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Music is employed rather ubiquitously in exercise settings and has been shown to contribute positively to exercise motivation. It would seem that individuals listen to music that is preferable to them for the duration of their exercise participation; however, the role of music preferences in the music-motivation-exercise relationship has remained largely unexplored. There is evidence to support significant differences in the music preferences of exercisers during different modes and intensities of exercise. The differential effects of music during various exercise types suggest that individuals may prefer different types of music depending on the psychological and physiological demands of the exercise. However, there is a dearth of literature on whether individuals have task-specific music preferences during exercise. The primary purpose of this study was to examine if music preferences differ significantly across four different exercise conditions of varying mode and intensity. Additionally, the exercise motivation of the participants was explored as a potential between-subjects factor in these analyses. Repeated-measures analyses of variance (ANOVA) were used to analyze the data. Results indicate that, overall, 'Energetic & Rhythmic' music was preferred among the participant sample regardless of exercise condition. Additionally, preferences for all music categories were significantly higher in the baseline condition than all of the exercise conditions. Preferences for 'Upbeat & Conventional' music were significantly higher in the 'low' motivation group than in the 'high' motivation group. In conclusion, the findings from this research did not support hypothesized differences, which may be

due to limitations in the study and that research on music preferences in the exercise domain is still in its early stages. Continued exploration of this topic with a more diverse sample and methodological modifications may yield clearer results, which can contribute to the literature on motivational music and how music can be used to improve performance and exercise adherence.

THE INFLUENCE OF EXERCISE TYPE AND MOTIVATION ON MUSIC PREFERENCE

by

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CHAPTER I

INTRODUCTION

Research indicates that individuals are driven to engage in exercise and physical activity by a number of different motives, such as interest and enjoyment, competence, body-related motives (Frederick & Ryan, 1993), or social motives (Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997). However, exercise adherence continues to be a concern within the health and fitness industries, with only 52.4% of adults (ages 18-24) meeting the Physical Activity Guidelines distributed by the U.S. Department of Health and Human Services in 2008 (Carlson, Fulton, Schoenborn, & Loustalot, 2010). Therefore, it is both important and necessary to explore all factors that contribute positively to the exercise experience so that they may be optimized for the ultimate purposes of increasing adherence. According to Rhodes and Courneya (2003), one such factor that has proven a reliable predictor of exercise participation is the affective properties of the experience, that is, the enjoyment and pleasure derived from exercise. Listening to a favorite type of music is a tool that has been shown to positively influence these affect states and reduce the influence of stress caused by fatigue (Yamashita, Iwai, Akimoto, Sugawara, & Kono, 2006). Therefore, music preferences may be important to consider for exercise promotion.

Increasing numbers of people listen to music during exercise due to the development of smaller, more portable audio devices (Yamashita et al., 2006). Music is

present in a variety of social and personal contexts in which attention is focused, mood is regulated, and energy is channeled, such as exercise (DeNora, 2000). In fact, exercise is one of the four most common situations in which college-age individuals elect to listen to music (Rentfrow & Gosling, 2003). Within this context, music has been shown to be an important tool for self-regulation and self-management, as individuals select music for the needs of the situation (DeNora, 2000). However, different exercise conditions place different demands on the individual in terms of physiological requirements, arousal levels, cognitive control, and attention focus.

According to the literature, sedative music helps regulate physiological arousal during low-intensity aerobic exercise (Copeland & Franks, 1991). Music with strong rhythmic properties facilitates synchronization and dissociation during moderate-intensity aerobic exercise (Wales, 1986; Seath & Thow, 1995). During high-intensity aerobic activity, music that is intense and rebellious facilitates higher physiological arousal to meet the demands of that activity (Rhea, Butcher-Mokha, & Ludwig, 2004; Simpson & Karageorghis, 2006). At lower intensities of exercise, music can be used to alleviate boredom, and, as the exercise intensity increases, it can be an effective distraction from the inherent discomfort associated with high-intensity or long-duration exercise (Yamashita et al., 2006). The literature on the use and benefits of music in strength or resistance-based exercise is far less extensive, despite the fact that this type of exercise is recommended by a number of health organizations, including the Centers for Disease Control and Prevention (CDC), the American College of Sports Medicine (ACSM), and

the National Strength and Conditioning Association (NSCA), and is frequently engaged in by many recreational exercisers.

While the literature shows that listening to music during exercise can be beneficial in a number of ways, there is a noticeable gap as to whether or not music preferences have been considered, and if the participants have a preference for the music being used in these studies. Music preferences in the exercise domain have remained largely unexplored, but are an important consideration if music is to optimally increase the affective properties of exercise, facilitate dissociation, improve performance, and promote exercise adherence (Yamashita et al., 2006; Seath & Thow, 1995; Simpson & Karageorghis, 2006). While musical preferences have the ability to influence an individual's behavior, including physiological responses (Pothoulaki, Natsume, & MacDonald, 2006) and the amount of time spent listening to it (North & Hargreaves, 2000), these preferences are also dependent upon the listening context (North & Hargreaves, 2007). Therefore, it is important to understand if music preferences change under different exercise contexts, as this may help guide physical activity behavior and optimize motivation and performance in a variety of exercise conditions.

While music preferences are an important consideration when trying to understand what drives exercise behavior, motivation to engage in exercise is also noteworthy. Self-Determination Theory (SDT) is a widely-used framework that aims to explain human behavior, which postulates that events and activities which facilitate autonomy, relatedness, and competence will increase intrinsic motivation to engage in these behaviors. That which restricts creativity and choice will undermine intrinsic

motivation (Deci & Ryan, 1985). While music is an external stimulus, listening to preferred music reflects choice, which may be an indication of more autonomous and, therefore, self-determined behavior during exercise. However, one's overall degree of self-determination (i.e., how autonomous one is) may have different effects on music choices between individuals of high and low autonomy.

In addition, there is a body of research on the aspects of music that contribute to its motivational properties, that is, its ability to influence one's motivation (see Karageorghis & Terry, 1997; Karageorghis, Terry, & Lane, 1999). Rhythm response, which comprises the rhythm, tempo, and beat of a music selection, is the most influential music factor on an individual's motivation response to it (Karageorghis et al., 1999). Music is considered highly motivational when it includes a strong rhythmical component and falls within certain tempo parameters. Research indicates that the ideal music tempo to enhance the listener's motivational response and, subsequently, mood, arousal, and exercise performance, is within 125-140 beats per minute (bpm) (Karageorghis, Terry, Lane, Bishop, & Priest, 2012). Therefore, due to the strong influence of both rhythm and tempo on one's motivational response to music, it is possible that exercisers will prefer rhythmic and uptempo music over music without these characteristics as they may enhance overall motivation for exercise.

Aims

The primary purpose of this study is to examine the influence of exercise type and intensity on music preferences to help understand if individuals prefer different types of music in different exercise conditions. In addition, overall exercise motivation will be

examined as a potential between-subjects factor in these relationships. There is extensive literature that supports the differential influence of music during various exercise modes and intensities as well as the differences between preferred and nonpreferred music during exercise, but there is a dearth of literature on whether exercise participants prefer various types of music in different exercise conditions, and if they self-select different music types of music for each type of exercise. Based on the previously discussed literature, it was expected that 'energetic and rhythmic' music would be preferred in a moderate-intensity aerobic exercise condition in order to promote synchronization as well as the distraction effect. For a vigorous-intensity aerobic condition, it was expected that participants would prefer both 'upbeat and conventional' music and 'intense and rebellious' music due to their fast tempo and ability to physiologically arouse the participant, respectively. Lastly, in resistance-based exercise conditions of both moderate and vigorous intensity, it was expected that participants would prefer 'intense and rebellious' music for its stimulative properties, or have the same preferences as at baseline. In other words, no significant differences are expected in the music preferences of individuals performing strength-based exercises at either a moderate or vigorous intensity. It is hypothesized that overall exercise motivation, denoted by the Relative Autonomy Index (RAI), may act as a between-subjects factor on associations between exercise condition and music preference. That is, those with a higher degree of self-regulation for exercise will demonstrate significantly higher average ratings of each music category than those with a low overall degree of self-regulation for exercise. This is due to the expectation that those with greater exercise regulation will self-select music

to enhance and maximize the enjoyment and interest of the exercise, while those with lower exercise regulation will not consciously self-select music to optimize performance in a given exercise condition.

