submaximal repetitive exercise such as running, music can change the performer’s attention away from fatigue on the body, and it is used by many runners and athletes and referred as dissociation technique. This could help in giving positive mood state to the performer and avoid the thought related to fatigue. Second, music can offer athletes a form of stimulant before competition to calm down athletes (Karageorghis, Drew, & Terry, 1996). Third, music helps in improving output of exercise performers (Karageorghis & Terry, 1997). Fourth, in relation to the previous point, music also controls the patterns of physical skills and it can create better motor skills and improve at learning the environment. There are evidence from both gymnastic and swimming for the above point (Chen, 1985; Jernberg, 1981).

The Previous studies had shown that music had both physiological and psychological effects on human. It stimulated and reduced stress. Different type of music would affect the heart rate and blood pressure, so the effect of relaxation music will decrease heart rate and blood pressure after heavy workout.

Relaxation music should affect on muscle relaxation and mental stress. So it is needed to prove the theory of music therapy by which “The most effective relaxation method in music therapy and the effect of music on recovery time and fatigue” that the effect of music not only on relaxation but will help on resting time or recovery time and decrease fatigue. And nowadays the recovery period is very necessary for many kind of sport and exercise because of the shorten recovery time used, the faster re-exercise started. That was very beneficial to athlete or exerciser to gain more time to fit.

Comparison of the difference between usage of 3 conditions; relaxation music (treatment), Preferred music and without music is used. There are no research done by taking the subjects to exercise again (second workout) after resting with treatment of relaxation music.

The purpose of this research was to examine that resting with relaxation music at 55-70 beats/minutes in 15 minutes recovery period would affect to both psychological and physiological state of exercisers.

Purpose

1. To compare the percent change on fatigue mood state, blood pressure, heart rate, and respiratory rate of without music (WOM, relaxation music (RM) and preferred music (PM) condition in 15 minutes recovery period.

2. To compare the recovery time from the 1st minute exhaustion after exercise return to ±10 recovery hearth rate of without music (WOM, relaxation music (RM) and preferred music (PM) condition.

3. To compare the duration of the second exercise of without music (WOM, relaxation music (RM) and preferred music (PM) condition after HRR came to 85-90% max.

Hypothesis

1. Relaxation music condition had less fatigue mood scale but more percent change of HR, RR, and BP in 15 minutes recovery period than preferred music and without music condition.

2. Relaxation music condition had shorter recovery time from the 1st minute exhaustion after exercise return to ± 10 recovery hearth rate (RHR) than preferred music and without music condition.

3. Relaxation music condition could exercise longer in the second time of exercise until exhausted than preferred music and without music condition.

CHAPTER II
LITERATURE REVIEWS

"Music is a science-related issue, especially the human voice; we can't see a line or a voice call to other fields like art, which can consume the beauty of objects with different eyes".

The researcher would review the literature as the following;

○ The Emotion of music
○ The Elements of music
○ Classical Music
○ The Mozart effects
○ Benefits of classical music
○ Effects of music on Emotional response
○ Effects of music on Physiological response
○ Recovery period

2.1 The Emotion of music

People are full of emotions leads to how they act and what they say. Human emotions are triggered by many factors. One of those things is music by the sense of hearing. Music is gives different type of emotion and induction of showing and explaining the meaning for each type. Music can lead up to have various type of feelings while listening to music. Music has the ability to change the emotion and physical status of people, whether they are in bad moods, good moods, or sad moods such music can also make people feel suspense or excitement during different type of entertainment. It has been proven that music affects us physically, psychologically, emotionally and spiritually. It is known that the responses to music are far more complex. Through the way that music will make people to have different emotion or feeling while listening to music is depending on elements of music.

The most important elements of music which conduct people to have various feeling are Melody, time including tempo and rhythm that dynamic (light-loud) are the important part and produce various of emotion such as music start with slow beginning and then suddenly change to loud music or begin with slow music and change little by little towards loud music. Thus in each different music will make different feeling too, Melody, Rhythm, Harmony, Texture, Tone color or Tembre , Characteristics of Sound.

2.2 Elements of music

Elementary music texts sometimes categorize and describe musical experiences according to the "elements of music." They represent the components that are most often present in music. For the purposes of this instructional site, the seven elements of music are defined as:

- Melody
- Rhythm
- Harmony
- Texture
- Tone color or Tembre
- Characteristics of Sound

1. Melody

Melody is often the element in music that makes the most direct appeal to the listener. It is usually what we remember and whistle and hum. Melody is the horizontal structure of music. Thus an organization's risks associated with height - low short - and the long – light. These practices, when used consistently on the basis of the slow – fast. Are elements of the music audience can understand most easily. Million of melodies have been written around the world, but no matter how different they may sound, all music cultures share the concept of melody as a musical line. Melody may be defined as a series of individual pitches one occurring after another in order so that the composite order of pitches constitutes a recognizable entity. A melody as a "recognizable entity" implies that a well written melody does not wander aimlessly, but seems to stand by itself as an abstract "idea" and can be remembered. Repetition of pitch and rhythm patterns is an important factor in any melody existing as an ÒentityÓ. Melodic pitches are not randomly ordered, but are subject to basic principles of design. In most music melody and rhythm are intimately bound up together. In certain styles of religious music, notably chant, melody and musical rhythm are separated. But in most music, when melody is mentioned, musical rhythm is assumed to coexist with it. Such will be the case in all uses of that term in this unit. Melody is sometimes called melodic line, line, theme, or subject. Melodic line and line are often used in a general sense, while specific melodic entities are called melody, theme , or subject, depending upon the point of reference. In an abstract sense, melody is the repository of "subject matter" or "idea" in many world music traditions. Melody is very important as "idea" in Western music. The Western view of melody is that it "means something" -- it is what the music "is about". The melodic material of a given piece of music is what the overall piece is based upon and it is this basic "idea" to which all other elements in a composition relate. Music that has a strong melodic component takes on a linear character, as if the melodic line were tactile in space and time. Well written melodies greatly contribute to the effect of goal-oriented motion in music, and they "move" in real time with direction and purpose. Western melody is highly goal-oriented and is therefore a condensed mirror of Western language, behavioral traits, and philosophy Ð all of which are goal-oriented in their makeup. Melody has a sense of "line" in its presentation - it has linear profile. Melodic pitches rise and fall and are perceived as high and low. Imagine melody as a curvilinear line, like the profile of a mountain range Ð but occurring in time instead of space

Melody is the horizontal structure of music. Thus an organization's risks associated with height - low short - and the long – light. These practices, when used consistently on the basis of the slow – fast. Are elements of the music audience can understand most easily.

2. Time and time on musical elements include Tempo, Meter and rhythm.

Tempo

-Tempo the speed of the beat- is the basic pace of the music. Tempo variation has consistently been associated with differential emotional responses to music (Dalla Bella et al., 2001; Gagnon & Peretz, 2003; Gundlach,1935; Henkin, 1957; Hevner, 1937; Juslin, 1997; Rigg, 1940, 1964; Scherer &Oshinsky, 1977). In addition tempo is postulated to be the most important determinant of response to music (Brown, 1979; Karageorghis et al., 1999) and preference for different tempi may be affected by the physiological arousal of the listener and the context in which the music is heard (North & Hargreaves, 1997)

Largo	(Very Slow, broad)	40-56
Grave	(Very Slow, solemn)	
*Adagio	(Slow)	58-70
Andante	(Moderately Slow)	72-90
Moderato	(Moderately fast)	93-100
Allegretto	(Moderately)	102-120
Allegro	(Fast)	125-134
Vivace	(Lively)	136-172
Presto	(Very fast)	174-216
Prestissimo	(As fast as possible)	218-....

*Adagio was measure in this study.

The metronome is told in 1 minute rhythm or rhythmic slap rap (Beat) how many times that means rap beat or rhythm count on a regular basis. The normal rhythm of operation indefinitely similar to the rhythm of your heart (Pulse) the speed of the rhythm is slow or fast depending on the rhythmic slap as fast tempo, slow tempo.

Rhythm

-Rhythm in music is propelled forward by rhythms, the element that organizes movement in time (Machilis & Forney, 2003). Rhythm is basic to life. We see it in the cycle of day and night, the four seasons, the rise and fall of tides. More personally, we find it in our heartbeats, and we feel it when we breathe and walk. The essence of rhythm is a recurring pattern of tension and release, or expectation and fulfillment (Kamien, 2006) Rhythm response relates to natural responses to musical rhythm, especially tempo (speed of music as measured in beats per minute [bpm]) (Karageorghis, Terry, & Lane, 1999).

Rhythm and tempo, used harmonically, are sympathetic to the body. The tempo should usually correspond to the normal human heart rate range of approximately sixty to 120 beats per minute, with most music between seventy and eighty beats per minute (Torres & Torres quote in Scott Severance). The rhythm should not detract from the main beat, and there should be rhythmic variety

Meter

-Meter in music, some beats feel stronger or more stressed-that is, more emphasized-than others, and we find repeated patterns of a strong beat plus one or more weaker beats. The organization of beats into regular groups is called meter (Kamien, 2006).

3. Harmony

Harmony describes the movement and relationship of intervals and chords (Machilis & Forney, 2003). Harmony will hold chorus music that has emotional power. Chorus of the musical elements within a sensitive help support the beauty of music (Charoensuk, 2532;Sriwibool, 2003).The chorus will allow the audience the emotion and feel the harmony in which the 2 types. Polyphonic music refers to music of many sounds, that is, of more than one sound or more than one melody at the same time. Homophonic is a synonym for harmonic. Second, homophonic means music of “the same sound,” and used to describe music in which a dominant melody is supported by chords (Boyden, 1971).

4. Texture

The nature of the relationship between melody (Polyphony) and chorus (Homophony) there are many forms.

4.1. Monophonic texture (one sound) music means music using melody only, such as a single unaccompanied tune (Boyden, 1971).

4.2. Homophonic texture, a single voice takes over the melodic interest, while the accompanying parts take a subordinate role. Normally, they came become blocks of harmony, the chords that support, color, and enhance the principle line (Machilis & Forney, 2003).

4.3. Polyphonic texture music refers to music of many sounds, that is, each melody has a distinctive identity and the relationship between formal chorus sometimes referred to sections like this that "counterpoint" (element) Contrapuntal means the same thing as polyphonic, since counterpoint means “point against point or, more generally, melody against melody” (Boyden, 1971)

5. Tone color or tembre

Tone color or tembre means the characteristic quality of sound of voices or instruments. There are characteristic differences between voices and instruments in general and also between different individual voices and instruments of the same register (Boyden, 1971).

Timbre

Timbre is determined by the harmonic profile of the sound source. Every sound source has an individual quality that is determined by its harmonic profile. Timbre influences human mood. Sound sources which have a complexity of harmonic profile enjoy a psychological "richness" of sound. Timbre stimulates human energy levels without regard to rhythmic or harmonic saturation. Sound sources that have simple harmonic profiles have "darker" timbres and tend to soothe human emotions. Bright or rich timbres coupled with loud dynamics affect moods of vigor, turmoil, conflict, and valor. The same timbres coupled with soft dynamics affect moods of sensuality, passion and compassion. Dark or simple timbres coupled with loud dynamics are encountered only occasionally in music and affect moods of starkness and loneliness. The same timbres coupled with soft dynamics affect moods of mystery and terror. These combinations are subjective to all listeners but are well understood by theater and movie composers.

6. Characteristics of Sound

-Dynamics: degrees of loudness or softness in music are called dynamics. Loudness is related to the amplitude of the vibration that produces the sound. When instruments are played more loudly or more softly, or when there is a change in how many instruments are heard, a dynamic change results; such a change may be made either suddenly or gradually. A gradual increase in loudness often creates excitement, particularly when the pitch rises too.

- **Expressions**

Beside loudness, expressions are another characteristic of sound that makes music a true. Such as, the expressions of music that express the emotion, love, hate, sorrow, happy, sad, merry, happy, funny & etc. (Kosinanon, 2552 quote in Sriwibool, 2003).

- **Pitch**

Refers to the highness and lowness of sound, measured in frequency (or vibration: the number of vibrations per second) - the faster the vibration, the higher the pitch.

2.3 Classical Music and Mood

Classical music is a complex form of music as it requires high musical skills, like learning the ragas and ability to coordinate with other musicians. One has to maintain the complex relationship between its emotional flows. If you wish to learn this music, then you have to go through proper training.

Listening to classical music decreases tension, even in those for whom classical music is not their preferred genre. However, listening to classical music does not necessarily affect other feelings. The ability of music to influence feelings and moods appear to vary depending on musical preference or different if music (REA, et al., 2010). Moreover Classical music has been found to reduce a hormone known as cortisone that adds to stress. It is believed this style of music enhances relaxation by freeing the appropriate neurons in the brain.

2.4 The Mozart Effect

The Mozart effect has been the subject of much research in recent years, after it was found that listening to Mozart's music may increase specific types of intelligence, particularly spatial-temporal abilities. After at least 10 minutes of exposure to Mozart music, spatial abilities do increase temporarily (for about 15 minutes). Such as after listening to Mozart's sonata for two pianos (K448) for 10 minutes, can increase spatial reasoning skills and decrease blood pressure. The mean spatial IQ scores were 8 and 9 points higher after listening to the music than in the other two conditions. The enhancing effect did not extend beyond 10-15 minutes. These results proved controversial. However, children who were given keyboarding lessons, taught musical notation and other music-related skills, and learned to play simple melodies by Mozart and Beethoven achieved scores that were approximately 30% higher on tests of spatial-temporal reasoning than children of the same age who did not receive musical training, and these effects did not diminish over time. Thus, it appears that greater gains can be achieved by not only listening to music but also learning about it and creating it. The Mozart effect also occurs with other music that is similar to Mozart's, and animals are also subject to the effect. Mice and rats solve mazes faster after exposure to Mozart's music.

This indicates that it is more than simple enjoyment of the music that enhances certain types of intelligence. And from many research approved that classical music or "Mozart effect" not only have the vary effects on Psychological but on Physiological also. By in the Psychophysical effects of music held that four factors – rhythm response, musicality, cultural impact, and association – contribute to the motivational qualities of a piece of music (Karageorghis, Terry, & Lane, 1999). Music can be beneficial for anxiety reduction, enhancement of linguistic and spatial abilities, and reduction of epilepsy symptoms.

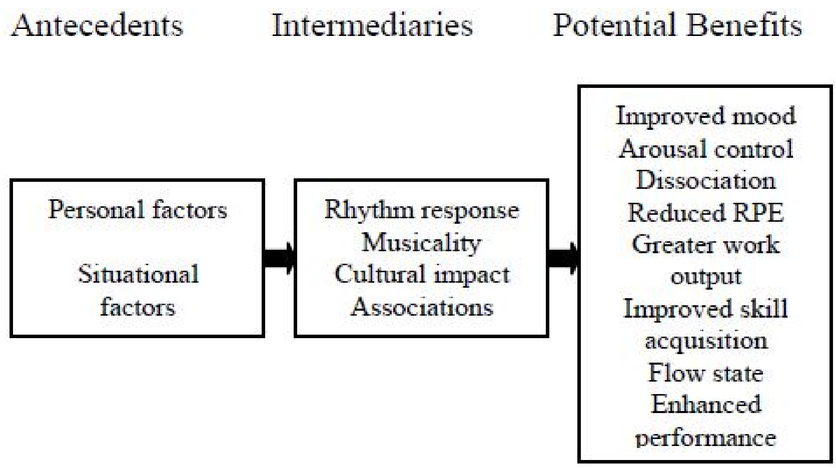
2.5 Benefits of Classical music

Sixty Beats

Listening to classical music set to 60 beats per minute (such as Mozart and Baroque period compositions) stimulates both the right and left parts of the brain and allows the listener to be more susceptible to processing information appropriately. Dr. George Lozanov, (a psychologist teaching foreign language), used this 60-beats framework to instruct his pupils to the tune of a 92% rate of retaining the material. And relaxation music decreases the level of anxiety.

Karageorghis et al. (1999) proposed that four factors contribute to the motivational qualities of a piece of music: (a) rhythm response, (b) musicality, (c) cultural impact, and (d) association. Rhythm response relates to the musical rhythm, most notably tempo (speed of music as measured in beats per minute), whereas musicality is the response to pitch-related elements, such as harmony and melody. Cultural impact refers to the pervasiveness of the music within society, and association pertains to the extramusical associations a piece may evoke (e.g., Vangelis's Chariots of Fire with Olympic glory). The factors exhibit a hierarchical structure (i.e., rhythm response is the most important, while association is the least important contributor to the motivational quotient of a piece of music).