CHAPTER II

REVIEW OF THE LITERATURE

The Development of Music Preference

The methods by which individuals develop preferences for certain music can be attributed to a variety of causal factors, the most widely supported of which include specific characteristics of the music (e.g. pitch, tempo, rhythm, etc.), familiarity and repeated listening, and the social influences and affective experiences of the listener while listening to music (Finnäs, 1989). Additionally, the listener's physiological parameters (McNamara & Ballard, 1999), innate auditory preferences (McDermott & Hauser, 2005), and age (Holbrook & Schindler, 1989; Mende, 1991) have received considerable support as influences of music preference. These factors answer one of the two primary questions in the research on music preferences, which is, "How can music preferences be influenced?" The second question is, "Why do people listen to music and why do they develop preferences for certain types of music?" The answer to this question speaks to the function of music. Research has repeatedly indicated that individuals use music to serve their needs and to reach certain goals (North & Hargreaves, 1999; Sloboda, O'Neill, & Ivaldi, 2001; Georgi, Grant, Georgi, & Gebhardt, 2006). Specifically, music is used to manage mood and emotions (Georgi et al., 2006), regulate arousal level or satisfy sensation seeking (Arnett, 1992; McNamara & Ballard,

1999), or facilitate physical activity. A study by Schäfer and Sedlmeier (2009) examining the relationship between music function and degree of preference found that influence and regulation of mood and arousal were among the highest-rated functions that participants attributed to their favorite music. Overall, the findings from this study showed that music preferences are closely related to the functions music serves throughout daily life.

Preferences for certain types of music have the ability to dictate an individual's behavior. It can affect the listener's physiological responses (Pothoulaki, Natsume, & MacDonald, 2006) and the amount of time they spend listening to it (North & Hargreaves, 2000). Sloboda et al. (2001) discovered that when listeners had personal choice over the music they listened to it was more likely to lead to positive outcomes, including increased positivity and energy levels. However, the literature indicates that music preferences are highly context-dependent (North & Hargreaves, 2007; Sloboda et al., 2001). Preferred music selections have been found to vary depending on individual moods, desires, and circumstances (Lamont & Webb, 2010).

Music preference has been shown to have considerable impact in many areas of life, including health and well-being (Batt-Rawden & DeNora, 2005; Mitchell, MacDonald, Knussen, & Serpell, 2007). Mitchell and colleagues (2007) tested empirical evidence that listening to one's own preferred music can offer a distraction capable of reducing both pain and its accompanying negative affective experience. In a survey of chronic pain sufferers, results indicated that a distraction effect was one of the most frequently reported benefits of music listening. Furthermore, the personal importance of

music (i.e., listening to preferred music) was significantly related to music listening for pain relief.

In a study examining the music preferences of participants during and after relaxation and exercise, North and Hargreaves (2000) showed that music preferences are influenced by the listening situation and that music selections reflect individuals' efforts to optimize responses to those situations. Participants in this study consisted of undergraduate college students and were asked to either ride an exercise bike or relax by lying down, as these activities were expected to yield high and low arousal, respectively. While engaging in either activity, participants listened to music of high and low arousal potential, and the time spent listening to each was recorded. In addition, liking for each type of music as well as appropriateness for the condition were also recorded. Findings showed that participants preferred high arousal music when exercising and low arousal music when relaxing. Participants also indicated that they preferred music that was perceived as appropriate for the listening situation. Therefore, the authors suggest that musical preferences are influenced by the situations in which the music is experienced (North & Hargreaves, 2000).

The abundance of literature on the influences of preferred music in different listening situations as well as the influence of the listening situation on musical preferences require an understanding of how these preferences are defined and evaluated. Music preferences are commonly determined via the indication of preferred music genres. Genre-based measures have been widely used in determining music preferences due to their pragmatism and ease of use. In addition, results can be easily correlated with

other psychometric variables or reduced into more general preference dimensions. While not always reliable, these measures can capture a general indication of individuals' music preference (Ferrer, Eerola, & Vuoskoski, 2013). One such measure is the Short Test of Music Preference developed by Rentfrow and Gosling (2003) to assess an individual's preferred music genres.

Short Test of Music Preference. The STOMP was the first comprehensive measure of music preference and has been successfully applied to research for over a decade. The 14-item scale determines preference for music genre, and responses are categorized into four dimensions that have consistently been substantiated by exploratory and confirmatory factor analyses. These are: 'reflective and complex', 'intense and rebellious', 'upbeat and conventional', and 'energetic and rhythmic'. The 'reflective and complex' category comprises the specific music genres of blues, jazz, classical, and folk music as they are structurally complex and tend to foster introspection. The 'intense and rebellious' category is defined by rock, alternative, and heavy metal music, which are full of energy and emphasize themes of rebellion. The music genres of country, soundtrack, pop, and religious make up the 'upbeat and conventional' category as they are structurally simple and encourage positive emotions. Lastly, the 'energetic and rhythmic' category includes the genres of rap/hip-hop, soul/funk, and electronica/dance as they are lively and focus on the rhythmical components of the music (Rentfrow & Gosling, 2003).

While the original scale only included 14 genres of music for evaluation, the authors acknowledge the advent of new music genres all the time. Therefore, they devised the Short Test of Music Preferences-Revised (STOMPR), which includes 23

items and the same four dimensions of music preference. The 'reflective and complex' category has expanded to include bluegrass, blues, classical, folk, international/foreign, jazz, new age, and opera. The 'intense and rebellious' dimension now includes alternative, heavy metal, punk, and rock. The 'upbeat and conventional' dimension is comprised of country, gospel, oldies, pop, religious, and soundtracks. Finally, the 'energetic and rhythmic' category includes the genres of dance/electronica, funk, rap/hip-hop, reggae, and soul/R&B (Rentfrow & Gosling, 2006).

Music Preferences in Exercise

The findings from Rentfrow and Gosling (2003) indicated that people consider music listening to be an important part of their lives, and music listening is an activity in which people frequently engage. Specifically, exercise is one of the four most common situations in which people listen to music, along with driving, being alone at home, and hanging out with friends (Rentfrow & Gosling, 2003). As previously mentioned, music preference is related to self-views. That is, individuals select music that reinforces their dispositions and self-views. With regard to exercise, research has indicated that individuals with an athletic self-view preferred vigorous music and were categorized in the 'intense and rebellious' dimension. In addition, those who listen to 'upbeat and conventional' music score highly on both self-perceived physical attractiveness and athleticism, traits which can also serve as extrinsic motives for exercise (Benson, 2003). This suggests that a preference for these categories may be associated with individuals who enjoy engaging in exercise and physical activity and are highly motivated to do so.

Research has also indicated that music preference can influence physiological arousal. For example, Gowensmith and Bloom (1997) discovered that listening to heavy metal music increased the arousal level of heavy metal music fans greater than it did country music fans. Therefore, having a preference for the music one listens to has a greater influence on physiological arousal than listening to non-preferred music. This relationship also exists in the opposite direction. That is, physiological arousal can influence one's music preference. An explanation for this is that people select a music tempo that is consistent with their current or desired mood and energy level (Rentfrow & Gosling, 2003). Findings on the relationship between cognitive ability and music preference indicate that individuals prefer music that will provide optimal levels of stimulation for the particular situation in which they find themselves (Rentfrow & Gosling, 2003). This is particularly relevant within the exercise domain given the importance of regulating physiological arousal and optimizing stimulation while engaging in exercise.