Tempo is considered to be the most significant determinant of musical response (Brown, 1979; Budd, 1985; Hevner, 1935; Karageorghis et al., 1999). Berlyne (1971) predicted a curvilinear relationship between preference and tempo. A review by Bruner (1990) supported this; however, the listener's physiological arousal and the context in which the music is heard may affect the tempo preference (North & Hargreaves, 1997), meaning that as physiological arousal increases, one should, accordingly, prefer higher tempi. Neuropsychologists have asserted that the optimal speed at which humans are able to process rhythmical stimuli may influence preferred tempo (Carroll-Phelan & Hampson, 1996). Fast tempi and strong rhythms may contribute to preference, because they are inherently stimulative (Gaston, 1951)



(Terry & Karageorghis, 2006b) Figure 1: Conceptual framework for benefits of music in sport and exercise contexts.

2.6 Effect of music on Emotional response

Karageorghis and Terry (1999) assessed affective and psychophysical responses to motivational and oudeterous music during submaximal treadmill running at 50% VO_2 3 max using RPE, affect, heart rate, and post-exercise mood as dependent measures. They found affect differences between all conditions in the predicted direction and differences between the motivational music and control for the vigor component of mood and RPE. The results indicated that asynchronous music was more effective in influencing *how* participants felt (affect) rather than *what* they felt (exertion). This conclusion was corroborated in a subsequent study (Tenenbaum et al., 2004) using a hill running task at 90% VO_2 max which showed that although motivational asynchronous music did not influence perceptions of effort, it did shape participants' interpretations of fatigue symptoms. Considerable research has confirmed the effectiveness of background music as a strategy for mood enhancement (e.g., Hewston, Lane, Karageorghis, & Nevill, 2005; Terry, Dinsdale, Karageorghis, & Lane, in press).

Webster & Weir, (2005) explored the interactive effects of mode, texture, and tempo in emotion responses to music. Participants were tested in four different groups. Each group received a unique, random order of the 48 stimuli to control for serial dependency. The musical stimuli varied in duration from 5 to 15s and were presented with 12s inter-stimulus times. Each experimental session lasted between 15 and 20 min. Following each session, participants were debriefed on the purpose of the experiment. Musical phrases presented in major key, a simply melodic texture, or at a fast tempo were rated happier than those presented in minor keys, a thick harmonized texture, or at a slow tempo. Results indicated that the effects of mode, texture, and tempo were interactive in nature, producing a reliable three-way interaction. The nature of this interaction was such that the typically positive relationship between increase in tempo and happier responses was inverted among nonharmonized, minor music. The magnitudes of the effects of mode and tempo were stronger for women than men (Webster & Weir, 2005)). Music is a major key produces feelings of happiness and contentment while music in a minor key produces feelings of sadness and depression (Hevner, 1936); Webster & Weir, 2005; (D.-L. Priest, 2003).

Hayakawa Y et al., (2000) evaluated the effect of Japanese traditional folk song, aerobic dance music, or non-music on the mood of women during bench stepping exercise (60 min. bench step exercise). The subjects reported significantly less fatigue with aerobic dance and Japanese traditional folk song than with non-music. Aerobic dance music was associated with significantly more vigor and less confusion than non-music (Hayakawa, Miki, Takada, & Tanaka, 2000). Moreover, music alone and music assisted relaxation techniques have a strong effect on increasing relaxation when under an arousal condition due to stress (Pelletier, 2004).

Pates et al., (2003) examine the effects of self-selected asynchronous music on flow and netball shooting performance in three netball players. The participants comprised three collegiate netball players who were asked to complete 11 performance trials. Each trial involved taking 12 shots from lines located at three shooting positions. After each performance trial, flow and the internal experience of each player were assessed using the Flow State Scale and Practical Assessment Questionnaire. Participants received the intervention of asynchronous music with the length of pre-intervention baseline increasing for each succeeding player. The results showed self-select music and imagery helped to control both the emotions and cognitions that impacted upon performance. The music not only improves performance and increases feeling associated with flow but may also be used to help athletes cope with competition anxiety and to improve their self-confidence. These results are clearly relevant for applied sport psychologists (Pates, Karageorghis, Fryer, & Maynard, 2003)

In addition Marion Good et al., (2002) investigated the effect of three non-pharmacologic nursing interventions: relaxation, music, and the combination of relaxation and music on pain following gynecologic (GYN) surgery. A total of 311 patients, ages 18 to 70, from five Midwestern hospitals, were randomly assigned using minimization to either three intervention groups or a control group and were tested during ambulation and rest on postoperative days 1 and 2. Pain sensation and distress were measured using visual analogue scales. Multivariate analysis of covariance of posttest sensation and distress was used with pretest control and *a priori* contrasts. The intervention groups had significantly less posttest pain than the control group (p = .022-.001) on both days. The three interventions were similar in their effect on pain. Patients who received the interventions plus patient-controlled analgesia (PCA) had 9% to 29% less pain than controls who used PCA alone. Reduced pain was related to amount of activity (ambulation or rest), mastery of the use of the intervention, and decreased pulse and respiration. Those who slept well had less pain the following day. Nurses who care for GYN surgical patients can provide soft music and relaxation tapes and instruct patients to use them during postoperative ambulation and also at rest on days 1 and 2(Marion Good PhD, Gene Cranston Anderson PhD, Michael Stanton-Hicks MB, MD, & MD, 2002).

Moreover Vossa et al., (2004) revealed that Sedative music reduces anxiety and pain during chair rest after open-heart surgery. The effectiveness of non-pharmacological complementary methods (sedative music and scheduled rest) in reducing anxiety and pain during chair rest was tested using a three-group pretest–posttest experimental design with 61 adult postoperative open-heart surgery patients. Patients were randomly assigned to receive 30 min of sedative music (N=19), scheduled rest (N=21), or treatment as usual (N=21) during chair rest. Anxiety, pain sensation, and pain distress were measured with visual analogue scales at chair rest initiation and 30 min later. Repeated measures MANOVA indicated significant group differences in anxiety, pain sensation, and pain distress from pretest to posttest, P<0.001. Univariate repeated measures ANOVA (P≤0.001) and post hoc dependent t-tests indicated that in the sedative music and scheduled rest groups, anxiety, pain sensation, and pain distress all decreased significantly, P<0.001–0.015; while in the treatment as usual group, no significant differences occurred. Further, independent t-tests indicated significantly less posttest anxiety, pain sensation, and pain distress in the sedative music group than in the scheduled rest or treatment as usual groups (P<0.001–0.006). Thus, in this randomized control trial, sedative music was more effective than scheduled rest and treatment as usual in decreasing anxiety and pain in open-heart surgery patients during first time chair rest. Patients should be encouraged to use sedative music as an adjuvant to medication during chair rest (Vossa, et al., 2004).

Later on, Anne et al., (2008) demonstrated a significant reduction in anxiety for the experimental group on the anxiety measurement of the ESAS (*p* = 0.005). A post hoc analysis found significant reductions in other measurements on the ESAS in the experimental group, specifically pain (*p* = 0.019), tiredness (*p* = 0.024) and drowsiness (*p* = 0.018)(Anne Horne-Thompson & Denise Grocke, 2008) (Anne Horne-Thompson & Denise Grocke, 2008).

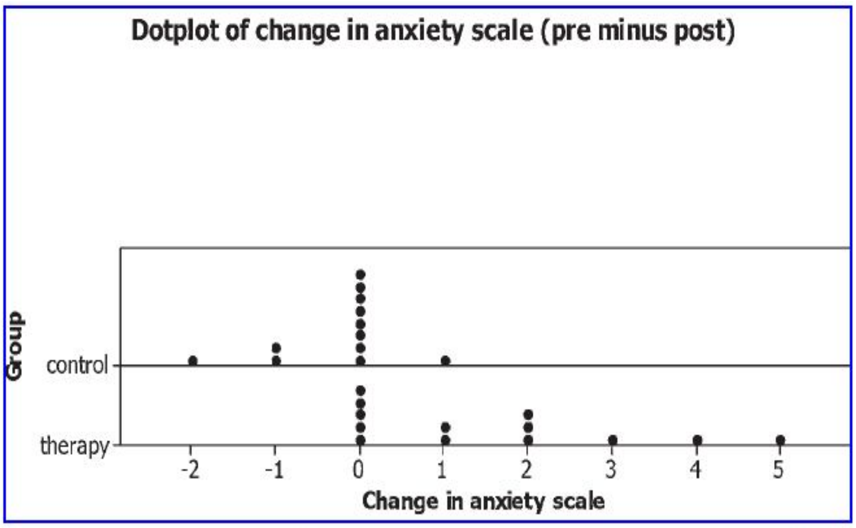


FIG. 1. Results of pre- and postmeasurements on the Edmonton Symptom Assessment System (ESAS) anxiety scale.

Linda et al., Studied in Confusion and agitation in elderly patients are crucial problems, showed that Music significant reduction in agitation during and following individualized music compared to classical music. This study expands science by testing and supporting a theoretically based intervention for agitation in persons with ADRD (A. G. Linda, 2000). Then Linda et al., (2007) Studied The Influence of Music on the Stress Response in Patients Receiving Mechanical Ventilatory Support: A Pilot Study. Result showed that levels of the 4 biomarkers of the stress response did not differ significantly between patients who listened to music and patients who rested quietly, though the levels of corticotrophin and cortisol showed interesting trends. Conclusions Additional research is needed with a larger sample size to evaluate further the influence of music on biochemical markers of the stress response in patients receiving mechanical ventilatory support. In future studies, confounding factors such as endotracheal suctioning and administration of medications that influence the stress response should be controlled for(L. C. Linda, William, Anthony, & Guttormson, 2007).

Prensner et al., 2001 showed that musical intervention has been helpful in assisting patients with pain management in a variety of medical settings. Music is an element of normal life that can be easily adapted for the needs of individual patients and their current environment while providing a means for self expression and for normalizing the environment. This article examines the rationale for using music therapy with burned patients, describes several protocols that have been adapted to meet the specific needs of burned patients, and summarizes our preliminary findings, which demonstrate significant response to music therapy protocols employed on our patients(Prensner , Yowler, Smith, Steele, & Fratianne, 2001).

Guzzetta, (1989) studied relaxation and music therapy were effective in reducing stress in patients in a coronary care unit admitted with the presumptive diagnosis of acute myocardial infarction. In this experimental study, 80 patients were randomly assigned to a relaxation, music therapy, or control group. The relaxation and music therapy groups participated in three sessions over a two-day period. Stress was evaluated by apical heart rates, peripheral temperatures, cardiac complications, and qualitative patient evaluative data. Data analysis revealed that lowering apical heart rates and raising peripheral temperatures were more successful in the relaxation and music therapy groups than in the control group. The incidence of cardiac complications was found to be lower in the intervention groups, and most intervention subjects believed that such therapy was helpful. Both relaxation and music therapy are effective modalities to reduce stress in these patients (Guzzetta, 1989).

Bishop et al., 2009 achieved the same result and added that faster music tempi induced higher valence and arousal; loud music elicited heightened arousal and shorter RTs. The finding shows that loud intensity (75dBA) music yielded significantly greater arousal and accompanying superior CRT performance than did moderate intensity (55dBA) (Daniel T. Bishop, Karageorghis, & Kinrade, 2009). The implications for athletes' use of music as part of a prevent routine when preparing for reactive tasks are discussed. Firm rhythms are vigorous and dignified; flowing rhythms are happy, dreamy, and tender, Complex harmonies are exciting, vigorous, and sad; simple harmonies are happy, serene, lyrical (Hevner, 1936). He also found out that high pitch is most expressive of sprightliness and humor, while low pitch expresses sadness, majesty, and dignity. The effect of tempo are largest and most consistent. Harmony and rhythm are less effective, while assending-dessending quality of the melody is of practically no significance. Slow tempos are most expressive of dignity, calmness and sadness; fast tempos of happiness and restlessness (Hevner, 1937;Krumhansl, 2002).

Kreutz et al., (2008) studied effect of classical music induce emotions in adults, five excerpts representing one of five emotion categories: 'happiness', 'sadness', 'fear', 'anger', and 'peace'. The participants seated comfortably on a reclining chair. Participants were requested to fill in the mood questionnaire first and then rate each excerpt immediately after listening. The light was dimmed and participants were left alone for create a private atmosphere. In general, the participants reported to be in a 'peaceful' and 'relaxed' mood. Lowest levels of affect were found for 'anger' and 'fear' scales. With respect to affective state changes, significant reductions of tiredness and tension were noted, while sadness was the only emotion that showed a significant increase. Emotion induction was found to be strongest for pieces in the 'happiness' and 'peace' categories, and was found to be weaker in the 'sadness', 'anger', and 'fear' categories. Preference for classical music clearly enhanced both intensity and specificity of induced emotions. Thus, the results provide further evidence that absorption is associated with emotional experiences during music listening (Kreutz, Ott, Teichmann, Osawa, & Vaitl, 2008). Whilst the adolescents showed that the adolescents appears to employ music effectively and successfully in diverting themselves from stress, worries and disturbances. Music also provided the adolescents with experiences of solace and consolation. The strategies of mental work and solace are very similar in the sense that both include experiences of dealing with worries and starting to feel better in the process. Music offer adolescents strong emotional experiences and entertainment, and served as a resource for personal renewal and recovery (Saarikallio & Erkkila, 2007). Music decreased stress the most in adolescents preparing for labor. Artificially induced stress in between adolescence and adulthood affected by music than older (Priest, Karageoghis et al. 2004) (Pelletier, 2004). It may be that subject preferred music is too distracting and therefore stimulates the subject rather than increasing relaxation (Pelletier, 2004).

Andrea K. McCullough, (1997) studied the effect of using music to change mood. The three focus unwelcome moods assessed were; sad, stress, and neutral. The study showed music was significantly more likely to be used to after sad or stressed moods than other things. The study showed that the participants used music when they were sad to help cheer up. Music was also used to cope with stress. Music was not used to change a neutral or apathetic mood. The participants did not use music more when sad than when stressed, and visa versa. People may use music to pick themselves up when things are not going as well as possible. Music could also be used to unwind and relax after a stressful day (McCullough, 1997). Moreover, listening to classical music or self-selected relaxing music after exposure to a stressor reduction in state anxiety and an increase in feeling of relaxation as compared to those who sit in silence or listening to heavy metal music. Interestingly, those participants who listened to heavy metal music not only experienced greater levels of state anxiety but were even more anxious after listening to the heavy metal music than when they were being stressed (Labbe', Schmidt, & Babin, 2007). The emotion response to heavy metal music found that heavy metal music is used for cathartic release and to dissipate negative emotions. Particularly among those with low self-esteem (Copley, May 8,2008); (Nater, Abbruzzese, Krebs, & Ehlert, 2006) in contrast with

Lai, (1999) investigated the physiological and psychological effects of music listening on depressed women in Taiwan. Through the use of a pretest-posttest, control group, experimental design, the heart rate, respiratory rate, blood pressure, and immediate mood states before and after a music/sound intervention were measured in 30 women. Quantitative data were analyzed descriptively and with t tests. A qualitative questionnaire was administered to participants to elicit information related to the subjective experience of music/sound listening. Significant posttest differences were found in experimental group participants' heart rates, respiratory rates, blood pressure, and tranquil mood states. Significant posttest differences also were found in control group participants' heart rates and tranquil mood states. The results support the use of music listening as a body-mind healing modality for depressed women (Lai, 1999).

James R. Austin, (1998) examine the effect of two music contest formats on the music achievement, self-concept, achievement motivation, performance achievement, and attitude of elementary band students. The author randomly assigned 44 fifth-and sixth-grade instrumentalists to one of two treatment groups: (a) students receiving written comments and ratings or (b) students receiving written comments only. Pretest and posttest data were obtained on dependent measures of the Music Achievement Test (MAT) and the Self-Concept in Music (SCIM) scale; data on achievement motivation and attitude were gathered on a posttest basis only. After 1 month of preparation, all students performed unaccompanied solos for an adjudicator. The results showed significant gains ($p < .05$) in musical self-concept for both groups, but only the rated group made a significant gain in music achievement. In addition, there was no significant difference in achievement motivation scores for rated versus nonrated students (James, 1988).