The influence of music preference has also been examined in clinical settings as well. Qualitative research from the field of health and well-being suggest that having music (as opposed to having no music) is the preference where exercise is concerned. A participant required to engage in light physical activity as part of a rehabilitation program reported that he would not have walked at all without having his favorite music to listen to while he did so. Participants found music motivational for both indoor and outdoor physical activity. One subject reported that music motivated her to get out of the house to exercise, but that she was not motivated to and did not want to exercise unless she had

her CD player with her. In addition, this participant also said music motivated her to exercise inside as well; she would begin dancing to the music and it would develop into "real exercising" (Batt-Rawden & Tellnes, 2011, pp. 116).

The literature on the effects of preferred music in exercise environments is quite varied with respect to the populations tested and methodological procedures. While some findings indicate it is beneficial to have any musical accompaniment regardless of preference (see Hutchinson & Karageorghis, 2013), the literature also suggests there are certain circumstances in which having a preference for the musical accompaniment produces benefits beyond those of having just any music to listen to (Dwyer, 1995; Nakamura, Pereira, Papini, Nakamura, & Kokubun, 2010).

In a study examining the effect of perceived choice of music on exercise intrinsic motivation in an aerobic dance environment, participants were randomized into two groups. One group was asked about their music preferences and led to believe that the music played during exercise represented their previously indicated music preferences while the second group, a control group, was not asked about their music preferences. Results indicated that the group who believed they had chosen their exercise music reported higher intrinsic motivation for exercise than the control group (Dwyer, 1995). These findings indicate that both a choice over the musical accompaniment and the belief that one is listening to preferred music have a greater positive influence on exercise motivation than music that is not preferred or that an individual does not have the option to choose.

In addition, preferred music appears to influence exercise performance through the interactions between the external music type and the internal exercise intensity. Gfeller (1988) reported that listening to preferred music during exercise facilitated active focus on the external information within the music rather than the internal discomforts that accompanied fatigue in moderate-intensity exercise. Additionally, nonpreferred music did not facilitate distraction from internal discomfort because it was an unpleasant auditory stimulus. Similar studies have been performed utilizing high-intensity exercise as well. Nakamura and colleagues (2010) selected a high-intensity cycling task to test the effects of preferred, nonpreferred, and a no-music control condition on cycling distance, rating of perceived exertion (RPE) and heart rate (HR) responses. Their findings indicate that, while HR did not change significantly across conditions, preferred music increased the cycling distance and reduced participant RPE in comparison to nonpreferred music at each time point of the exercise bouts. Furthermore, nonpreferred music increased RPE and reduced cycling distance, which suggests that the type of music can differentially influence these variables. Overall, the literature appears to indicate that preferred music can positively impact performance across a variety of intensities.

Self-Determination Theory and Exercise Motivation

Motivation is a central component in much of the psychology literature that aims to explain human behavior. One of the most influential theories within this body of research is Self-Determination Theory (SDT), which was developed by Edward Deci and Richard Ryan. SDT is based on the premise that events which support autonomy, foster relatedness, and signify competence will increase an individual's intrinsic motivation to

engage in these behaviors. These three psychological needs of autonomy, relatedness, and competence tend to facilitate a perceived internal locus of causality, which promotes intrinsic motivation and has been shown to create self-determined individuals. Events that restrict creativity and co-opt choice tend to undermine intrinsic motivation and promote an external locus of causality, which does not foster self-determination within an individual (Deci & Ryan, 1985). SDT is constructed around three sets of motivational processes—intrinsic, extrinsic, and amotivational—all of which exist on a motivation continuum. Additionally, the theory posits that there are two types of self-determined behaviors: intrinsically motivated and extrinsically motivated behaviors that are regulated by integrated internalizations. The latter constitutes self-determination because the individual experiences the behaviors as self-initiated, and they are integrated and congruent with the self (Deci & Ryan, 1985).

Each of the three motivational processes has its own subset of regulatory styles, which explains the extent to which their regulation by the individual is autonomous. 'Amotivation' is characterized by non-regulation, where the individual lacks control and intent to act, and feels incompetent. 'Intrinsic motivation' is characterized by intrinsic regulation, where the individual feels interest, enjoyment, and inherent satisfaction from a given activity. 'Extrinsic motivation' is characterized by four regulatory subdomains along the motivation spectrum: external regulation, introjected regulation, identified regulation, and integrated regulation. External regulation indicates compliance and external rewards and punishments associated with a given behavior or activity. Introjected regulation indicates self-control, ego-involvement, and internal rewards and

punishments for a given behavior. Identified regulation indicates that a behavior or activity has both personal importance and conscious value for the individual. Lastly, integrated regulation designates congruence, awareness, and synthesis with the self with respect to a certain act or behavior (Ryan & Deci, 2000).

This information has been used extensively in the fields of health and fitness to encourage behavior change and promote adherence to exercise programs. Findings from a 2003 study in which participants engaged in a 12-week structured exercise program indicated that identified regulation—a regulatory style of extrinsic motivation—was a stronger predictor than intrinsic motivation of self-reported exercise behavior (Wilson, Rodgers, Blanchard, & Gessell, 2003). Interestingly, some studies have found that introjected regulation positively correlates with strenuous exercise behavior (e.g. Wilson, Rodgers, & Fraser, 2002). One theory as to why regulatory styles of extrinsic motivation have shown to be greater predictors of exercise behavior than intrinsic motivation is that the characteristics of the situation will dictate the extent to which intrinsic and internalized extrinsic foster positive behavioral responses. That is, there is an innate tendency to internalize the role of activities that may simultaneously be important but lack intrinsic appeal. Ultimately, exercise constitutes a type of externally motivated behavior requiring internalization to begin and sustain action (Ryan, 1995).

Behavioral Regulation in Exercise Questionnaire. The Behavioral Regulation in Exercise Questionnaire (BREQ) was developed by Mullan, Markland, and Ingledew (1997) to measure extrinsic, identified, introjected, and intrinsic regulation of exercise behavior. This measure, which has become one of the most commonly used scales of

exercise motivation, was based on the continuum of extrinsic to intrinsic motivation originally conceptualized by Deci and Ryan (1985) in Self-Determination Theory. The original BREQ was a 15-item questionnaire which evaluated an individual's motivation for exercise and scored them in each of the four subcategories of extrinsic motivation (Mullan et al., 1997). This measure demonstrated acceptable discriminant validity and internal consistency for the exercise population (Mullan et al., 1997). The second version of this instrument, the BREQ-2 (Markland & Tobin, 2004), is a 19-item inventory that reinstates items designed to assess amotivation while maintaining assessment of extrinsic, introjected, identified, and intrinsic regulations for exercise. An additional subscale to measure integrated regulation was added to the BREQ-2 by McLachlan, Spray, and Hagger (2011) as it was found to be significantly different from the intrinsic regulation subscale although both constitute self-determined behaviors.

Determinants of Motivational Properties of Music

There are four factors that contribute to the motivational qualities of a piece of music: rhythm response, musicality, cultural impact and association (Karageorghis et al., 1999), which can be subdivided into primary and secondary factors (Karageorghis, Priest, Terry, Chatzisarantis, & Lane, 2006; Karageorghis et al., 2012). Primary factors include rhythm, melody, and harmony, while secondary factors relate to the interpretation of the listener based on cultural background and extramusical associations (Karageorghis & Terry, 2011). The determination of whether a music selection is motivational is based on an individual's responsiveness to it. As defined by Karageorghis et al. (2006), music is motivational when it stimulates an individual to exercise harder and/or longer.

Responsiveness to music, which is a measure of its motivational properties, is increased by both primary and secondary factors in a hierarchical fashion (Lucaccini & Kreit, 1972; Karageorghis et al., 1999).

Rhythm response refers to the rhythmical components of music, where musicality is the response to pitch-related elements, including how the notes are combined (harmony) and tune (melody) (Karageorghis et al., 1999). These are considered "music factors" (Karageorghis et al., 1999), and are classified as intrinsic sources of motivation for the listener (Sloboda & Juslin, 2001). Cultural impact and association are "personal factors" (Karageorghis et al., 1999), and are considered extrinsic sources of motivation for the listener (Sloboda & Juslin, 2001). Cultural impact is defined as the prevalence of a piece of music in the context of the listener's cultural experiences, and association refers to the extra-musical thoughts, feelings, and images that a piece of music can evoke (Karageorghis et al., 1999).

There is a hierarchical order to these four factors, with rhythm response being most important in determining if a music selection is motivational, followed by musicality, cultural impact, and association (Karageorghis et al., 1999). These four factors contribute, either positively or negatively, to an individual's overall interpretation of the music's motivational qualities, which is believed to specifically lead to improved mood, reduced ratings of perceived exertion, and optimal arousal (Kodzhaspirov, Zaitsev, & Kosarev, 1988). According to Lucaccini and Kreit (1972), each of the music factors influences a specific psychophysical outcome, with rhythm response impacting bodily

responses (e.g. optimal arousal) and musicality improving affective responses (e.g. mood).

These benefits are thought to influence domains of both sport and exercise. Specifically, it is believed that these benefits will lead to a greater quality of the pre-event routine of athletes and improved exercise adherence of the general exerciser. Specifically, the combined influence of arousal control, reduced RPE, and improved mood has great implications for exercise adherence (Karageorghis et al., 1999).

The role of lyrics in the relationship between music and exercise is worthy of discussion. According to Karageorghis et al. (2006), "lyrics that are related to determination and strength may also conceivably enhance motivation to exercise more intensely and/or for longer" (p. 907). This is particularly noteworthy given the preference to use lyrical music rather than instrumental music during exercise (Priest & Karageorghis, 2008). Furthermore, the affirmations (e.g., "Search for the hero inside yourself"), task-specific verbal cues (e.g., "Keep on running"), and positive self-statements (e.g., "I am the one and only") typically found in the lyrics of motivational music suggest they may influence the task demands of repetitive physical activity (Sanchez, Moss, Twist & Karageorghis, 2014). Crust & Clough (2006) suggest that lyrics may be the musical component that is most likely to produce the dissociation effect, reducing perceptions of effort, while Bishop, Karageorghis, and Loizou (2007) suggest that lyrics help induce optimal mood and emotional states. Both may help contribute to lyrical influences on motivation during exercise as well.

The information about what constitutes motivational properties in music is particularly important when examining the relationship between music and exercise, as well as the effects that music can produce within that context. Four mechanisms have been identified through which music is said to have a psychophysical effect in sport and exercise settings: (1) it reduces feelings of fatigue, (2) it enhances mood states, (3), it affects psychomotor arousal, and (4) it promotes the synchronization effect, which contribute to the domain-specific goals of increased exercise adherence and improved pre-event routine (Karageorghis & Terry, 1997).

Influence of Music in Different Exercise Modes and Intensities

These mechanisms through which music influences exercise have been examined across a variety of exercise modes and intensities. Music has been shown to have differential effects depending on the intensity of the exercise task. Copeland & Franks (1991) found that sedative music reduced physiological arousal during submaximal exercise, thus increasing endurance performance. Further, music serves to aid in exercise tasks by distracting the individual from the efforts of exercise (Copeland & Franks, 1991) and decreasing perceptions of pain (Corah, Gale, Pace, & Seyrek, 1981). Yamashita, Iwai, Akimoto, Sugawara, and Kono (2006) also cited a "distraction effect" (p. 429) for the reduced physiological and psychophysical parameters in a music condition compared to a no-music condition, especially at low exercise intensities (40% VO_{2max}). Their findings suggest that listening to a preferred music selection may help reduce the influence of stress caused by fatigue, which may increase the comfort associated with exercise performance (Yamashita et al., 2006). In addition to the psychological effects

(e.g., distraction, enhanced positive feelings), music has been shown to have an ergogenic (performance-enhancing) effect during physical activity as well, particularly at low-to-moderate exercise intensities (Karageorghis et al., 2012).

However, during maximal or near-maximal intensities, music may provide a necessary increase in arousal levels. While it is thought that an external auditory stimulus, such as music, can only improve psychophysical (e.g. RPE) parameters at low and moderate intensities (Rejeski, 1985), music can continue to positively influence affective responses even at high workloads (Wales, 1986). Music is both motivational and may serve to promote neuromuscular efficiency in repetitive, long-duration activities (Copeland & Franks, 1991; Karageorghis et al., 2012). Furthermore, Wales (1986) found that upbeat/stimulative music reduced feelings of anger, fatigue, and depression significantly ($p<.05$) more than slow/sedative music did. Additionally, upbeat music has been shown to produce a combined benefit of higher positive mood states and lower negative mood states than both a silent control condition and a slow tempo condition (Lee, 1989).

The majority of the research into the beneficial effects of music on mood states has been conducted using aerobic exercise. In 1995, Seath and Thow found that music significantly influenced the feelings of pleasure/displeasure and reduced perceived exertion as compared to the acoustic accompaniment of a metronome set to the same tempo during a moderate-intensity aerobic task. Furthermore, participants reported greater enthusiasm, enhanced levels of motivation, increased ability to maintain interest level, and less effort required to perform the exercises. In contrast, the metronome

condition yielded reports of discomfort, pain, boredom, reduced motivation to exercise, and difficulty finding a rhythm with which to perform the exercise tasks (Seath & Thow, 1995).

While the research in circuit, resistance, and anaerobic training is more limited than it is for aerobic exercise, studies have begun to examine the effects of music in those domains more frequently. Rhea and colleagues (2004) found that arousal (denoted by heart rate) was higher in a music condition compared to a no-music condition during a near-maximal (90% 1RM) bench press test. Furthermore, the music condition produced lower bar movement time and higher bar vertical velocity, suggesting that music can necessarily heighten physiological arousal to improve efficiency during an exhaustive strength task (Rhea et al., 2004). In a 2006 study by Simpson and Karageorghis, 400m sprint times were faster with both motivational and oudeterous (neither motivational nor demotivational) synchronous music (music with which one consciously aligns movement) than in a no-music control condition. More recently, Karageorghis, Priest, Williams, Hirani, Lannon, and Bates (2010) examined the ergogenic and psychological effects of synchronous motivational music during a circuit-type workout, and noted that "music is more likely to exert an ergogenic effect when there is the possibility for it to influence voluntary performance as in a gymnasium-type 'workout' rather than a strictly-controlled exhaustive effort" (Karageorghis et al., 2010, p. 557). This evidence of the differential effects of music during various exercise modes and intensities lends support to the hypothesis that music preferences will vary across these situations due to the different functions that music serves for the individual.