2.7 Effect of music on Physiological response

In the hotbed of competition, where athletes are often very closely matched in ability, music has the potential to elicit a small but significant effect on performance (Karageorghis & Terry, 1997) (C. I. Karageorghis & Terry, 1997). Music also provides an ideal accompaniment for training. Scientific inquiry has revealed five key ways in which music can influence preparation and competitive performances:

dissociation, arousal regulation, synchronization, acquisition of motor skills, and attainment of flow and shows that the dissociation effect results in a 10% reduction in perceived exertion during treadmill running at moderate intensity (Karageorghis & Terry, 1999; Nethery, 2002; Szmedra & Bacharach, 1998) (C. I. Karageorghis & Terry, 1999).

Karageorghis and Lee (2001) examined the interactive effects of music and imagery on an isometric muscular endurance task which required participants to hold dumbbells in a cruciform position for as long as possible. Males held 15% of their body weight and females held 5% of their body weight. The authors found that the combination of music and imagery, when compared to imagery only, music only, or a control condition, enhanced muscular endurance (see Figure 1), although it did not appear to enhance the potency of the imagery. The main implication of the study was that employing imagery to a backdrop of music may be a useful performance-enhancement strategy that can be integrated in a pre-event routine (C.I. Karageorghis & Lee, 2001).

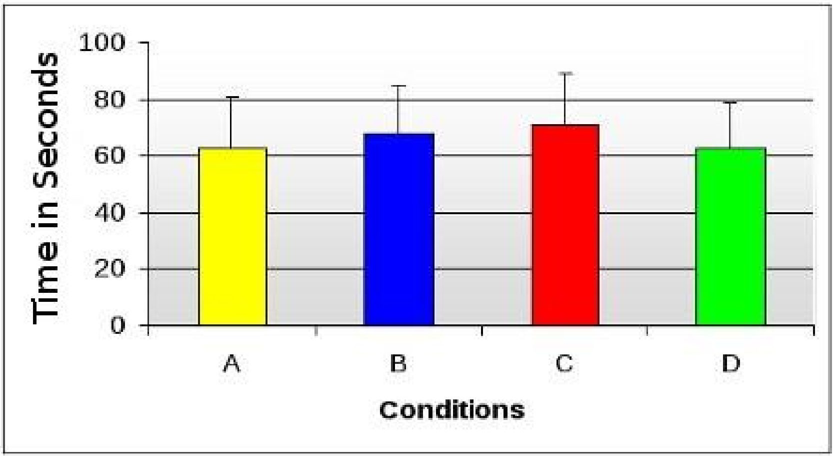


Figure 1. Bar chart illustrating mean scores (+ 1 SD) for isometric muscular endurance under conditions of imagery only (A), motivational music (B), motivational music and imagery (C), and a no music/imagery control (D).

Bacon, Myers, & Karageorghis, (2008) research has consistently shown that the synchronization of music with repetitive exercise is associated with increased levels of work output. This applies to such activities as rowing, cycling, cross-country skiing, and running. Musical tempo can regulate movement and thus prolong performance. Synchronizing movements with music also enables athletes to perform more efficiently, again resulting in greater endurance. In one recent study, participants who cycled in time to music found that they required 7% less oxygen to do the same work as compared to cycling with background (asynchronous) music. The implication is that music provides temporal cues that have the potential to make athletes' energy use more efficient (Bacon, Myers, & Karageorghis, 2008). Moreover the synchronization effect of music in running was demonstrated in an experimental setting by Simpson and Karageorghis (2006), who found that motivational synchronous music improved running speed by ~.5 s in a 400-m sprint, compared to a no-music control condition (see Figure 2)(Simpson & Karageorghis, 2006)

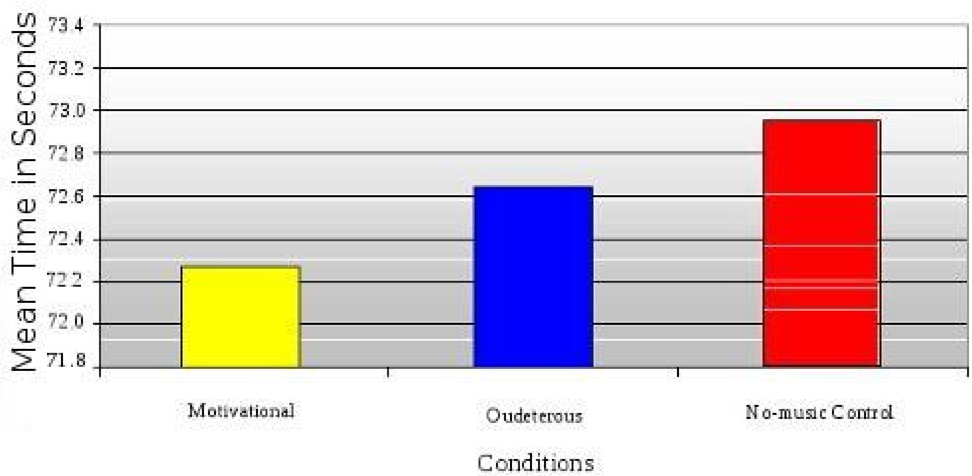


Figure 2. Mean 400 m times for synchronous motivational music, synchronous oudeterous music, and a no-music control.

Szmedra & Bacharach, (1998) examined the effects of listening to headphone music in ten well trained men (25.1 ± 6 years) during treadmill running. Maximal oxygen consumption, determined by open circuit spirometry, was followed by two sub-maximal work bouts 72 hours apart. The work bouts consisted of a supine rest, a 15 minute run at 70% of maximal oxygen consumption, and a three minute active recovery period. Participants listened to music during one of the two trials. Hemodynamic variables and perceived exertion were recorded at three minute intervals during each trial. A venous blood sample, obtained prior to and following each trial, was assayed for norepinephrine and plasma lactate. Analysis of variance revealed significant differences ($p < 0.05$) between the no music versus the exercise with music trial for (aggregate data 3,6,9,12,15 minutes): heart rate 152.9 ± 5.3 to 145.9 ± 4.7 beats.min-1; systolic blood pressure, 158.1 ± 3.7 to 151.7 ± 3.3 mmHg; rate-pressure product 242.2 ± 11.5 to 222.1 ± 11.4; exercise lactate 2.75 ± 0.15 to 2.13 ± 0.18mmol.l-1; and perceived exertion 14.4 ± 0.4 to 12.9 ± 0.4. A 17.5% lower level of norepinephrine (841.5 ± 314.7 to 694.1 ± 254.5 pg.ml-1) in the exercise and music trial was not statistically significant ($p<0.05$); however a moderate effect size (ES = 0.52) was calculated and may be of practical significance considering the variability of the sample. Higher values for hemodynamic and lactate in the no music trial is suggestive of a greater metabolic demand; however, oxygen consumption was not different. Perhaps the music allowed individuals to relax reducing muscle tension thereby increasing blood flow and lactate clearance while decreasing lactate production in working muscle. The combined results of this study suggest the introduction of music has a psychobiological impact on the exerciser demonstrated by changes in perceived effort, lactate and nor-epinephrine (Szmedra and Bacharach 1998)

Mathews et al., (2001) recorded instrumental musical accompaniment was evaluated on participation in a series of 14 exercise activities with a group of nursing home residents with dementia. All exercise sessions, specifically designed by physical therapists for older adults, were lead by an activity aide and consisted of a series of seated exercises. Direct observations of resident behavior were conducted over a 25-week period in a reversal experimental design. Results showed increased levels of participation during the experimental condition observations where rhythmic music accompanied the exercise activities. The music intervention was most successful on those generally most willing to participate in social activities (Mathews, Clair, & Kosloski, 2001).

Edworthy et al., (2006) examined the effects of loudness and tempo of background music on exercise performance. A total of 30 volunteers performed five 10-min exercise sessions on a treadmill. The music listened to whilst exercising was either fast/loud, fast/quiet, slow/loud, slow/quiet or absent. Measures of running speed, heart rate, perceived exertion and affect were taken. Significant effects and interactions were found for running speed and heart rate across the different music tempo and loudness levels. More positive affect was observed during the music condition in comparison to the 'no music' condition. No significant differences for perceived exertion were found across conditions. These results confirm that fast, loud music might be played to enhance optimal exercising, and show how loudness and tempo interact (Edworthy & Waring, 2006).

Bharani et al., (2004) studied the effect of music on treadmill exercise in healthy males. Twenty healthy males age 23-34 years exercised till exhaustion on a treadmill, twice within 24-72 h, using Bruce protocol under identical conditions, while listening to self selected music or without music randomly. The results revealed highly significant differences between the exercise performances with music compared to that without music accompaniment. Participants, while listening to self selected music exercised longer before exhaustion, achieved higher peak heart rates, higher peak pressure-rate products and showed lower rating of perceived exertion at equivalent sub-maximal exercise compared to exercise without music (Bharani, Sahu, & Mathew, 2004; Judy Edworthy & Hannah Waring, 2006).

Later on, Estate M. Sokhadze, (2007) studies the effects of music on the recovery of autonomic and electrocortical activity after stress induced by aversive visual stimuli. Aversive visual stimulation evoked heart rate deceleration, increased high frequency component of heart period variability, increased skin conductance level and skin conductance response frequency, decreased facial blood flow and velocity, decreased temporal slow alpha and increased frontal fast beta power in all three sessions. Both subjectively pleasant and sad music led to the restoration of baseline levels on most parameters; while white noise did not enhance the recovery process. The effects of pleasant music on post-stress recovery, when compared to white noise, were significantly different on heart rate, respiration rate, and peripheral blood flow. Both positive and negative music exerted positive modulatory effects on cardiovascular and respiratory activity, namely increased heart rate, balanced heart period variability, increased vascular blood flow and respiration rate during the post-stress recovery (Estate M. Sokhadze, 2007).

In addition Labbe' et al., (2007) studied the effectiveness of different types of music (classical music, self-selected relaxing music and heavy metal music). The study indicates that the group listening to self –selected music experienced a decrease in heart rate where as participants listening to classical, heavy metal music or silence did not. The group listening to classical and heavy metal music experienced lower respiration rates than participants listening to self-selected or silence (Labbe', et al., 2007).

Helper et al., (1996) studied effect of relaxation music during treadmill walking. Ten college students of varying physical fitness levels performed two 10-minute walks at 70% of age-predicted maximal heart rate on a motorized treadmill. Throughout the walk subjects were connected to an automated metabolic cart to determine metabolic function. The result showed relaxation music did not significantly change the energy cost of walking, buy it did produce a significantly lower cardiac stress and if the objective is to keep cardiac stress low while maintaining an exercise effect, as in a cardiac rehabilitation or stress management setting, relaxation music would be appropriate ergogenic aid. It is possible longer durations of exercise might manifest greater effects for the relaxation music condition (Hepler & Kapke, 1996). Perhaps the music allowed individuals to relax reducing muscle tension thereby increasing blood flow and lactate clearance while decreasing lactate production in working muscle. The combined results of this study suggest the introduction of music has a psychobiological impact on the exerciser demonstrated by changes in perceived effort, lactate and nor-epinephrine (L. Szmedra & D. Bacharach, 1998).

Khalfa et al., (2003) investigated the effects of listening to relaxation music on salivary cortisol level after psychological stress. Twenty- four francophone male university students were evaluated before and after the Trier Social Stress Test (TSST). It consists of a speaking task and mental calculations performed in front of an audience. The sampling of salivary cortisol was undertaken 20 and 30 minute after the subject's arrival and served as a baseline. The students were comfortable seated and were asked to relax in silence or with a musical tape being played. The psychological stressor provoked a strong emotion that was revealed by a sharp increase in cortisol levels within 15 minutes. The concentration of cortisol decreased more rapidly in the saliva of the subjects exposed to music than in the group recovering from stress in silence, suggesting that relaxing music after a stressor can act by decreasing the post-stress response of the hypothalamic-pituitary-adrenal axis (Khalfa, Bella, Roy, Peretz, & Lupien, 2003). Listen to music produces a greater effect on the immune system than no listening to music supporting by SIgA levels of the active group showed a significantly greater increase than those of the passive group and the control group (Kuhn, 2002).

Yamamoto et al., (2003) examined the effect of listening to two different types of music (with slow and fast rhythm), prior to supramaximal cycle exercise, on performance, heart rate, the concentration of lactate and ammonia in blood, and the concentration of catecholamines in plasma. Six male students participated in this study. After listening to slow or fast rhythm music for 20 minutes, the subjects performed supramaximal exercise for 45 s. When listening to slow and fast rhythm music prior to supramaximal exercise did not affect on blood lactate and ammonia levels following exercise. The heart rate did not affect when resting, during exercise or during recovery. The plasma norepinephrine level decreases when listening to slow rhythm music and increases when listening to fast rhythm music (Yamamoto, et al., 2003).

And Aversive visual stimulation evoked heart rate deceleration, increased high frequency component of heart period variability, increased skin conductance level and skin conductance response frequency, decreased facial blood flow and velocity, decreased temporal slow alpha and increased frontal fast beta power in all three sessions. Both subjectively pleasant and sad music led to the restoration of baseline levels on most parameters; while white noise did not enhance the recovery process. The effects of pleasant music on post-stress recovery, when compared to white noise, were significantly different on heart rate, respiration rate, and peripheral blood flow. Both positive and negative music exerted positive modulatory effects on cardiovascular and respiratory activity, namely increased heart rate, balanced heart period variability, increased vascular blood flow and respiration rate during the post-stress recovery (Estate M. Sokhadze, 2007).

Francis C revealed that evidence from a variety of fields and clinical specialties existed, including the use of music in critical care environments, surgical settings, dental surgery applications, mental healthcare, pain control, and generally for the control of anxiety and promotion of relaxation and the research indicated that there often appear to be positive changes in physiological variables measured, although these changes are not consistent, nor are they always statistically significant (Francis C. Biley,20

Iwanaga, (1995) examined the predicted positive and linear relationship between exercise heart rate and music tempo preference. Initially (Iwanaga, 1995a, 1995b), 128 undergraduate students (M age = 20.0 years, SD = 0.9) were surveyed to establish their three favorite music artists. A separate experimental group of 29 undergraduates (M age = 20.3 years, SD = 1.2) selected the music of a single artist from the three highest-rated artists from the earlier survey. They reported their preference for slow, medium, and fast tempo selections from each artist for three treadmill walking conditions at 40%, 60%, and 75 % maximal heart rate reserve. A mixed-model 3 x 3 x 2 (Exercise Intensity x Music Tempo x Gender) analysis of variance was used to analyze the data. Results indicated there was no three-way interaction for music preference. There was, however a significant ($p < .05$) two-way interaction for Exercise Intensity x Music Tempo (partial 712 = .09) and a significant ($p < .05$) main effect for music tempo, with large differences evident between preference for medium versus slow tempo and fast versus slow tempo music at all exercise intensities (partial 712 =. 78). Participants reported a preference for both medium and fast tempo music at low and moderate exercise intensities and for fast tempo music at high intensity. Only partial support was found for the expected linear relationship between exercise intensity and music tempo preference (Iwanaga, 1995).

Labbe' et al., (2007) studied the effectiveness of different types of music (classical music, self-selected relaxing music and heavy metal music). The study indicates that the group listening to self –selected music experienced a decrease in heart rate where as participants listening to classical, heavy metal music or silence did not. The group listening to classical and heavy metal music experienced lower respiration rates than participants listening to self-selected or silence (Labbe', et al., 2007)

Szabo, et al (1999) investigate, based on the parallel information processing model and arousal hypothesis, whether musical tempo and its manipulation during exercise affect the maximal workload (watts) achieved during progressive cycling. Methods Design: repeated measures experiment that involved one control and four treatment conditions. Settings: the experiment was performed in a controlled laboratory environment. Participants: twenty-four male and female volunteers, recruited from among a University population, were tested. Intervention: the data collection proceeded in five counterbalanced test-sessions that included control (C), slow music (SM), fast music (FM) slow to fast music (SFM) and fast to slow music (FSM) interventions. In the last two conditions, musical tempo was changed when the participant's maximal HR reserve has reached 70%. In all test-sessions, participants started to cycle at 50 watts and then the workload was increased in increments of 25 watts every minute until self-declared exhaustion. Maximal ergometer cycling was defined as the workload at the last completed minute of exercise. Measures: workload, HR, and post-experimental ratings of test-session preferences were the dependent measures. Results Significantly higher workload was accomplished in the SFM condition. No between-session differences were seen in HR. The results also yielded significantly better efficiency, in terms of workload/HR reserve ratio, in the SFM session. Participants preferred the FM and SFM sessions more than the other sessions. In conclusions switching to FM during progressive exercise results in the accomplishment of more work without proportional changes in HR. These effects may be due to distraction from fatigue and are, apparently, dependent on the attention capturing strength of the distracting stimulus (SZABO, SMALL, & LEIGH, 1999).