CHAPTER III

METHODS

Participants

The targeted population for this study was college students who, at a minimum, were recreationally active and who have listened to music at least sometimes during exercise. The sample did not exclude competitive varsity athletes on campus. The requirements for being considered recreationally active are consistent with those of the 2008 Physical Activity Guidelines for Americans. In collaboration with faculty in the Kinesiology and Psychology departments at a southeastern university, participants were recruited from Clinical Human Anatomy, Clinical Human Physiology, Psychology of Physical Activity, and Interpersonal Behavior and Group Processes, and multiple sections of Physical Fitness for Life classes. Professors of these courses were provided the survey link and subsequently distributed it to their students. Inclusion criteria for this study consisted of being at least 18 years of age, at least recreationally active according to the physical activity guidelines, and a music listener at least sometimes during exercise. In total, 507 students were invited to participate. Data from 112 students are included in this study. Students were excluded if they did not meet the inclusion criteria, if they self-selected not to participate, or if they indicated that they did not listen to music during exercise. Descriptive information on the participant sample is provided in the Results

section. Participants provided consent to participate, and were assured that their participation in the study was entirely voluntary and that refusal to participate would not impact their course grade in any way. Additionally, participants were informed that survey responses would remain confidential. All procedures were approved by the Institutional Review Board of the University of North Carolina at Greensboro (UNCG).

Measures

Behavioral Regulation in Exercise Questionnaire-2. The BREQ-2 is the second version of the Behavioral Regulation in Exercise Questionnaire (Markland & Tobin, 2004). This 19-item questionnaire assesses five subscales of regulatory styles: Amotivation (4 items), Extrinsic Regulation (4 items), Introjected Regulation (3 items), Identified Regulation (4 items), and Intrinsic Regulation (4 items). Confirmatory factor analysis indicated an excellent model fit with the addition of the amotivation items to the original BREQ. The comparative fit index (CFI) measured .95; the non-normed fit index (NNFI) measured .94; and the standardized root mean square residual (SRMR) measured .04. Furthermore, standardized factor loadings were all significant and moderate to strong (M = .76; range = .53-.90; p's < .001), and there was acceptable internal consistency of all factors. For the purposes of this research, an additional 4-item Integration subscale was included (McLachlan, Spray, & Hagger, 2011). Analyses of the factorial, nomological, discriminant, and predictive validity support its use and inclusion with the BREQ-2 through a series of confirmatory factor analyses (CFI = .98; NNFI = .97; SRMR = .02). Responses are scored on a 5-point scale ranging from 1 = "not true for me" to 5 = "very true for me" (Markland & Tobin, 2004). Sub-scores are calculated

via the sum of the items in each subscale divided by the number of items. This accounts for the Introjected Regulation subscale, which only has three items. Additionally, a total score representing the degree to which participants feel self-determined, known as the Relative Autonomy Index (RAI), was used to examine overall relationships of autonomy to music preference. This value has the advantage of reducing the number of variables required to represent variations in autonomy (Vallerand & Ratelle, 2002). The RAI is calculated by applying a weighting to each subscale, then summing the weighted scores. The weightings for each subscale are as follows: Amotivation = -3; Extrinsic Regulation = -2; Introjected Regulation = -1; Identified Regulation = +1; Integrated Regulation = +2; Intrinsic Regulation = +3. Higher and/or positive scores indicate greater relative autonomy; lower and/or negative scores indicated more controlled regulation. Calculated RAIs were used to divide into two groups denoting 'high' and 'low' exercise autonomy to explore its potential moderating influence.

Short Test of Music Preference. The STOMPR includes 23 items measuring four distinct dimensions of music preference. These include: Reflective & Complex (R&C) (8 items: bluegrass, blues, classical, folk, international/foreign, jazz, new age, opera), Intense and Rebellious (I&R) (4 items: alternative, heavy metal, punk, rock), Upbeat & Conventional (U&C) (6 items: country, gospel, oldies, pop, religious, soundtrack/theme song), and Energetic & Rhythmic (E&R) (5 items: dance/electronica, funk, rap/hip-hop, reggae, soul/R&B). Results from multiple CFAs support the existence of the four music preference dimensions (goodness-of-fit index = .94; adjusted goodness-of-fit index = .91; root-mean-square error of approximation = .07; standardized root-mean-square residual =

.06) (Rentfrow & Gosling, 2003; Rentfrow & Gosling, 2006). A test of the generalizability of the four dimensions across samples, methods, and geographic regions was performed according to two different models: one where factors were independent and one where they were allowed to correlate. Results of the orthogonal model provided a reasonable fit $\chi^2(77, N=500) = 176.31$, (GFI = .95, AGFI = .93, RMSEA = .05, SRMR = .06); however, the model that allowed for correlated factors fit significantly better $\Delta\chi^2(6) = 39.27$, $p<.001$; $\chi^2(71, n=500) = 137.05$ (GFI = .96, AGFI = .94, RMSEA = .04, SRMR = .05). Therefore, there is strong evidence for the generalizability of the four music preference dimensions across time, populations, method, and geographic regions. Scores are reported on a 7-point scale ranging from 1 = "dislike strongly" to 7 = "like strongly." Values for each dimension are calculated via the sum of the items in each dimension, divided by the number of items, yielding 4 total scores for this measure. This accounts for the variation in the number of items per dimension.

Godin Leisure-Time Exercise Questionnaire. Lastly, the GLTEQ is a 3-item measure of how frequently participants engage in strenuous, moderate, or mild exercise in a 7-day period (Godin & Shephard, 1985; Godin, 2011). Responses are multiplied by the metabolic equivalents (METs) of each of the three exercise intensities (strenuous = 9 METs; moderate = 5 METs; mild = 3 METs) and summed for a total leisure-time physical activity score. The reliability and concurrent validity of this measure was evaluated with 306 self-selected healthy adults of both sexes, and results indicated that this simple instrument has value for assessing leisure-time exercise behavior (Godin & Shephard, 1985). In addition, a number of subsequent studies have utilized the Godin

Leisure-Time Exercise Questionnaire and supported its reliability and validity (see Ainsworth, Berry, Schnyder & Vickers, 1992; Noreau, Shephard, Simard, Pare & Pomerleau, 1993).

Procedures

Participants were provided a link to an online survey including the three questionnaires and asked to respond as honestly as possible. The scales used in this study include the following: (1) the Short Test of Music Preference-Revised (STOMPR), (2) the Behavioral Regulation in Exercise Questionnaire-2 (BREQ-2) with the additional Integration Subscale, and (3) the Godin Leisure Time Exercise Questionnaire (GLTEQ). Questionnaires were administered to participants in the order previously listed. With the exception of the STOMPR, each measure was answered once, along with demographic information of age, sex, race/ethnicity, year in school, and academic major. Participants were also asked if they usually listen to music during exercise. Those who answered in the affirmative were asked if they find music motivational during exercise. Participants were asked to complete the STOMPR five (5) times, in four (4) hypothetical exercise conditions and at baseline, which represented general music preferences and was described to participants as "basic". The four hypothetical exercise conditions consisted of moderate-intensity aerobic exercise, vigorous-intensity aerobic exercise, moderate-intensity resistance-based exercise, and vigorous-intensity resistance-based exercise. Participants completed a baseline STOMPR first, then the four exercise conditions were presented in a randomized order, and participants were provided with examples of each of these conditions to clarify the definitions of each. Definitions of moderate, vigorous,

aerobic, and resistance-based exercise were established by the American College of Sports Medicine and the American Heart Association. Following the completion of each STOMPR, participants were asked if they usually listened to music during that exercise condition, and to respond to an open-ended question regarding the specific music to which they would prefer to listen.

Data Analysis

To investigate the primary research question, results were analyzed for differences in music preference among the five conditions (baseline, moderate-aerobic, vigorous-aerobic, moderate-resistance, vigorous-resistance) using a within-subjects repeated measures analysis of variance (ANOVA). Subsequently, a two-way repeated measures ANOVA was used to compare the four exercise conditions (excluding baseline) and investigate possible main effects of the two within-subject independent variables (exercise intensity and exercise mode) on music preferences, as well as possible interaction effects (intensity x mode) of the independent variables on music preferences.