Music induces an arousal effect, predominantly related to the tempo. Slow or meditative music can induce a relaxing effect; relaxation is particularly evident during a pause. Music, especially in trained subjects, may first concentrate attention during faster rhythms, then induce relaxation during pauses or slower rhythms according to L Bernardi et al., (2005) assessed the potential clinical use, particularly in modulating stress, of changes in the cardiovascular and respiratory systems induced by music, specifically tempo, rhythm, melodic structure, pause, individual preference, habituation, order effect of presentation, and previous musical training measurement of cardiovascular and respiratory variables while patients listened to music.

Interventions after a five minute baseline, presentation in random order of six different music styles (first for a two minute, then for a four minute track), with a randomly inserted two minute pause, in either sequence. The main outcome measures: Breathing rate, ventilation, carbon dioxide, RR interval, blood pressure, mid-cerebral artery flow velocity, and baroreflex. Results that Ventilation, blood pressure, and heart rate increased and mid-cerebral artery flow velocity and baroreflex decreased with faster tempi and simpler rhythmic structures compared with baseline. No habituation effect was seen. The pause reduced heart rate, blood pressure, and minute ventilation, even below baseline. An order effect independent of style was evident for mid-cerebral artery flow velocity, indicating a progressive reduction with exposure to music, independent of style. Musicians had greater respiratory sensitivity to the music tempo than did non-musicians (Bernardi., Porta, & Sleight, 2005).

Hass, Distenfeld, & Axen, (1986) assessed the effect of rhythmic input on breath period (TT) under constant metabolic drive studied in 10 musically trained and 10 untrained subjects. They tapped to a metronome and then to four musical segments, each for 5 min. Ten of these subjects (5 from each group) also listened to the selections without tapping. TT, beat period (TB), and phase coupling (PC) were assessed during the last 20 breaths of each presentation. TT coefficient of variation decreased significantly (P less than 0.001) in all subjects (base line = 23%; listening = 15%; listening and tapping = 10%). Significant correlation between rhythm and TT, indicating relative entrainment, was found in half of the subjects (r greater than 0.45; P less than 0.01). Significant integer TT/TB ratio and PC, both indicating tight entrainment between rhythm and breathing, were observed in 12 subjects (though not consistently in each one). These data advance the following hypothesis: musical rhythm can be a zeitgeber (i.e., pacemaker), with its ability to entrain respiration dependent on the strength of its signal relative to spurious signals from the higher neural centers that introduce noise into the central pattern generator. Tapping reinforces the zeitgeber, increasing its signal-to-noise ratio and thereby promoting entrainment

2.8 Recovery period

Exercise is the exertion of the body to achieve a physical purpose. Physical movements, no matter how structured, will require a period of rest to permit the body to be restored to a state where it can exercise once more. The observance of the fundamental rules concerning the perpetual process of exercise and recovery is essential to sport success; exhausted made athletes cannot train or compete at their highest possible level if they have not sufficient recovery period. All exercise, whether viewed as the workout on a particular day, or as part of a larger program or training system, has a built in recovery factor. Aerobic sports are those where the duration of the activity is relatively long, but not indefinite. Recovery from the aerobic exercise begins the moment that the activity ceases. Anaerobic sports are built on short intervals that naturally presume a rest or recovery space between them. The length of the recovery period in relation to the active exercise period is a function of both the duration of the exercise as well as the intensity level at which the body performs the exercise. Exercise recovery has four specific divisions, each of which has its own recovery principles. The divisions are: musculoskeletal recovery from the stresses and forces of training and competition; recovery of the large-scale systems that power the body during exercise, particularly the cardiovascular and cardio-respiratory systems; restoration of the energy stores depleted by exercise, especially carbohydrates and minerals; and psychological recovery often necessitated when competitive and training stresses place a mental burden on the athlete over a period of time. Sore muscles and joints are the easiest aspect of any athlete to identify as being in need of a recovery period after training sessions or competition. One of the great challenges of athletic participation is a true understanding of the difference in the signals sounded by the body between the pain of an injury, physiological damage requiring decisive treatment and rehabilitation including probable enforced rest, and discomfort caused by exercise, which can be borne or otherwise tolerated as the athlete continues to perform at the highest level possible. The further an athlete advances in a particular discipline, the more often this decision will arise. Rest is the easiest solution to overtaxed muscles; therapy such as massage and various stretching programs suited to the muscle group in question; cool down stretches ease the body to recovery after vigorous workouts by taking the muscles gently through a full range of motion and help prevent cramping and stiffness. In the period following a hard workout or competition, cross-training exercises will serve to keep the body working, thus maintaining over all fitness, while not unduly stressing the muscles that were most stressed by the activity. Examples of effective cross training as a recovery tool are swimming or cycling after an event such as a run, or as a respite from a vigorous contact sport such as rugby. Recovery of the cardiovascular and cardio-respiratory systems is achieved through a reduction in the intensity of activity through the recovery period. The heart, the organ central to the function of both systems, rarely will benefit from a recovery program that eliminates any stress on it above the sedentary level. It is the body's fluid level, primarily water, that is critical to the recovery of the cardiovascular system, as the reduction of body fluid that occurs through the heat generated by exercise will correspondingly reduce the volume of fluid in the blood plasma, which lessens the ability of the blood vessels to transport oxygen, fuel in the form of glucose and other nutrients throughout the body. When an athlete has lost from 2% to 3% of their body weight in fluids, the recovery of the cardiovascular system to an optimal fluid level can take several hours; the recovery of depleted minerals (such as sodium) to assist in the operation of the cardiovascular system may be a longer process, depending upon how much mineral was depleted. Fluid level recovery is one part of the bodily equation, the restoration of the energy available for exercise is the other. The restoration of depleted energy stores will commence the moment that carbohydrates are consumed after the activity, either through energy drinks or by way of food. A return to the athlete's usual level of carbohydrates is a process that depends on the carbohydrates present in the foods consumed, and the level of physical activity in the rest period that may draw on these energy stores. The recovery of the muscles, body systems, and energy stores of an athlete after exercise can each be estimated with reasonable precision, given the known and predictable qualities of the components involved. Psychological recovery from exercise is a true variable. Every athlete reacts in a different way to similar stresses. After prolonged and difficult periods of training, or key competitions, many athletes build short rest breaks into their program to maintain mental freshness in their approach to the sport. In some instances, the spirit of the maxim "a change is as good as a rest" is employed, when the athlete continues to train at a significant level, but in an alternate sport (Dennis 1992).

During Recovery

Building recovery time into any training program is important because this is the time that the body adapts to the stress of exercise and the real training effect takes place. Recovery also allows the body to replenish energy stores and repair damaged tissues. Exercise or any other physical work causes changes in the body such as muscle tissue breakdown and the depletion of energy stores (muscle glycogen) as well as fluid loss. Recovery time allows these stores to be replenished and allows tissue repair to occur. Without sufficient time to repair and replenish, the body will continue to breakdown from intensive exercise. Symptoms of overtraining often occur from a lack of recovery time. Signs of overtraining include a feeling of general malaise, staleness, depression, decreased sports performance and increased risk of injury, among others.

Most athletes know that getting enough rest after exercise is essential to high-level performance, but many still over train and feel guilty when they take a day off. The body repairs and strengthens itself in the time between workouts, and continuous training can actually weaken the strongest athletes.

Rest days are critical to sports performance for a variety of reasons. Some are physiological and some are psychological. Rest is physically necessary so that the muscles can repair, rebuild and strengthen. For recreational athletes, building in rest days can help maintain a better balance between home, work and fitness goals.

Short and Long-Term Recovery

There are two categories of recovery. There is immediate (short-term) recovery from a particularly intense training session or event, and there is the long-term recovery that needs to be build into a year-round training schedule. Both are important for optimal sports performance.

Short-term recovery

Short-term recovery, sometimes called active recovery occurs in the hours immediately after intense exercise. Active recovery refers to engaging in low-intensity exercise after workouts during both the cool-down phase immediately after a hard effort or workout as well as during the days following the workout. Both types of active recovery are linked to performance benefits. Another major focus of recovery immediately following exercise has to do with replenishing energy stores and fluids lost during exercise and optimizing protein synthesis (the process of increasing the protein content of muscle cells, preventing muscle breakdown and increasing muscle size) by eating the right foods in the post-exercise meal. This is also the time for soft tissue (muscles, tendons, ligaments) repair and the removal of chemicals that build up as a result of cell activity during exercise.

Long-term recovery

Long-term recovery techniques refer to those that are built in to a seasonal training program. Most well-designed training schedules will include recovery days and or weeks that are built into an annual training schedule. This is also the reason athletes and coaches change their training program throughout the year, add cross-training, modify workouts types, and make changes in intensity, time, distance and all the other training variables.

Adaptation to Exercise

The Principle of Adaptation states that when we undergo the stress of physical exercise, our body adapts and becomes more efficient. It's just like learning any new skill; at first it's difficult, but over time it becomes second-nature. Once you adapt to a given stress, you require additional stress to continue to make progress. There are limits to how much stress the body can tolerate before it breaks down and risks injury. Doing too much work too quickly will result in injury or muscle damage, but doing too little, too slowly will not result in any improvement. This is why personal trainers set up specific training programs that increase time and intensity at a planned rate and allow rest days throughout the program.

Balance Exercise with Rest and Recovery.

It is this alternation of adaptation and recovery that takes the athlete to a higher level of fitness. High-level athletes need to realize that the greater the training intensity and effort, the greater the need for planned recovery. Monitoring your workouts with a training log, and paying attention to how your body feels and how motivated you are is extremely helpful in determining your recovery needs and modifying your training program accordingly (Elizabeth 2008).

At modern days, there are many methods to improve the recovery period, and body function. Recovery period is one of the most commonly used way improving sports performance. And people tend to find many ways in improving Recovery Strategies via active recovery, passive recovery, Compression clothing, Ice Bath, Contrast water therapy, massage, nutrition.

Active recovery

This is a gentle form of exercise or activity that can be done on a scheduled rest day or after a hard workout. It can include a leisurely walk, cycle or swim, some light strength training, a gentle pilates or yoga class or some simple stretches. It's believed that active rest can aid recovery by helping to flush away the toxins and lactic acid from your previous session and also take healing oxygen to tired and achy muscles. When performing any exercise as active recovery, stick to a low intensity and keep any activity at a conversational pace. Work at no more than 65% of your maximum heart rate if doing cardio and use very light weights if strength training. This will ensure that no further toxins or lactic acid are produced, which would potentially hinder recovery rate (Martin A. Nancy. , Zoeller F. Robert et al. 1998).

Passive recovery

This is complete rest from any form of exercise. Research has shown that passive recovery is not nearly as effective as active recovery, however sometimes the break can do you good, if not so much physically, then mentally.

Compression clothing

Compression clothing applies pressure to certain parts of the body in order to enhance circulation. This delivers more healing oxygen to the active muscles and helps eliminate lactic acid build-up and other by-products of exercise. Wearing compression clothing post exercise has been shown to reduce swelling, perceived muscle soreness and DOMS, thereby improving the effectiveness and speed of muscle recovery. It's advised to wear the garment for about three hours or more after training and also when flying. Compression clothing is now also being worn during training, with findings showing that it could improve muscle power and endurance, reduce lactic acid build-up and help the prevention of injuries. The most reliable and researched brand is Skins™ (used by many elite sports people), with Nike, Adidas and Canterbury also offering ranges, including shorts, tights, vests and short and long-sleeved tops.

Ice bath or Cold Baths (Cryotherapy)

Body is plunged into a bath of icy cold water, the blood vessels constrict and the blood will be drained away from the muscles that have been working (removing lactic acid). Once you get out of the bath, the capillaries dilate and 'new' blood flow back into the muscles, bringing with it oxygen which help the functioning of the cells (2011).

Contrast water therapy

when immerse part of body in cold water for about one minute and hot water for two minutes, alternating between the two several times. As with ice baths, the cold water restricts the blood vessels, while the warm water makes them dilate, allowing for a fast flow of blood that brings oxygen to the muscles and takes away any lactic acid (Peiffer, Abbiss et al. 2010).

Alternating hot and cold showers/baths provides increased muscle flow to the working muscles and speeds the removal of lactic acid. The following guidelines should provide the most benefits:

- Complete within 30 minutes of training/exercise
- Begin and end with cold exposures
- Cold should be between 10 and 16
- Hot should be between 35 and 37

- Repeat the alternations 3 or 4 times
- Cold exposure should last between 30 and 60 seconds
- Hot exposures should be between 3 and 4 minutes

Nutrition & Hydration

Ensuring the body is fully nourished and hydrated is vital for good recovery. It is most important to replace fluids after exercise and to replenish energy stores by eating the right foods at the right time (Louise 2007). According to Shimal (2011) has been proven to be a popular recovery drink for trained cyclists to achieve high profile results because milk contains carbohydrates and protein. On the other hand, research has now shown that Soy milk can be just as effective as semi skimmed milk as it contains the same high quality protein (Shimal 2011).

Cool Down and Stretch

The cool down is a group of exercises performed immediately after training to provide an adjustment between exercise and rest. Its purpose is to increase muscular soreness and bring the cardiovascular system back to rest. Stretching is often combined with the cool down

Massage

The physical benefits of a massage following exercise include:

• Increased blood flow, enhanced oxygen and nutrient delivery to fatigued muscles, increased removal of lactic acid

• Warming and stretching of soft tissues, increasing flexibility, removal of microtrauma, knots and adhesions

In addition to the physical benefits, massage has been reported to help improve mood state and help increase relaxation and reduce feelings of fatigue (Robertson A, Watt J et al. 2004).

CHAPTER III
MATERIALS AND METHODS

Participants

Participants in this study volunteered from Mahidol University, age from 20 to 29 years, The participants were 12 healthy male and female who had regular exercise (3-5 times/weeks, ACSM 2009) by self-reporting in The Physical Activity Readiness Questionnaire (PAR-Q) before exercise and ones who answered “YES” to all questions and had the same physical fitness level using Bruce’s protocol would be selected as research subjects. The participants who achieved walk/run until exhaust according to 85-90% Max HRR and VO2max range from 42.5-46.4 ml/kg/min for male and 33.0-36.9 ml/kg/min for female will be selected for this research. The subjects were blind to the purpose of the study. All participants were fully informed about the experimental design and signed the consent form.

Inclusion Criteria

1. Participants were healthy and had no any problem that might affect when they exercise.
2. Participants had regular aerobic exercise (3-5 times per weeks) and VO2max range from 42.5-46.4 ml/ kg/ min for male and 33.0-36.9 ml/ kg/ min for female by Bruce’s protocol test (Choosakul and al 2008).
3. Participants did not have history of hearing problems.

Exclusion Criteria

1. Participants had some problems that might affect when they exercise.
2. Participants had history of hearing problems.
3. Participants wanted to resign from this investigation.

Instruments

1. Demographic questionnaire: age, height, weight
2. The Physical Activity Readiness Questionnaire (PAR-Q) was a Yes/No question with seven items by McArdle, Katch, & Katch (2007). It assessed an individual's general medication condition (e.g. heart condition, chest pain, bone or joint problem etc.)
3. Brunel Mood Scale Thai Version (Choosakul, 2008) developed from Terry & Lane's (2003), contained 24 items to assess six dimensions of mood; anger, confusion, depression, fatigue, tension and vigor, with 5-point scale ranging from "not at all (0)" to "extremely (4)". Only "fatigue dimension" was assessed in this study. It was measured after exhaustion exercise to recovery period at 85-90% Max HRR.
4. Attitude Questionnaire used at the 15th minutes recovery period and after second period of exercise.

Music Selection

1. Selecting relaxation music

For selecting "relaxation music" as an intervention in this study, forty volunteers (age: 20-40 years) had listened to 10 songs twice, then they were asked to rank all of those songs from 1-10 (10- highest score, 1- the lowest score). The researcher recorded songs orderly by rating in a CD, and then brought it to the three experienced musicians (Assoc.Prof. Nrongchai Pidokrajt, Asst.Prof. Anak

Charanyananda and Mr.Surat Kemaleelakul) to select only 1 song that met the objectives of this study, which their characteristics promoted relaxation and reduce anxiety from exhaust after exercise. The songs the experts picked were selected for “relaxation music” (55-70 bpm). Then researcher brought that relaxation music to pilot study and interviews the participants’ feeling during their exercise. This research found out that the selected songs promoted relaxation and desire to take more exercise.

2. Preferred music

Preferred music was 1 favorite song which was selected by every single participant for listening while resting.

Apparatus

1. Treadmill (Sensor Medics: 2000 Treadmill).
2. HR Monitor (PolorS810i): on the chest of the participants by the sensor held at handle and continuously monitor.
3. Hand-held stopwatch (CASIO STOPWATCH HS-30W).
4. iPod (Touch)
5. Headset as an individual to own familiarity
6. Stethoscope
7. Sphygmomanometer

Procedure

For Screening: This study was considered by the ethics committee on human experiment of Mahidol University and conducted at laboratory room in College of Sports Science and Technology.

Screening participants by evaluation of pre-exercise questionnaire with PAR-Q by answering “YES” to all questions Researcher described the process of testing, guidelines for answering mood state and explaining the preparations before the experiment and finally informed every participant to answer only the truth.

Pre-test stage: researcher describes the process of testing, and follow the preparation before the experiment (see experiment below), and the participants tested everyone to fully answer the truth in each step. Mood, HR, RR, BP and mood state were measured as soon as participants exhausted and change to the 1st cool-down mode 2 minutes and continuous to came down from treadmill. By the conditions were give since subjects started the first minutes to the 1st cool down and continuous to 15minutes recovery period then measurement Mood, HR, RR, BP and mood state again. After that researcher let's subjects rest until heart rate return equal to ±10RHR (resting heart rate before exercise). Participants test each one by answering questions Mood after exhaustion (exhaustion according to 85-90% Max HRR calculated by Kavonen formula (ACSM, 2009) the 1st cool down (the first minute cool down period) and the second measurement answer again after 15 minutes when finish conditions time exercise in the first round by exhaustion according to 85-90% Max HRR. Then subjects started to exercise again in round2 (by Bruce's protocol: same level and incline with1st exercise)

: 15 minutes recovery period; (cool down 2minutes + 13minutes)

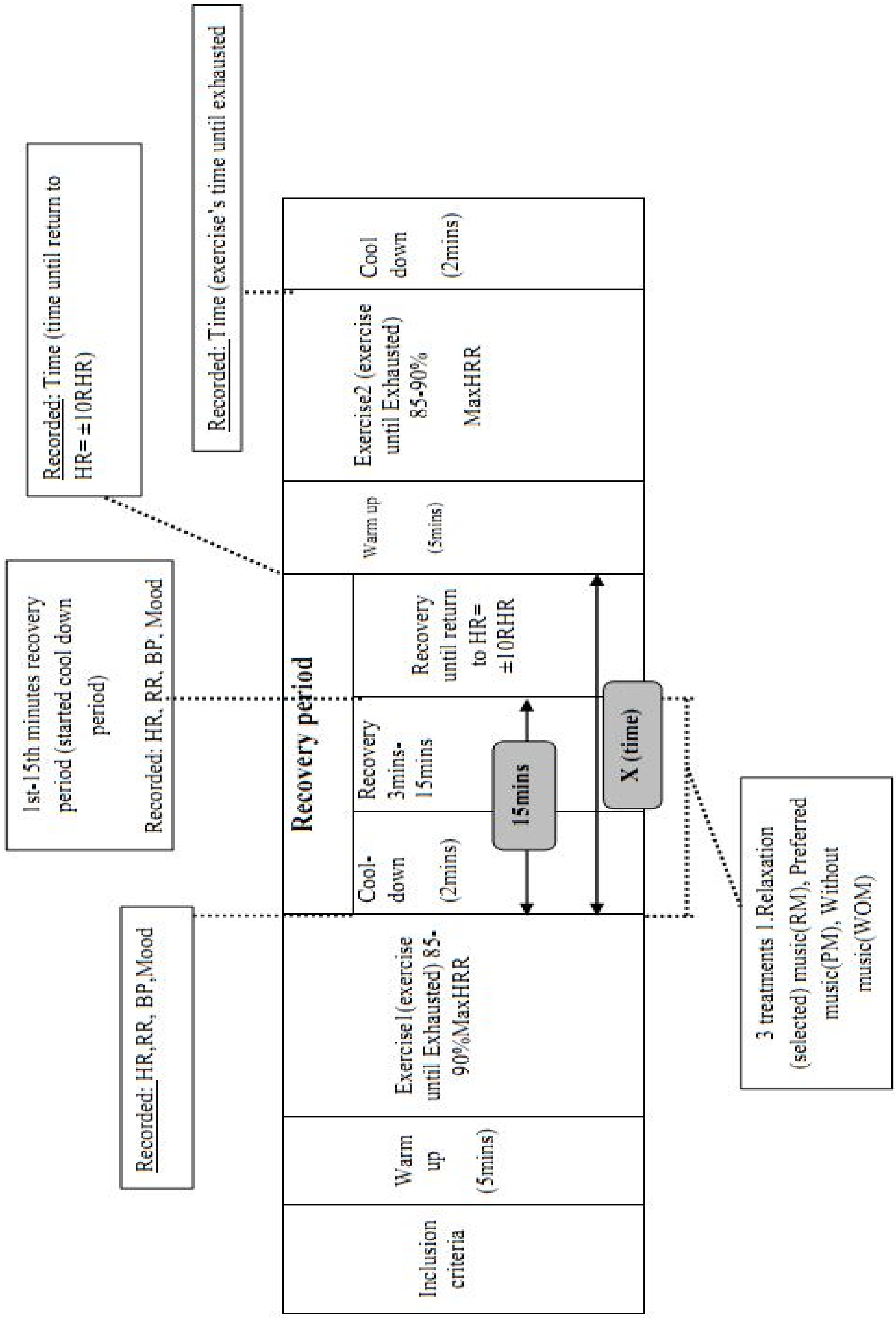
Then measured HR RR BP and Mood state after came down from treadmill and measure again after finish resting time (recovery period). Later on started second exercise until exhausted; according to reach 85-90% Max HRR after that measured HR RR BP and Mood state again. Total time complete use estimate VO2max interview subject participated in this study on the basis that participants want to familiarize yourself with each track and the environment in the lab, walk / run 15 minutes each for 3 days before the trial. In this study was give the treatments to each subjects in recovery (resting) period (each subjects will receive 3treatments by randomized control)by each subjects were receive 3 treatments in 15 minute recovery period; without music (WOM), listen to relaxation music (RM) and listen to preferred music (PM); exercise by Bruce's Protocol to exhausted according to 85-90%MaxHRR. Heart rate, blood pressure, respiratory rate, mood were measured after exhaust from exercise. Heart rate recovery in 15 minutes resting period was determined by percent change. Mood was assessed by Thai version of the Brunel mood scale. Each condition was performed week after week. By pre-test is the baseline for no music treatment; In this study divided into 3 parts of strategy to investigate in 15minutes recovery period, X-time (return to ±10RHR) and Exercise's time (second period of exercise).

Experimental stage: Each participants performed all three conditions (relaxation music, selected music and no music) at random condition for each participant to attend the trial equal condition (3 times/3conditions) 4-week experimental period (Monday - Friday) throughout the experiments done at the same time of the day and as well organized environmental. The room temperature was maintained at 20 ° C - 22 ° C and humidity at less than 60% (ACSM, 2009). The exercise HR of 85-90% Max HRR was calculated by Kavonen formula (ACSM). Researcher describes the detail, including the steps of the experiment. And practices to prepare before the test: try to eat before the 3 hours, adequate sleep at night, avoid alcohol and caffeine, do not exercise hard before the test, wearing comfort and the same every time and wear comfortable shoes .When participants arrive laboratory room ; sit and stay 15 minutes before start exercise. Participant has to warm-up and stretching 5 minutes and then start of the trial run / walk with Bruce's protocol until voluntary reach 85-90% Max HRR, exhaustion and come down from treadmill. Then answer questions of Brunel Mood Scale by use fatigue for measurement. And then recorded HR RR and started recovery period (resting time). By HR, RR, BP and Brunel Mood Scale will be measured before, after listened to relaxation music. And measured again after exhaustion and reached 85-90% Max HRR from second exercise. Start timer with a stopwatch and stop when reach 85-90% Max HRR and exhaustion from second exercise. And measured HR RR BP and Mood state, the volume of music that was the experiment to adjust the volume according to preferences of individual HR was continuously monitored with a polar.

Statistical analysis

1. One Way ANOVA was analyzed heart rate (HR), blood pressure (BP), respiratory rate (RR) and the duration of the second exercise in 3 conditions.
2. Wilcoxon Signed Ranks test was performed to determine fatigue (Mood state) after exhausted and fatigue after 15 minutes in recovery period in 3 conditions.
3. The level of significance used to determined a priori is $p<0.05$.

Research Diagram



CHAPTER IV
RESULTS

List of the symbols used in this study

To interpret the result and to analyze the data in this study the researcher used the following symbols instead:

1.	Relaxation music	means	The music with slow tempo between 55-70 beats / minutes call “Adagio”
2.	Recovery Period	means	The period of time to rest after quitting exercise till the function of body system turn to normal state
3.	WOM	means	The condition of exercise without music
4.	RM	means	The condition of exercise with relaxation music
5.	PM	means	The condition of exercise with preferred music
6.	RHR	means	The recovery heart rate measured at a fixed period after ceasing activity, typically over a one minute period
7.	HRR	means	The heart rate reserve used to describe the difference between maximum heart rate and resting heart rate
8.	M 1st Peak	means	Mood State at the 1st minute exhaustion after exercise
9.	M 15st Peak	means	Mood State at the 15th minute in recovery period after exercise
10.	M % Change	means	Percent change of Mood State (Fatigue)
11.	HR	means	Heart rate
12.	HR 1st minute Peak	means	Heart rate at the 1st minute exhaustion

		after exercise
13. HR 15st minute	means	Heart rate at the 15th minute in recovery period after exercise
14. HR % Change	means	Percent change of heart rate from the 1st minute exhaustion to the 15th minute in recovery period after exercise
15. RR	means	Respiratory rate
16. RR 1st minute Peak	means	Respiratory rate at the 1st minute exhaustion after exercise
17. RR 15st minutes	means	Respiratory rate at the 15th minute in recovery period after exercise
18. RR % Change	means	Percent change of respiratory rate from the 1st minute exhaustion to the 15th minute in recovery period after exercise
19. SBP	means	Systolic blood pressure
20. SBP 1st minute Peak	means	Systolic blood pressure at the 1st minute exhaustion after exercise
21. SBP 15st minutes	means	Systolic blood pressure at the 15th minute in recovery period after exercise
22. SBP % Change	means	Percent change of Systolic blood pressure from the 1st exhaustive exercise to 15st minutes recovery period
23. DBP	means	Diastolic blood pressure
24. DBP 1st minute Peak	means	Diastolic blood pressure at the 1st minute exhaustion after exercise
25. DBP 15st minutes	means	Diastolic blood pressure at the 15th minute in recovery period after exercise
26. DBP % Change	means	Percent change of diastolic blood pressure from the 1st exhaustive exercise to 15st minutes recovery period
27. X-time	means	Recovery time from the 1st minute exhaustion after exercise return to ±10

		RHR
28. $\overline{X}$	means	Mean
29. SD	means	Standard deviation

Data analysis would present as the following:

1. The demographic information of the participants.
2. The comparison of percent change on fatigue mood state, blood pressure, heart rate, and respiratory rate of without music (WOM), relaxation music (RM) and preferred music (PM) condition in 15 minutes recovery period.
3. The comparison of the recovery time from the 1st minute exhaustion after exercise return to ±10 recovery hearth rate (RHR) of without music (WOM, relaxation music (RM) and preferred music (PM) condition.
4. The comparison of the duration of the second exercise of without music (WOM, relaxation music (RM) and preferred music (PM) condition.

1. The demographic information of the participants

Participants in this study volunteered from Mahidol University who had regular exercise (3-5 times per weeks), age from 20 to 29 years. All was healthy.

Table 4.1 Means and standard deviation of height weight and age of participants.

Gender	Height (m.)	Weight (kg.)	Age (yr.)
Male	174.77 ± 4.20	70.16 ± 8.14	21.11 ± 1.50
Female	163.16 ± 6.22	57.83 ± 3.16	20.66 ± 0.40

2. The comparison of percent change on fatigue mood state, blood pressure, heart rate, and respiratory rate of without music (WOM), relaxation music (RM) and preferred music (PM) condition in 15 minutes recovery period.

Table 4.2 Means and standard deviation of percent change on Fatigue Mood State of WOM, RM, PM conditions in 15 minutes recovery period

condition	M (%) change (mean ± SD)	P-value
WOM	20.76±29.52	0.478
RM	33.82±25.71	*0.003
PM	13.13±11.52	0.381

* P-value < .05

Wilcoxson Signed-Rank Test showed that only the condition of exercise with relaxation music had significantly changed in fatigue mood state after 15 minutes recovery.

From table 2 and table 3 showed the percent change in HR, RR, BP and mood from peak HR, RR, BP at the 1st exhaustion after exercise. In RM condition percent change (%) in HR, RR, BP and Fatigue level were more than WOM and PM conditions that meant HR, RR, BP tend to decrease the recovery period and fulfill energy and body function as same as before exercise than WOM and PM conditions. Moreover in PM condition HR, RR, BP was also more than WOM condition and the fatigue was less than WOM.

Table 4.3 Means and standard deviation of percent change of HR, RR, and BP of WOM, RM, PM conditions in 15 minutes recovery period

(% change)	Condition (mean ± SD)		
	WOM	RM	PM
HR	90.67±3.79	86.92±3.71*	88.08±3.81
SBP	111.67±3.86	110.58±4.23	113.75±3.94
DBP	66.67±4.66	65.00±4.52	70.42±4.70
RR	15.58±1.13	13.42±1.01*	15.83±1.12

* P-value < .05

One Way ANOVA was analyzed the percent change of heart rate, respiration rate, and blood pressure found that there were significant difference of heart rate and respiratory rate percent change only in relaxation music condition.

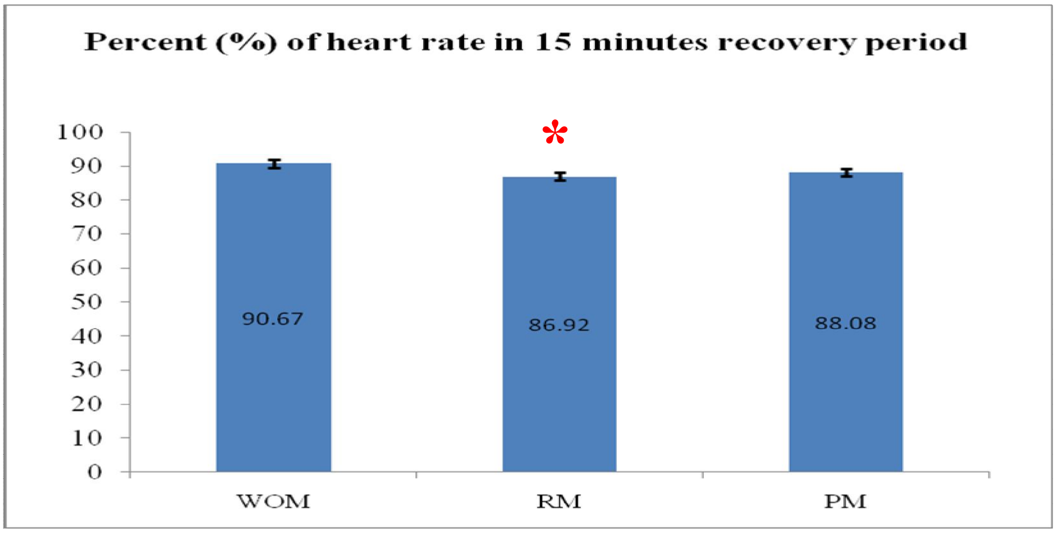


Figure 4.1 The comparison of percent change on HR recovery in 15 minutes with relaxation music, preferred music, and with music condition.