To explore the secondary purpose of this research study, exercise autonomy, as denoted by the Relative Autonomy Index, was analyzed as a between-subjects factor in the influence of exercise mode and intensity on music preferences. Scores from the BREQ-2 and additional Integration Subscale were calculated to produce a single score for each participant to reflect the overall degree of self-determination for exercise. These scores were dichotomized into 'high' and 'low' categories by the median score. Three-way within-subjects ANOVAs with a between-subjects factor (autonomy) were performed to examine differences in music preferences within each of the four exercise

conditions between the low- and high-autonomy groups. Subsequently, four-way repeated measures ANOVAs (music type x mode x intensity x autonomy) were performed to see if main effects and interaction effects of mode and intensity differed significantly between the low-and high-autonomy groups.

Finally, open-ended responses were categorized for possible trends in music preferences beyond the scope of the measures used, which may be helpful in explaining unexpected findings and aid in the development of subsequent studies on this topic. All analyses were performed using SPSS software, version 21.0.

CHAPTER IV

RESULTS

Descriptive Information for Sample

Of the 507 students invited to participate, the survey was started by 124, and 112 students completed it, yielding a 24% response rate and a 90% completion rate. Demographic information was gathered from each participant, including age, sex, race/ethnicity, class or year in school, and academic major, which is presented in Table 1. Of the 112 participants whose data were included in this study, 82 were female (73%) and 30 were male (27%). The majority of the sample was comprised of Caucasian (48%, n=54) and African American (35%, n=39) individuals, with a mean age of 21.6 years (SD=3.69). The majority of the participants were upperclassmen, with seniors making up 44% (n=49) and juniors making up 31% (n=35). Additionally, 56% of participants (n=63) identified Kinesiology as their academic major and 27% (n=30) identified Psychology as their academic major. Participants were asked if they usually listen to music during exercise and 82% (n=92) reported 'Yes', 16% (n=18) reported 'Sometimes', and less than 2% (n=2) reported that they do not listen to music during exercise. Participants were subsequently asked if they find music motivational during exercise and 86% of the sample (n=96) indicated 'Yes', music was motivational for them during exercise, while 11% of the sample (n=12) reported that they sometimes found

music motivational during exercise, and less than 2% of the sample (n=2) did not find music motivational during exercise.

Table 1

Demographic Information for Participant Sample

Demographic Measure	N	%
Sex		
Male	30	27
Female	82	73
Age (Mean=21.6)		
18	6	5
19	13	12
20	18	16
21	23	21
22	24	21
23	10	9
≥24	18	16
Race		
Asian/Pacific Islander	5	4.5
Black/African American	39	35
Hispanic or Latino/a	8	7
Native American/American Indian	1	1
White/Caucasian	54	48
Other	5	4.5
Academic Year		
Freshman	13	11.5
Sophomore	10	9
Junior	35	31
Senior	49	44
Other	5	4.5
Academic Program		
Kinesiology	63	56
Psychology	30	27
Other	19	17
Do you usually listen to music during exercise?		
Yes	92	82
Sometimes	18	16
No	2	2
Do you find music motivational during exercise?		

Yes	98	88
Sometimes	12	10
No	2	2

Descriptive Information on Exercise Type, Music Preference Measure, Exercise Autonomy Measure, and Physical Activity

All items were used to calculate scores for the four music preference subcategories for the primary analysis. Reliability of the four subscales was examined in the current study and the STOMPR was found to be a moderately reliable measure ('R&C' α=.848; 'I&R' α=.850; 'U&C α=.626; 'E&R' α=.550). Because the STOMPR was used during four different exercise conditions, which was not its intended use, reliability was also tested during each of these conditions. Results indicated acceptable reliability (see Table 2) for all four music subscales in each of the four exercise conditions. Reliability tests were also conducted for the five subscales of the BREQ-2 as well as the added Integration Subscales, and results indicated good reliability for these. All reliabilities and descriptive information for the STOMPR in each of the five conditions are included in Table 2.

The secondary purpose of this study was to see if autonomy for exercise moderated the effect of exercise type on music preference. To do this, data were gathered from participants about their self-determination for exercise using the Behavioral Regulation in Exercise Questionnaire-2 (BREQ-2) with an additional 4-item Integration Subscale, both of which have established reliability and validity. From these responses, the Relative Autonomy Index (RAI) was calculated for each participant using the following equation:

RAI = Amotivation*(-3) + External*(-2) + Introjected*(-1) + Identified*(1) + Integrated*(2) + Intrinsic*(3)

This number is intended to reflect the overall degree of self-determination. The median of the calculated RAI scores was used to dichotomize scores into 'High' and 'Low', which reflect high and low autonomy for exercise. 'High' and 'low' autonomy was used as a between-subjects factor in the second set of analyses. Table 2 provides descriptive information for these measures as well.

Finally, the Godin Leisure-Time Exercise Questionnaire was used to gather information about the exercise behaviors of the participant sample. Descriptive information from this inventory can also be seen in Table 2.

Table 2

Descriptive Statistics for Measures

	Mean	SD	α
STOMPR Subscales – Basic Preferences			
STOMPR Reflective & Complex	3.28	1.24	.848
STOMPR Intense & Rebellious	3.96	1.68	.850
STOMPR Upbeat & Conventional	4.57	1.07	.626
STOMPR Energetic & Rhythmic	4.73	1.03	.550
STOMPR Subscales – Moderate Aerobic			
STOMPR Reflective & Complex	2.23	1.20	.880
STOMPR Intense & Rebellious	3.42	1.74	.796

STOMPR Upbeat & Conventional	3.61	1.34	.701
STOMPR Energetic & Rhythmic	4.11	1.28	.597
STOMPR Subscales – Vigorous Aerobic			
STOMPR Reflective & Complex	2.16	1.15	.869
STOMPR Intense & Rebellious	3.47	1.69	.792
STOMPR Upbeat & Conventional	3.50	1.32	.738
STOMPR Energetic & Rhythmic	4.02	1.27	.550
STOMPR Subscales – Moderate Resistance			
STOMPR Reflective & Complex	2.17	1.13	.888
STOMPR Intense & Rebellious	3.38	1.72	.798
STOMPR Upbeat & Conventional	3.52	1.36	.701
STOMPR Energetic & Rhythmic	4.06	1.26	.585
STOMPR Subscales – Vigorous Resistance			
STOMPR Reflective & Complex	2.15	1.18	.898
STOMPR Intense & Rebellious	3.45	1.80	.800
STOMPR Upbeat & Conventional	3.28	1.31	.709
STOMPR Energetic & Rhythmic	3.96	1.31	.629
BREQ-2 Total – RAI	11.80	7.30	
BREQ-2 Subscales			
BREQ-2 Amotivation	1.26	0.60	.855
BREQ-2 External Regulation	1.79	0.85	.821
BREQ-2 Introjected Regulation	2.83	1.04	.772
BREQ-2 Identified Regulation	3.95	0.74	.668

BREQ-2 Intrinsic Regulation	3.83	1.04	.914
Additional Integration Subscale	3.22	1.18	.892
Godin Subscales			
Godin Strenuous METs	25.14	7.31	
Godin Moderate METs	16.26	10.32	
Godin Mild METs	12.27	8.72	
Godin Total	53.66	27.58	

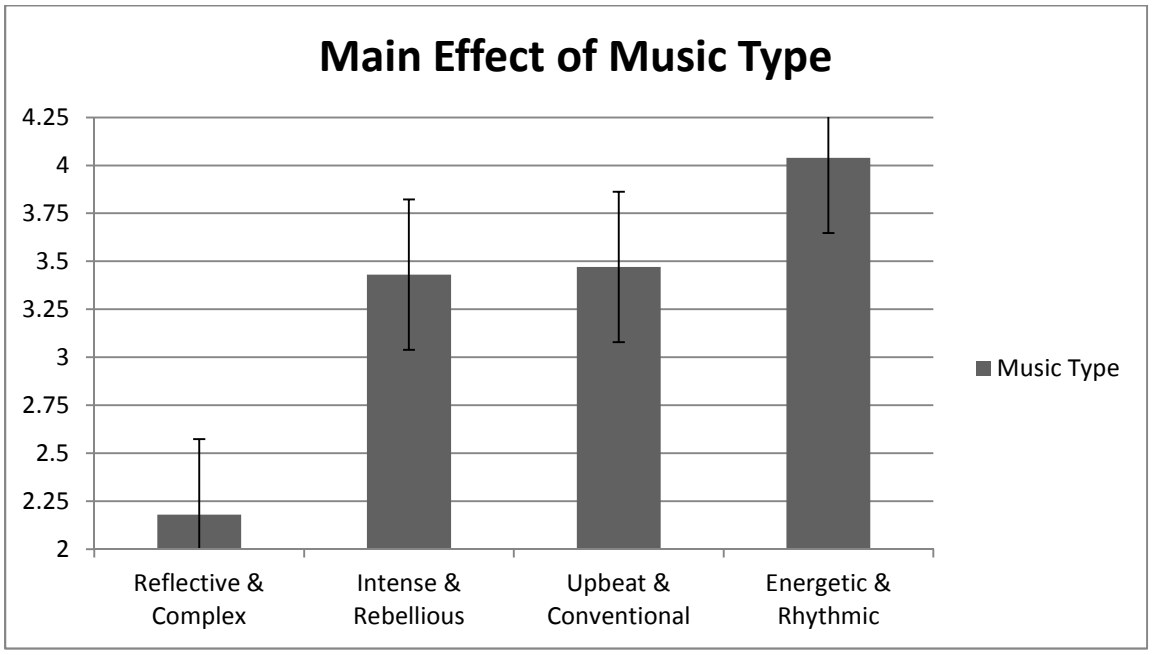
Exercise Condition and Music Preference

A 4 (music type) x 5 (condition) within-subjects repeated measures analysis of variance (ANOVA) using the General Linear Model was used to investigate whether preferences varied by music type (i.e., 'Reflective & Complex', 'Intense & Rebellious, 'Upbeat & Conventional', and 'Energetic & Rhythmic') across the five conditions (baseline, moderate-intensity aerobic exercise, vigorous-intensity aerobic exercise, moderate-intensity resistance exercise, and vigorous-intensity resistance exercise). Results of this analysis indicated a significant main effect of music type, Wilks' Lambda=.22, $F(3,109)=128.50$, $p<.001$, $\eta^2 = .78$. Simple contrasts within the General Linear Model revealed that 'E&R' preferences were significantly different than 'U&C' music $F(1,111)=21.27$, $p<.001$, $\eta^2 = .16$, 'I&R' music $F(1,111)=13.67$, $p<.001$, $\eta^2 = .11$, and 'R&C' music $F(1,111)=326.46$, $p<.001$, $\eta^2 = .75$. Mean scores indicated 'E&R' preferences were significantly higher than all other music types. Overall, participants

significantly preferred music in the 'Energetic & Rhythmic' category of music over all other music types across all conditions. Figure 1 illustrates this main effect of music.

Figure 1

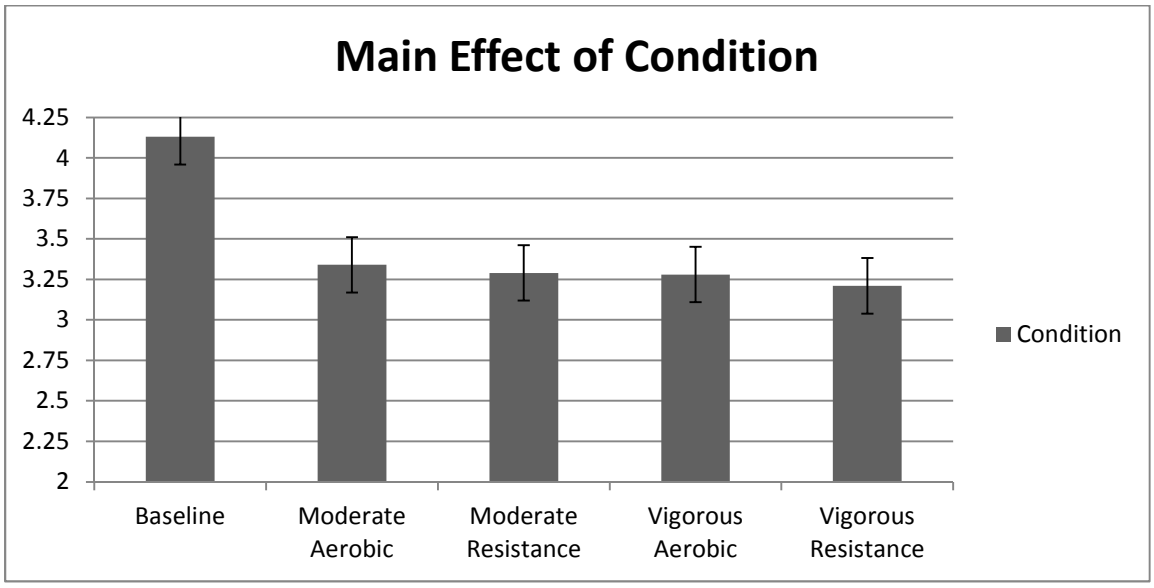
Main Effect of Music Type



Results also indicated a significant main effect of condition, Wilks' Lambda=.37, $F(4,108)=45.46$, $p<.001$, $\eta^2 = .63$. Helmert contrasts within the General Linear Model revealed that music preferences at baseline were significantly higher than all other conditions $F(1,111)=179.50$, $\eta^2 = .62$. In addition, overall music preferences differed significantly between the moderate-aerobic and vigorous-resistance conditions $F(1,111)=4.76$, $p<.05$, $\eta^2 = .04$. Figure 2 illustrates this main effect of condition.

Figure 2

Main Effect of Condition



There was also a significant interaction between music and condition, Wilks' Lambda=.62, F(12,100)=5.02, p<.001, η^2 = .38. Repeated contrasts within the General Linear Model revealed a number of interactions. The interaction was weaker than the main effects. The order of music preferences was the same under all conditions, with E&R most preferred and R&C least preferred, but as the table and figure show, the strength of those differences in preferences varied across conditions. Table 3 provides a summary of means and Figure 3 illustrates interaction effects.