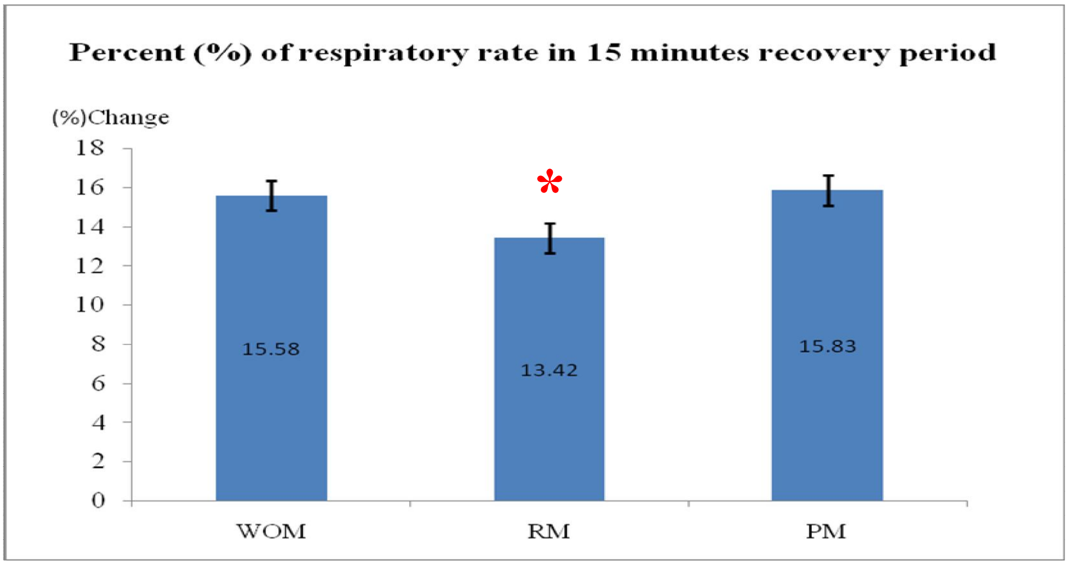


Figure 4.2 The comparison of percent change on respiratory rate recovery in 15 minutes with relaxation music, preferred music, and without music condition.

3. The comparison of the recovery time from the 1st minute exhaustion after exercise to return to ±10 resting hearth rate (RHR) of without music (WOM, relaxation music (RM) and preferred music (PM) condition.

Table 4.4 The recovery time from the 1st minute exhaustion after exercise return to ±10 resting hearth rate of without music (WOM), relaxation music (RM) and preferred music (PM) condition.

Parameters (3 conditions)	The recovery time to return to ±10 RHR (mins) (Mean ± SD)	P-value
WOM	18.45±0.175	0.061
RM	18.12±0.172	*0.025
PM	26.63±0.199	0.523

*P-value < .05

The recovery time to return to ±10RHR from peak heart rate in 1st exhaustive exercise to return to ±10RHR was significantly different at $p<0.05$ in RM condition.

The comparison of 3 parameters; relaxation music (RM), preferred music (PM), and without music (WOM) the duration of the second exercise is the time of exercise until exhausted was recorded immediately in15 minutes recovery period after 1st exhausted from second exercise; By second period of exercise complete rest after participants were receive same level and same conditions on each participants with the 1st exhaustive exercise.

4. The comparison of the duration of the second exercise of without music (WOM, relaxation music (RM) and preferred music (PM) condition.

Table 4.5 The duration of the second exercise of without music (WOM), relaxation music (RM), and preferred music (PM) condition.

Parameters (3 conditions)	The duration of the second exercise (mins) (Mean ± SD)	P-value
WOM	11.69±0.175	0.335
RM	13.45±0.172	*.025
PM	13.25±0.199	0.076

*P-value < .05

Mean ± SD; Duration of Second Exercise until exhausted. Significantly affect between Relaxation Music (RM) and WOM (without music) with, $p < 0.05$, Preferred Music (PM) and WOM (without music) with, $p < 0.05$.

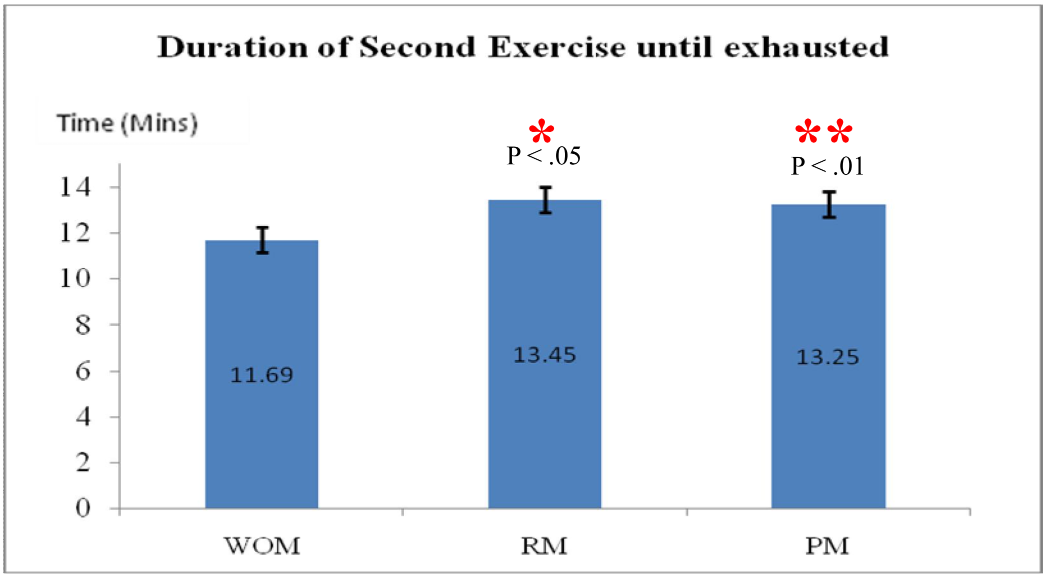


Figure 4.3 The mean time of exercise duration in Second period of exercise until exhausted of WOM, RM, PM conditions.

The duration of the second exercise until exhausted was recorded immediately when they had their own same level and physical conditions as at the 1st minute exhaustion after exercise. The RM and PM condition could exercise round 2 until exhausted longer than WOM. But RM condition was the longest.

CHAPTER V
DISCUSSION

Effects of relaxation music on mood states

In the present study, the mean ± SD of fatigue in the Brunel mood scale demonstrated that RM significant improved. The fatigue score in the Brunel mood scale decreased and tended to increase relaxation in RM after exhausted from exercise according to Cathy et al., (1997) and Elise, Nicholas et al., (2007). This result indicated that the participants' mood was elevated through relaxation music. In addition use of relaxation music during recovery period could facilitated motivation participants to relax and reduce fatigue after exhaust from exercise. Moreover RM also reduced stress and muscle, caused silent, and promoted relaxation. Thus, it was possible that the improvement of mood states was benefit by relaxation music. It was noticeable that the change of fatigue in this study induced by RM corresponded with the iceberg profile (POMs) of elite athletes: low fatigue score (Jarvis, 1999) in both groups despite the initial expectation of such change only in the RM and PM condition. Adjacent to Kreutz et al., (2008) revealed that RM (relaxation music) or classical music also helped and effected on mood via promoted relax and decreased fatigue. Therefore the strategies of mood in this study was change the feeling from fatigue and stress from exercise and solace were very similar in the sense that both include experience of dealing with fatigue and tired and starting to feel better in the process of RM condition. Music offered the strong emotion to relax and peaceful but lessen fatigue. According to Andrea K McCullough, (1997) who reported that the effect of using music to change mood, and in this study also use the RM for change attention in exhausted state from exercise to relax and decrease fatigue. Not only use RM for change mood but also use RM to delay fatigue in second period exercise via listening to RM in recovery period before start to exercise in second period of exercise. From this study RM performed as a arousal and as a stimulant via rhythm of music and influence of relaxed feeling to decrease fatigue. In addition after RM affected on mood, the RM also affected on HR, RR, BP via the rhythm of the music too. Optimal stimulant or arousal led to high performance or optimal performance according to the "Inverted U Hypothesis". In the other hand; high arousal or too much arousal led to worse performance. Low arousal led to poor performance too. Both of these criteria showed that too much arousal and too low arousal led to decrease performance. But from the result of this study showed that only in optimal arousal led to the optimal performance or enhancing performance.

The finding demonstrated that resting with RM, participants could exercise in second period of exercise with longer time to exhaustion compared with WOM and PM. It could be explained that after listening to RM in recovery period or resting time, participants mood state enhanced, causing them to exert more effort and stimulant the replenish energy store, repair body function, facilitated body to prepare and ready for exercise again via decrease fatigue, promoted relaxation and RM also change the mood of them from fatigue too.

Effects of relaxation music on heart rate recovery.

Relaxation music (58-70 beats) "adagio" demonstrated psycho-physiological response during 15 minutes recovery period. It was significantly increase compared with WOM and PM conditions. The percent (%) change of heart rate was used as parameter to measure the psycho-physiological effect to music (RM, PM). Increase in percent change of heart rate recovery and decrease in heart rate recovery by returning to resting level suggested that the heart rate could recover faster after exhausted from exercise in the recovery period with RM. Heart rate variability is controlled by the autonomic nervous system (ANS), which demonstrates that the relaxation music can affect the heart rates via ANS. And from this study showed that RM condition facilitated to reduce heart rate which corresponded to Linda 1998 and Jing et al. (Linda 1998), Jing and Xudong (2008) reported that heart rate decreased over time in the RM condition. This supported to Gomez and Danuser (Gomez and Danuser 2004) and (Bradt and Dileo 2009) in their research.

Therefore, this result agreed with hypothesis that the RM could accelerate heart rate recovery according to Labbe´ Elise et al., (1997) studied. The increase in the percent change of heart rate recovery suggested by Elise, Nicholas, Jonathan, & Martha (2007) that the heart could recover faster in the with-relaxation music condition. In addition heart rate variability is controlled by the autonomic nervous system (ANS), which demonstrates that the relaxation music can affect the heart rates via ANS. Therefore, this result could agree with hypothesis that the relaxation music could facilitate recovery period and accelerate heart rate recovery.

Moreover the average time of heart rate returning to the resting level after exhaustive 1st exercise in recovery period with relaxation music increase more percent change but not significant different in WOM and PM condition. It meant that RM could reduce time of heart rate recovery compared with WOM and PM conditions.

Effects of relaxation music on respiratory rate recovery.

In this study in RM condition was significantly decrease of respiratory rate in 15 minutes recovery period compared with WOM and PM conditions. It was found that RM dominant respiratory rate more decrease than WOM and PM condition. It meant that RM could induce RR to relax and to reduce tired via the rhythm of the RM. Moreover a slow reduction in the RR after exercise might indicate the effects of RM on RR that RM also induced the RR to recover faster as good as the result of RM on HR and get better WOM and PM conditions. Thus listening to RM in resting time could have more percent change in respiratory rate recovery and decrease the duration of RR returning to the baseline of resting level (resting of RR). From the result recommended that the respiratory rate could recover faster in RM condition and also tend to expand the exercise’s time until exhaustion compared with WOM and PM conditions

Moreover a slow reduction in the RR after exercise might indicate the effects of RM on RR that RM also induce the RR to recover faster as good as the result of RM on HR and get better than WOM and PM conditions . Thus listening to RM in resting time could the percent change in respiratory rate recovery and decrease in the duration of RR returning to the baseline of resting level of RR. In addition it found that in RM condition participants could control the timing or beat of respiratory better than in WOM and PM conditions.

The improvement of percent change of respiratory rate recovery suggested that the respiratory rate could recover faster in the with-relaxation music condition. Respiratory rate demonstrated that the relaxation music could affect the respiratory rate via rhythm. Therefore, this result could agree with hypothesis that the relaxation music could facilitate recovery period and promoted respiratory rate recovery.

Effects of relaxation music on blood pressure recovery

Even the improvement of percent change of blood pressure recovery was non-significantly, but the mean ± SD decreased after exercised in both conditions .And BP was more improved in both groups while listening to relaxation music, preferred music in recovery period than without music according to Wendy et al., 1997(Wendy & Nikki, 2001).

Therefore, the result suggested that RM also had effect on blood pressure recovery via decreasing time to the recover baseline blood pressure recovery and delay the exercise's duration in the second period of exercise until exhaustion.

Effects of relaxation music on second exercise duration

Participants exercised until exhaustion under the same criteria which founded that the exercise time in RM was longer compared with WOM and PM condition.

In this study in RM condition was significantly increase of the exercise duration until exhaustion in second period of exercise with RM condition in 15 minutes recovery period compared with WOM and PM conditions. Researcher found that RM dominant the body to restore and fully rest than WOM and PM condition. It meant that RM could also induce mood to relax and reduce tired via the rhythm of the RM in recovery period and facilitated the HR function and RR function to delay exhaustion in second period if exercise. Moreover slow reduction in the RR and HR after exercise may indicate the effects of RM on HR RR that RM also induce the HR and RR to recover faster and return to the baseline resting HR and RR as good as the 1^{st} period of exercise.

RM condition got better HR than WOM and PM conditions. Thus listening to RM in resting time could improve the percent change of respiratory rate recovery and decrease in the duration of RR returning to the baseline of resting level of RR. From the result recommended that the respiratory rate could recover faster in RM condition and also tend to expand the exercise time until exhaustion compared with WOM and PM conditions.

In addition, in this study RM led to complete rest from the results that HR, RR and mood were improved with RM after recovery period. For example, HR could decrease the recovery period to baseline heart rate, RR recovered faster after exhausted from exercise in the recovery period with RM. Moreover RM also persuaded mood to decrease fatigue and motivate to relaxed state compared with WOM and PM conditions. HR and RR with RM improved and promoted mood state via decrease the fatigue score. From the result recommended that the respiratory rate could recover faster in RM condition and also tend to expand the exercise time until exhaustion compared with WOM and PM conditions.

As a result, the researcher recommended that RM could replenish the energy and body function and mood to ready for exercise again with consummative performance of body. Consequently participants could exercise in second period of exercise until exhaustion with longer time of exercise as same as in the 1st exercise. Because the body had sufficient time to rest and restore the body function as HR, RR, and Mood from exhaustion exercise.

The attitude on the music use in 15 minutes recovery period

These findings suggested that the participants had positive feeling toward beat of music, no difference was found between males and females. Most of them felt more relaxed after listening to the relaxation music by the percent change and Mean ± SD of fatigue score. RM also changed mood according to Andrea K. McCullough (1997) who studied the effect of using music to change mood. The results of this study indicated that resting with RM condition providing greater performance compared with WOM and PM conditions. Furthermore, relaxation music revealed greater capability by diminished recovery period, reduced fatigue and improved relaxation.

The RM enhanced exercise performance by delay 85-90%MaxHRR and also facilitated the HR, RR to recover faster from exhausted via decrease in the duration of HR, RR to returning to the resting level or baseline level. The results supported that mood affected on body function and exercise performance by decreasing percent change of HR, BP and RR.

Moreover RM could help to decreasing fatigue mood states and facilitate relaxation. In addition music not only promotable mental state or emotion but improved psychological state also. Psychological state; in other words, psychological skills training was a way to enhance an athlete's performance in high-intensity sports (Birrer and Morgan 2010) that could be applied in exercise, as RM could help facilitating athlete’s fatigue and exhaust from exercise, reducing fatigue, refreshing during timeout period, and getting them ready to keep on competing.

It could be concluded from the existing data that music effects on recovery period via decreasing fatigue and promoting relaxation after exhaustion from exercise and music could be supported to development of physiological systems that facilitate the recovery period (E. M Sokhadze, 2007) via decrease in the duration of HR, RR to returning to resting level or baseline level. For example, shorten recovery period and restore body function (Elise, et al., 2007) for ready to exercise again as well as before exhaustion. Therefore, this research suggested that using relaxation music or preferred music in sport and exercise contexts (Terry & Karageorghis, 2006a). Even so, RM can be used for both training and competition, so the selected music is very important because it is used to benefit must be considered type or style of music, preference of each individual in style and should to listen rhythm and tempo of the music to match the activity (Karageoghis and Terry 1999; Bishop 2007).

Rest and recovery was an essential part of any workout routine. Recovery period after exercise was a big impact on fitness gains, sports performance and allows the body to train much more effectively. Thus should to take the RM in this study to improve the recovery period for adjust the exercise performance.

CHAPTER VI

CONCLUSION

This present study investigated the effects of relaxation music on recovery period after exhausted from exercise. It concluded that resting with relaxation music in 15 minutes recovery period reduced fatigue mood state, had more percent change of heart rate, and respiratory rate compare with preferred music and without music conditions. The recovery time from the 1st minute exhaustion after exercise return to ±10 recovery hearth rate of resting with relaxation music and resting with preferred music were shorter than resting without music. The RM and PM condition could exercise until exhausted longer than WOM in the second exercise. But RM condition was the longest.

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APPENDICES

APPENDIX A

COA. No. MU-IRB 2010/287.1810

Documentary Proof of Mahidol University Institutional Review Board

Title of Project: Effects of Music on Exercise

Title of Subproject: Effects of Music on Enhancing Exercise Performance (Thesis for Master Degree)

Principal Investigator: Miss Chadaphan Suwannate

Title of Subproject: Effects of Relaxation Music on Recovery Period (Thesis for Master Degree)

Principal Investigator: Miss Prompatsorn Pattanapornchai

Name of Institution: College of Sports Science and Technology

Approval includes:
1) MU-IRB Submission form version received date 11 October 2010
2) Participant Information Sheet version date 14 October 2010
3) Informed Consent form version date 11 October 2010
4) Questionnaire for screening version date 11 October 2010
5) Data Record form for Effects of music on enhancing exercise performance version date 11 October 2010
6) Data Record form for Effects of relaxation music on recovery period version date 11 October 2010

Mahidol University Institutional Review Board is in full compliance with International Guidelines for Human Research Protection such as Declaration of Helsinki, The Belmont Report, CIOMS Guidelines and the International Conference on Harmonization in Good Clinical Practice (ICH-GCP)

Date of Approval: 18 October 2010

Date of Expiration: 17 October 2011

Signature of Chairman: ....

(Professor Rutja Phuphaibul)
Vice Chair for Chair

Signature of Head of the Institute: ....

(Professor Sansanee Chaiyaroj)
Vice President for Research and Academic Affairs

Office of the President, Mahidol University, 999 Phuttamonthon 4 Rd., Salaya, Phuttamonthon District, Nakhon Pathom 73170. Tel. (662) 8496223-5 Fax. (662) 8496223

APPENDIX B

<u>แบบสอบถาม</u>

คัดเลือกบุคคลร่วมงานวิจัยวิทยานิพนธ์สาขาวิชาจิตวิทยาการกีฬา สาขาวิทยาศาสตร์การกีฬา มหาวิทยาลัยมหิดล

เรื่อง ประสิทธิภาพของเพลงผ่อนคลายต่อช่วงของการฟื้นตัว

(Effects of relaxation music on recovery period)

....

คำชี้แจง : โปรดกรอกข้อมูลและตอบคำถามต่อไปนี้ตามความเป็นจริง ข้อมูลทั้งหมดในแบบสอบถามนี้จะถูกเก็บไว้เป็นความลับ และถูกใช้ในงานวิจัยนี้เท่านั้น

SUB : ....

วันที่ ....

ตอนที่ 1 : ข้อมูลทั่วไป

แบบสอบถามข้อมูลทั่วไปของผู้เข้ารับการทดลอง

ส่วนที่ 1

รายละเอียดเกี่ยวกับข้อมูลส่วนตัว

1. เพศ □□ ชาย □□ หญิง

2. อายุ ....ปี

3. น้ำหนัก……………………..กิโลกรัม ส่วนสูง………………………..เซนติเมตร

4. ท่านเป็นนักกีฬาหรือไม่

□ เป็น ชนิดกีฬา……………………………..

□□ ไม่เป็น

5. ปัจจุบันท่านเล่นกีฬาหรือออกกำลังกายหรือไม่

□ เล่นกีฬาหรือออกกำลังกาย โปรดระบุประเภทกีฬา………………………จำนวนครั้ง/สัปดาห์ ………… ครั้ง/สัปดาห์

□ ไม่เล่นกีฬาหรือออกกำลังกาย

6. ประวัติการสูบบุหรี่

□□ ไม่สูบบุหรี่ □ □ สูบบุหรี่เป็นบางครั้ง

□ สูบบุหรี่เป็นประจำ ระบุ .... มวน/วัน

7. ประวัติการดื่มเครื่องดื่มแอลกอฮอล์

□ ไม่ดื่ม □ ดื่มเครื่องดื่มแอลกอฮอล์ใดๆเป็นบางครั้ง

□□ ดื่มเครื่องดื่มแอลกอฮอล์ใดๆเป็นประจำ

ระบุ........... วัน/สัปดาห์

8. ปกติท่านชอบฟังเพลงหรือไม่ (ถ้าชอบ ชอบฟังเพลงชนิดใดโปรดระบุ)

□□ ชอบ ชนิดเพลง…………………………

□ □ไม่ชอบ

9. กรุณากรอกรายชื่อเพลงที่ท่านชอบ 5 เพลงพร้อมทั้งชื่อวงและชื่อนักร้อง

1.……………………………………………………………………………………

2.……………………………………………………………………………………

3.……………………………………………………………………………………

4.……………………………………………………………………………………

5.……………………………………………………………………………………

10. การติดต่อกรณีฉุกเฉิน

ผู้ใกล้ชิด... หมายเลขโทรศัพท์.......................

แพทย์ประจำตัว.. หมายเลขโทรศัพท์........................

APPENDIX C

Personal Details

Part I

Personal information

Gender □ male □ female

Age ___________

Weight ________ Height ________

Are you an athlete? □ Yes, that kind is _____________
□ No

At present, are you smoking? If yes, what kind of tobacco?
□Yes, ______ □ No

Are you drinking alcohol? If yes, how often do you drink?

□ Yes, ______ □ No

Do you like listening to music?
□ Yes (□ Thai song □ International song)
□ No

Please list your 5 favorite songs (□ bands/ □ singers); every style of music that you like.

1.____
2.____
3.____
4.____
5.____

APPENDIX D

ตอนที่2 : แบบสอบถามก่อนการออกกำลังกาย

เพศ _______ อายุ _____ ปี

กิจกรรมทางกายที่เกี่ยวข้อง

ภายใน 3 เดือนที่ผ่านมาคุณเคยทำกิจกรรม / การออกกำลังกายชนิดใดบ้าง

กิจกรรมต่างๆ	จำนวนครั้ง/สัปดาห์	ระยะเวลาการออกกำลังกาย
การเดิน		30 นาที หรือน้อยกว่า 45 นาที 1 ชม. 1 ชม.+
การวิ่ง/จ็อกกิ้ง		30 นาที หรือน้อยกว่า 45 นาที 1 ชม. 1 ชม.+
กอล์ฟ		30 นาที หรือน้อยกว่า 45 นาที 1 ชม. 1 ชม.+
กีฬาที่ใช้ไม้แร็กเก็ต		30 นาที หรือน้อยกว่า 45 นาที 1 ชม. 1 ชม.+
ว่ายน้ำ		30 นาที หรือน้อยกว่า 45 นาที 1 ชม. 1 ชม.+
ฟุตบอล		30 นาที หรือน้อยกว่า 45 นาที 1 ชม. 1 ชม.+
รักบี้		30 นาที หรือน้อยกว่า 45 นาที 1 ชม. 1 ชม.+
กีฬาต่อสู้ป้องกันตัว		30 นาที หรือน้อยกว่า 45 นาที 1 ชม. 1 ชม.+
ขี่จักรยาน		30 นาที หรือน้อยกว่า 45 นาที 1 ชม. 1 ชม.+
การเต้นแอโรบิค		30 นาที หรือน้อยกว่า 45 นาที 1 ชม. 1 ชม.+
ยกดัมเบล บาร์เบล		30 นาที หรือน้อยกว่า 45 นาที 1 ชม. 1 ชม.+
อื่นๆ โปรดระบุ		30 นาที หรือน้อยกว่า 45 นาที 1 ชม. 1 ชม.+
ออกกำลังกายไม่สม่ำเสมอ		

APPENDIX E

Part II

Questionnaires before the exercise

Gender: _______ Age: _____ years

Activity profile

Within the last three months describe the activities that you regularly participated in:

Activity	Sessions per week	Average duration
Walking		30 min or less 45 mins 1 hr. 1 hr.+
Running/Jogging		30 min or less 45 mins 1 hr. 1 hr.+
Golf		30 min or less 45 mins 1 hr. 1 hr.+
Racquet sports		30 min or less 45 mins 1 hr. 1 hr.+
Swimming		30 min or less 45 mins 1 hr. 1 hr.+
Football		30 min or less 45 mins 1 hr. 1 hr.+
Rugby		30 min or less 45 mins 1 hr. 1 hr.+
Martial arts		30 min or less 45 mins 1 hr. 1 hr.+
Cycling		30 min or less 45 mins 1 hr. 1 hr.+
Aerobic dance		30 min or less 45 mins 1 hr. 1 hr.+
Weight lifting		30 min or less 45 mins 1 hr. 1 hr.+
Other activity		30 min or less 45 mins 1 hr. 1 hr.+
(specify_____)		30 min or less 45 mins 1 hr. 1 hr.+
Do not regular exercise.		

APPENDIX F

แบบสอบถามความพร้อมทางร่างกาย (สำหรับผู้ที่มีอายุตั้งแต่ 15 ปี-69 ปี)

การออกกำลังกายอย่างสม่ำเสมอช่วยให้เกิดความเพลิดเพลินและสุขภาพที่ดี อย่างไรก็ดีการออกกำลังกายยังเป็นสิ่งที่ปลอดภัยมากสำหรับคนส่วนใหญ่ แบบสอบถามด้านล่างนี้ถูกออกแบบมาเพื่อช่วยให้ทุกคนที่มีอายุตั้งแต่ 15-69 ปี สามารถใช้ในการตรวจสอบว่าคุณควรจะพบแพทย์ก่อนการออกกำลังกายหรือไม่

ใช่	ไม่ใช่	
☐	☐	1.แพทย์เคยบอกว่าคุณมีสภาวะทางโรคหัวใจและคุณควรจะทำกิจกรรมทางกายภาพตามแนะนำของแพทย์?
☐	☐	2. คุณรู้สึกเจ็บหน้าอกเวลาทำกิจกรรมทางกายภาพ?
☐	☐	3. ในเดือนที่ผ่านมา คุณเคยเจ็บหน้าอกเวลาทำกิจกรรมทางกายภาพ?
☐	☐	4. คุณสูญเสียความสมดุลเพราะหน้ามืดวิงเวียนศีรษะ หรือเคยหมดสติ?
☐	☐	5. คุณมีปัญหากระดูกหรือข้อต่อที่จะทำให้เปลี่ยนแปลงไปในทางเลวร้ายลงเมื่อทำกิจกรรมทางกาย?
☐	☐	6. แพทย์ของคุณสั่งยาให้คุณเป็นประจำสำหรับความดันเลือดหรือสภาวะทางหัวใจของคุณ?
☐	☐	7. คุณรู้ด้วยเหตุผลอื่นว่าทำไมคุณไม่ควรทำกิจกรรมทางกายภาพ?

ข้าพเจ้าได้อ่านทำความเข้าใจและได้กรอกแบบสอบถามนี้อย่างครบถ้วนสมบูรณ์ด้วยความเต็มใจ
ลงชื่อ ....

APPENDIX G

PAR-Q TO ASSESS READINESS FOR PHYSICAL ACTIVITY ORIGINAL PAR-Q

Common sense is your best guide in answering these question. Please read each question carefully and check *yes* or *no* if it to you. The Physical Activity Readiness Questionnaire (PAR-Q) has been recommended as minimal screening for entry into moderate –intensity exercise program. PAR-Q was designed to identify the small number of adults for whom physical activity might be inappropriate or those who should receive medical advice concerning the most suitable type of activity

YES □ NO □ 1. Has your doctor ever said that you have a heart trouble?

YES □ NO □ 2. Do you frequently have pains in your heart and chest?

YES □ NO □ 3. Do your often feel faint or have spells of severe dizziness?

YES □ NO □ 4. Has a doctor ever said your blood pressure was too high?

YES □ NO □ 5. Has your doctor told you that you have a bone or joint problem that has been aggravated by exercise or might be made worse with exercise?

YES □ NO □ 6. Is there a good physical reason not mentioned here why you should not follow an activity program even if you wanted to?

YES □ NO □ 7. Are you over age 65 and not an customed to vigorious exercise?

APPENDIX H

(หลังจากออกกำลังกายครั้งที่1จนล้า)

แบบวัดอารมณ์ บรูเนล (The Brunel Mood Scale)

(อ.ดร.ชัยรัตน์ ชูสกุล และคณะ, 2008)

ประเด็นที่ปรากฏข้างล่างนี้ คือ คำที่อธิบายถึงความรู้สึก ขอความกรุณาอ่านแต่ละคำอย รอบคอบ จากนั้นให้ทำเครื่องหมายถูก (√)ในช่องสี่เหลี่ยมที่อธิบายได้ดีที่สุดถึง ความรู้สึกที่เป็นจริงของท่านว่าเป็นอย่างไร

	ไม่มีเลย	นิดหน่อย	ปานกลาง	มาก	มากสุดๆ
1. ถอดใจ	..........☐	☐	☐	☐	☐
2. หมดแรง	..........☐	☐	☐	☐	☐
3. เฉื่อยชา	..........☐	☐	☐	☐	☐
4. เหนื่อยล้า	..........☐	☐	☐	☐	☐

APPENDIX I

The Brunel Mood Scale

(Peter C Terry and Andrew M Lane, 2003)

Below is a list of words that describe feelings. Please read each one carefully.
Then cross the box that best describes HOW YOU FEEL RIGHT NOW.
Make sure you answer every question.

		Not at all	Moderately	A little	Quite a bit	Extremely
1.	Worn out……………………………………….	❑	❑	❑	❑	❑
2.	Exhausted………………………………………….	❑	❑	❑	❑	❑
3.	Sleepy………………………………………………...	❑	❑	❑	❑	❑
4.	Tired…………………………………………………...	❑	❑	❑	❑	❑

APPENDIX J

แบบสอบถามหลังการทำทดสอบ

เรื่อง ประสิทธิภาพของเพลงผ่อนคลายต่อช่วงการฟื้นตัว

(Effects of relaxation music on recovery period)

ความรู้สึกในการฟังเพลงหลังจากการออกกำลังกายจนล้า

1. ท่านรู้สึกชอบเพลงที่ฟังหรือไม่

   ☐ ไม่ชอบ ☐ ชอบน้อย ☐ ชอบมาก ☐ ชอบมากที่สุด

2. เพลงช่วยให้ท่านรู้สึกผ่อนคลาย หายเหนื่อยหรือไม่

   ☐ ไม่เลย ☐ น้อย ☐ มาก ☐ มากที่สุด

3. ท่านคิดว่าการนำเพลงมาใช้หลังจากการออกกำลังกายจนล้านั้นมีความเหมาะสมหรือไม่

   ☐ ไม่เลย ☐ น้อย ☐ มาก ☐ มากที่สุด

4. ความคิดเห็นหลังจากการฟังเพลงหลังการออกกำลังกายจนล้า

....
....
....

ขอขอบคุณที่ให้ความร่วมมืออย่างดียิ่ง

พรหมภัสสร พัฒนาพรชัย

APPENDIX K

<u>แบบบันทึกการวิจัย</u>

เรื่อง ประสิทธิภาพของเพลงผ่อนคลายต่อช่วงการฟื้นตัว

(Effects of relaxation music on recovery period)

Table 1 : Data record RESEARCH ID CODE ……………

วันที่ ....

Age:…………years Weight:………………….kg Height:………………………..cm

Resting Heart rate (RHR) ………………………………bpm.

Music : □ Relaxation music, □ Preferred music, □ No music

After Exhaust exercise1					
Recovery Period	Cool Down	Time	HR	RR	BP
		0			
		1st			
		2nd			
	Recovery 15 mins	3th			
		4th			
		5th			
		6th			
		7th			
		8th			

Recovery Period	**Recovery 15mins**	**9th**			
		10th			
		11th			
		12th			
		13th			
		14th			
		15th			
	Until ±10RHR				

After Exhaust exercise2				
After Exhaust Ex2	**Time/Stage**	**HR**	**RR**	**BP**

APPENDIX L

Bruce Protocol (21minutes)

Table 2 Increase the speed and elevation every 3 minutes.

Stage	Time	Speed		Elevation	
		ml/h	Km/h	(%)percent	METS
1	3	1.7	2.7	10.0	4.6
2	4-6	2.5	4.0	12.0	7.1
3	7-9	3.4	5.0	14.0	10.2
4	10-12	4.2	6.7	16.0	13.5
5	13-15	5.0	8.0	18.0	17.2
6	16-18	5.5	8.8	20.0	20.4
7	19-21	6.0	9.6	22.0	2.8

APPENDIX M

Participants

Table 3 Participant details

NO.	AGE	HEIGHT	WEIGHT
1	25	180	83
2	23	180	73
3	20	178	77
4	20	168	74
5	20	177	63
6	21	171	62.5
7	20	175	75
8	20	176	71
9	21	168	55.5
10	21	153	55
11	21	168	53
12	20	168.5	63

APPENDIX N

Table 4 Changing of mood during 1 minute exhausted and 15 minute resting period and percent change in heart rate recovery in WOM (without music) condition.

WOM = Without music

M 1st Peak = Mood in 1 minute exhausted

M 15st Peak = Mood in 15 minutes recovery period

M % Change = Percent change of Mood

Condition: WOM	Mood		
Subs	M1st Peak	M 15st minutes	M % Change
1	9	8	11.11
2	4	8	100
3	8	8	0
4	9	7	22.22
5	4	6	50
6	14	14	0
7	7	7	0
8	11	9	18.18
9	7	7	0
10	6	6	0
11	7	6	14.29
12	6	8	33.33

Table 5 Changing of mood during 1 minute exhausted and 15 minute resting period and percent change in heart rate recovery in PM (Preferred music) condition.

PM = Preferred music

M 1st Peak = Mood in 1 minute exhausted

M 15st Peak = Mood in 15 minutes recovery period

M % Change = Percent change of Mood

Condition: PM	Mood		
Subs	M1st Peak	M 15st minutes	M % Change
1	11	11	13.22
2	8	8	18.18
3	6	6	14.29
4	9	9	0
5	7	7	11.11
6	6	6	0
7	6	6	22.21
8	11	11	0
9	6	7	16.67
10	7	7	0
11	7	9	28.57
12	6	8	33.33

Table 6 Changing of mood during 1st minute exhausted and 15st minute resting period and percent change in heart rate recovery in RM (Relaxation music) condition.

RM = Relaxation music

M 1st Peak = Mood in 1 minute exhausted

M 15st Peak = Mood in 15 minutes recovery period

M % Change = Percent change of Mood

Condition: RM	Mood		
Subs	M1st Peak	M 15st minutes	M % Change
1	6	7	16.67
2	6	8	33.33
3	8	4	100
4	9	7	22.22
5	7	8	14.29
6	16	12	25
7	15	7	53.33
8	10	14	40
9	6	7	16.67
10	4	4	0
11	5	7	40
12	9	5	44.44

APPENDIX O

Table 7 Changing of heart rate during 1minute exhausted and 15 minute resting period and percent change in heart rate recovery in WOM (without music) condition

WOM = Without music

HR 1st Peak = Heart rate in 1 minute exhausted

HR 15st Peak = Heart rate in 15 minutes recovery period

HR % Change = Percent change of Heart rate

Condition: WOM	HEART RATE (HR)			
Subs	RHR	HR1st Peak	HR15 minutes	%Change
1	60	168.00	80	40.51
2	84	169.00	113	32.97
3	61	173.00	89	35.46
4	67	194.00	102	41.46
5	77	190.00	103	38.38
6	64	192.00	104	39.61
7	80	176.00	69	44.75
8	77	175.00	83	47.75
9	68	172.00	89	48.44
10	64	173.00	78	54.74
11	71	173.00	81	53.39
12	66	174.00	97	44.04

Table 8 Changing of heart rate during 1minute exhausted and 15 minute resting period and percent change in heart rate recovery in RM (Relaxation music) condition.
RM = Relaxation music

HR 1st Peak = Heart rate in 1 minute exhausted
HR 15st Peak = Heart rate in 15 minutes recovery period
HR % Change = Percent change of Heart rate

Condition: RM	HEART RATE (HR)			
Subs	RHR	HR1st Peak	HR15st minutes	%Change
1	68	173.00	85	49.84
2	77	173.00	113	34.45
3	82	176.00	90	49.13
4	68	174.00	93	46.55
5	76	175.00	108	52.81
6	69	173.00	83	51.97
7	65	173.00	73	59.75
8	69	172.00	82	52.66
9	72	174.00	86	50.54
10	71	173.00	70	59.61
11	69	173.00	76	56.07
12	68	174.00	84	51.65

Table 9 Changing of heart rate during 1minute exhausted and 15 minute resting period and percent change in heart rate recovery in PM (Preferred music) condition.

PM = Preferred music

HR 1st Peak = Heart rate in 1 minute exhausted

HR 15st Peak = Heart rate in 15 minutes recovery period

HR % Change = Percent change of Heart rate

Condition: PM	HEART RATE (HR)			
Subs	RHR	HR1st Peak	HR15st minutes	%Change
1	71	174.00	81	52.35
2	79	173.00	114	34.00
3	65	173.00	83	51.97
4	63	173.00	102	41.02
5	71	174.00	109	37.31
6	76	174.00	82	52.84
7	80	175.00	72	59.00
8	75	175.00	85	51.32
9	72	173.00	90	48.08
10	62	173.00	77	55.25
11	70	174.00	79	54.42
12	66	173.00	83	52.08

APPENDIX P

Table 10 Changing of respiratory rate during 1 minute exhausted and 15 minute resting period and percent change in heart rate recovery in WOM (without music) condition.

RR = Respiratory rate

WOM = Without music

RR1st Peak = Respiratory rate in 1 minute exhausted

RR 15st Peak = Respiratory rate in 15 minutes recovery period

RR% Change = Percent change of Respiratory rate

Condition: WOM	Respiratory rate (RR)		
Subs	RR1st Peak	RR15st minutes	%Change
1	110	110	0
2	140	130	7.14
3	130	120	7.69
4	100	100	0
5	140	130	7.14
6	120	100	16.67
7	100	100	0
8	120	110	8.33
9	110	110	0
10	90	90	0
11	140	130	7.14
12	120	110	8.33

Table 11 Changing of respiratory rate during 1 minute exhausted and 15 minute resting period and percent change in heart rate recovery in PM (Preferred music) condition.

RR = Respiratory rate

PM = Preferred music

RR1st Peak = Respiratory rate in 1 minute exhausted

RR 15st Peak = Respiratory rate in 15 minutes recovery period

RR% Change = Percent change of Respiratory rate

Condition: PM	Respiratory rate (RR)		
Subs	RR1st Peak	RR15st minutes	%Change
1	150	110	0
2	140	130	3.45
3	125	120	12
4	110	110	8.33
5	110	115	8.33
6	120	100	16.67
7	100	100	0
8	120	110	1.18
9	140	140	9.09
10	110	90	18.18
11	120	120	14.29
12	130	120	0

Table 12 Changing of respiratory rate during 1 minute exhausted and 15 minute resting period and percent change in heart rate recovery in RM (Relaxation music) condition.

RR = Respiratory rate

RM = Relaxation music

RR1st Peak = Respiratory rate in 1 minute exhausted

RR 15st Peak = Respiratory rate in 15 minutes recovery period

RR% Change = Percent change of Respiratory rate

Condition: RM	Respiratory rate (RR)		
Subs	RR1st Peak	RR15st minutes	%Change
1	120	120	26.67
2	145	140	7.14
3	125	110	4
4	120	110	0
5	120	110	4.55
6	120	100	16.67
7	100	100	0
8	110	97	8.33
9	110	100	0
10	110	90	18.18
11	140	120	0
12	130	130	7.69

APPENDIX Q

Table 13 Changing of Systolic blood pressure during 1 minute exhausted and 15 minute resting period and percent change in heart rate recovery in WOM (without music) condition

SBP = Systolic blood pressure

WOM = Without music

SBP 1st Peak = Systolic blood pressure in 1 minute exhausted

SBP 15st Peak = Systolic blood pressure in 15 minutes recovery period

SBP % Change = Percent change of Systolic blood pressure

Condition: WOM	SBP		
Subs	SBP1st Peak	SBP15st minutes	SBP %Change
1	110	110	0
2	140	130	7.14
3	130	120	7.69
4	100	100	0
5	140	130	7.14
6	120	100	16.67
7	100	100	0
8	120	110	8.33
9	110	110	0
10	90	90	0
11	140	130	7.14
12	120	110	8.33

Table 14 Changing of Systolic blood pressure during 1 minute exhausted and 15 minute resting period and percent change in heart rate recovery in PM (Preferred music) condition.

SBP = Systolic blood pressure

PM = Preferred music

SBP 1st Peak = Systolic blood pressure in 1 minute exhausted

SBP 15st Peak = Systolic blood pressure in 15 minutes recovery period

SBP % Change = Percent change of Systolic blood pressure

Condition: PM	SBP		
Subs	SBP1st Peak	SBP15st minutes	%Change
1	150	110	0
2	140	130	3.45
3	125	120	12
4	110	110	8.33
5	110	115	8.33
6	120	100	16.67
7	100	100	0
8	120	110	1.18
9	140	140	9.09
10	110	90	18.18
11	120	120	14.29
12	130	120	0

Table 15 Changing of Systolic blood pressure during 1 minute exhausted and 15 minute resting period and percent change in heart rate recovery RM (Relaxation music) condition.

RM = Relaxation music

SBP = Systolic blood pressure

SBP 1st Peak = Systolic blood pressure in 1 minute exhausted

SBP 15st Peak = Systolic blood pressure in 15 minutes recovery period

SBP % Change = Percent change of Systolic blood pressure

Condition: RM	SBP		
Subs	SBP1st Peak	SBP15st minutes	%Change
1	120	120	26.67
2	145	140	7.14
3	125	110	4
4	120	110	0
5	120	110	4.55
6	120	100	16.67
7	100	100	0
8	110	97	8.33
9	110	100	0
10	110	90	18.18
11	140	120	0
12	130	130	7.69

APPENDIX R

Table 16 Changing of DBP 1st minute exhausted and 15st minute resting period and percent change in heart rate recovery in WOM (without music) condition.

WOM = Without music

DBP 1st Peak = Mood in 1 minute exhausted

DBP 15st Peak = Mood in 15 minutes recovery period

DBP % Change = Percent change of Mood

Condition: WOM	DBP		
Subs	DBP1st Peak	DBP15st minutes	DBP % Change
1	70	70	0
2	90	80	12.5
3	80	90	11.11
4	50	40	20
5	90	90	0
6	70	70	0
7	70	70	0
8	70	70	0
9	50	50	0
10	50	50	0
11	50	50	0
12	80	70	12.5

Table 17 Changing of DBP during 1 minute exhausted and 15st minute resting period and percent change in heart rate recovery in PM (Preferred music) condition.

PM = Preferred music

DBP 1st Peak = Mood in 1 minute exhausted

DBP 15st Peak = Mood in 15 minutes recovery period

DBP % Change = Percent change of Mood

Condition: PM	DBP		
Subs	DBP 1st Peak	DBP 15st minutes	DBP % Change
1	90	90	0
2	70	70	0
3	70	70	0
4	70	70	0
5	70	68	2.94
6	50	50	0
7	50	50	0
8	70	70	0
9	40	40	0
10	70	50	28.57
11	60	50	20
12	90	70	28.57

Table 18 Changing of DBP 1st minute exhausted and 15st minute resting period and percent change in heart rate recovery in WOM (without music) condition.

RM = Relaxation music

DBP 1st Peak = Mood in 1 minute exhausted

DBP 15st Peak = Mood in 15 minutes recovery period

DBP % Change = Percent change of Mood

Condition: RM	DBP		
Subs	DBP 1st Peak	DBP 15st minutes	DBP % Change
1	90	90	0
2	90	70	28.57
3	80	70	12.5
4	45	45	0
5	60	60	0
6	70	50	40
7	70	55	27.27
8	70	90	28.57
9	50	50	0
10	70	50	40
11	80	60	33.33
12	70	60	16.67

APPENDIX S

Table 19 The comparison of X-time between first exercise and second period of exercise on recovery period in 3conditions; WOM, RM and PM in ±10RHR condition.

X-time = Time until return to ±10RHR			
Subs	Condition: WOM	Condition: RM	Condition: PM
1	21.44	21.44	25.00
2	17.34	17.34	32.10
3	25.00	26.00	40.10
4	33.14	33.14	39.33
5	31.10	34.10	35.53
6	18.00	18.00	25.38
7	12.00	12.00	18.52
8	13.20	13.20	18.20
9	13.38	13.38	30.49
10	6.26	6.26	17.29
11	12.31	12.31	18.43
12	14.30	14.30	21.59

APPENDIX T

The first exercise's duration and second period of exercise's duration

Ex1 = First period of exercise WOM = Without music

Ex2 = Second period of exercise RM = Relaxation music

PM = Preferred music

Table 20 The comparison of the duration of the second exercise of 3conditions; WOM, RM and PM.

Duration of exercise until exhaustion						
Subs	Condition: WOM		Condition: RM		Condition: PM	
	Ex1	Ex2	Ex1	Ex2	Ex1	Ex2
1	12.15	12.05	13.59	13.45	12.32	12.59
2	12.1	12.2	13.42	12.57	11.18	13.55
3	12.1	12.13	14.09	14.44	15.03	13.55
4	12.05	11.23	10.28	12.23	10.3	12.44
5	12.38	12.34	14.56	13.34	13.15	13.57
6	12.31	11.11	14.54	13.33	12.42	14.59
7	12.14	12.12	10.35	13.45	13.39	12.11
8	12.03	10.49	12.13	13.55	12.3	12.56
9	12.27	12.02	12.44	13.54	12.53	13.34
10	12.35	11.27	13	14.01	15.31	13.55
11	12.3	12.2	12.06	13.43	12.52	13.56
12	12.12	11.11	14.06	14.02	12.31	13.56

APPENDIX U

Co-Relation of Health in Music

Sound:

- Transmitted vibrations of any frequency including those outside the range of human hearing.
- The sensation stimulated in the organs of hearing by such vibrations in the air or other medium.
- A distinctive noise.

Music:

- Transmitted vibrations of any frequency including those outside the range of human hearing.
- The sensation stimulated in the organs of hearing by such vibrations in the air or other medium.
- A distinctive noise

Harmony:

- Simultaneous combination of notes
- The study of the structure, progression and relation of chords
- Combination of sounds considered pleasing to the ear.

Harmonics:

- Of or relating to harmony.
- Integrated in nature.
- Series of overtones produced as an integral multiple of a fundamental tone.
- The theory or study of the physical properties and characteristics of musical sound.

Vibration:

- A rapid back and forth motion or oscillation.
- To shake or move with or as if with a slight quivering or trembling motion.
- To produce sound; resonate.

Resonant:

- Strong and deep in tone, resounding.
- Continuing to sound in the ears or memory; echoing.
- Having a prolonged subtle, or stimulating effect beyond the initial impact.

Dissonant:

- Discordant
- A clashing musical interval

Consonnant:

- Harmony or agreement among components.
- Correspondence or re-occurrence of sounds; repetition.
- An agreeable combination of sounds or musical notes

Coherency:

- The action or fact of stitching together, cohesion
- Logical connection, congruity, consistency
- Harmonious connection of the several parts of a discourse, system, etc., so that the whole works together.

APPENDIX V

18 Major Health Area that can Benefits from Music

-Headache / Migraine

-Sleep Disorders

-General Stress Symptoms

-Cardiac & Circulatory Disorders

-Disorder of the Hormone & Immune System

-Neurophysiological & Sensory Disorders (for hyperactive, autistic kids, people with learning difficulties or Alzheimer's

-Neurodermatitis / Memory

-Pains / Post-operative pains

-Pregnancy and birth

-Gynaecological Disorders (systems related to memstrual cycle or menopause)

-Relaxation

-Concentration / Memory

-Creativeity

-Courage to face life (Depression)

-Vital Energy

-Mental Distress / Fear

-Hormany

-Mother & Child

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