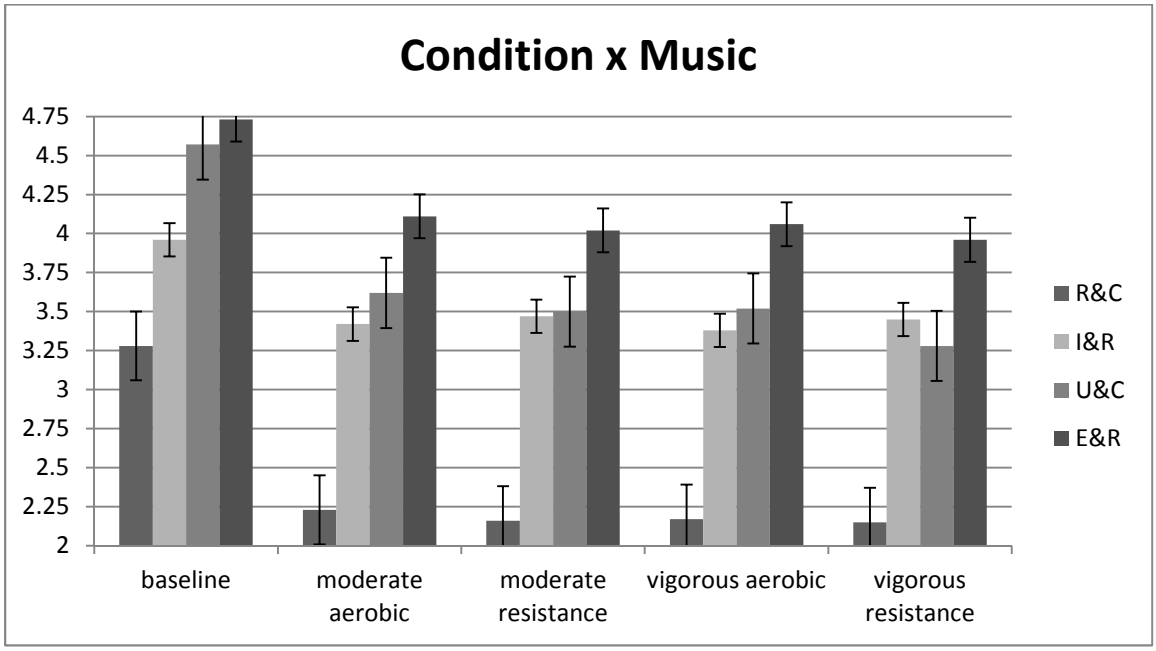
Table 3

Mean Preferences for Music Type x Condition

	Basic	Moderate Aerobic	Moderate Resistance	Vigorous Aerobic	Vigorous Resistance	**Average**
Reflective & Complex	3.28	2.23	2.16	2.17	2.15	**2.40**
Intense & Rebellious	3.96	3.42	3.47	3.38	3.45	**3.53**
Upbeat & Conventional	4.57	3.62	3.50	3.52	3.28	**3.70**
Energetic & Rhythmic	4.73	4.11	4.02	4.06	3.96	**4.18**
Average	**4.13**	**3.34**	**3.29**	**3.28**	**3.21**	

Figure 3

Condition x Music



Main Effects and Interaction Effects of Exercise Mode and Intensity

To further explore the primary research question, three-way repeated measures ANOVAs were conducted to examine the effect of exercise mode (aerobic, resistance), exercise intensity (moderate, vigorous) and music type ('R&C', 'I&R', 'U&C', 'E&R') on music preferences, excluding baseline music preferences. Overall, results of the three-way analysis yielded no significant main effect of intensity or mode, nor were there any interactions between intensity*mode, intensity*music, or intensity*mode*music. As in the previous analysis, there was a significant main effect of music type, Wilks' Lambda=.22, F(1,111)=127.21, p<.001, η^2 = .78. Results also indicated a significant interaction between exercise mode and music type, Wilks' Lambda=.93, F(3,109)=2.90, p<.05, η^2 = .07. Repeated contrasts for the music type main effect revealed that R&C was significantly lower than I&R, and R&R was significantly higher than U&C, but I&R and U&C did not differ from each other. That pattern held for both exercise modes, but U&C was preferred more than I&R with aerobic exercise while I&R was preferred more than U&C with resistance exercise. Table 4 provides a summary of means and Figure 4 provides a display of this interaction.

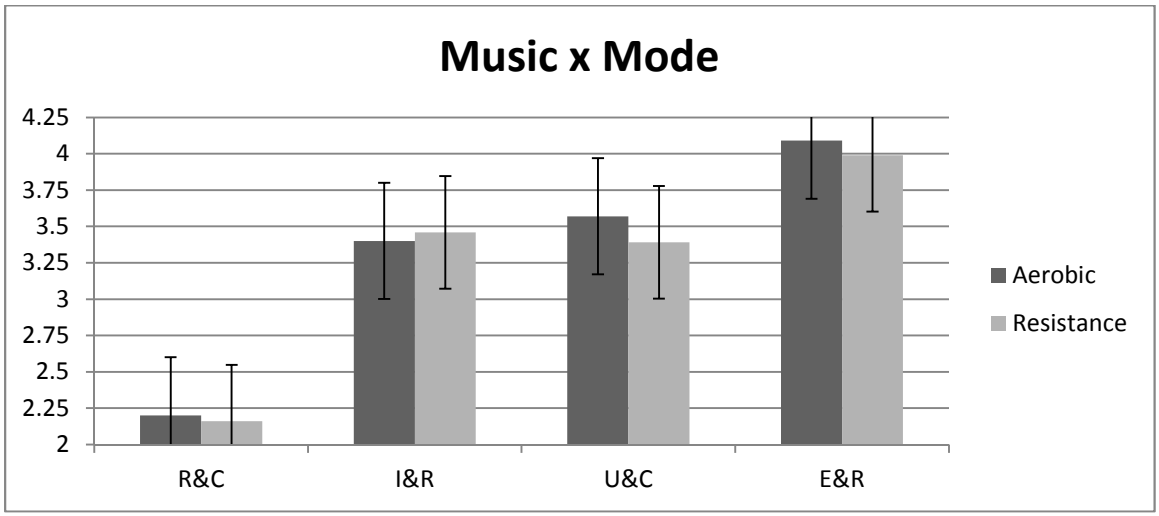
Table 4

*Marginal Means for Mode*Music*

	R&C	I&R	U&C	E&R	**Average**
Aerobic	2.20	3.40	3.57	4.09	**3.32**
Resistance	2.16	3.46	3.39	3.99	**3.25**
Average	**2.18**	**3.43**	**3.48**	**4.04**	

Figure 4

Music x Mode



Exercise Autonomy as a Between-Subjects Factor: Four-Way ANOVA

To explore the secondary purpose of this study, four-way mixed ANOVA (2x2x2x4 – autonomy x mode x intensity x music) were conducted using RAI as a between-subjects factor to investigate whether influences of exercise mode and intensity on the four music type factors depended on exercise autonomy. These analyses excluded responses to baseline music preferences. Results indicated that the influence of exercise mode and intensity on music preference does not significantly depend on exercise autonomy. While there was no overall main effect of autonomy across all music types and conditions ($p>.05$), there was a significant main effect of music, Wilks' Lambda=.22, $F(3,109)=126.24$, $p<.001$, $\eta^2 = .78$. Similar to previous analyses, 'E&R' music was significantly preferred over all other music types. Repeated contrasts for the music main effect within the General Linear Model revealed that 'R&C' music was preferred

significantly less than 'I&R' music F(1,111) = 69.45, p<.001, η^2 = .39, 'I&R' music and 'U&C' music did not differ significantly, and 'E&R' music was preferred significantly more than 'U&C' music F(1,111)=28.15, p<.001, η^2 = .20. There was also a significant interaction between music and autonomy, Wilks' Lambda=.92, F(3,109)=3.18, p<.05, η^2 = .08. Repeated contrasts for the music*autonomy interaction within the General Linear Model revealed that significant differences existed between 'R&C' and 'I&R' music F(1,111)=4.14, p<.05, between 'I&R' and 'U&C' music F(1,111)=8.23, p<.05, and between 'U&C' and 'E&R' music F(1,111)=4.49, p<.05. Table 5 provides a summary of the means for the interaction and Figure 5 provides a display. Participants in the 'low' autonomy group had significantly higher preference for 'U&C' music than the 'high' autonomy group. The same interaction effects mode*music from the previous analysis was found. Results also indicated no significant main effect of mode or intensity, nor were there any significant interactions between mode and autonomy (mode*autonomy), intensity and autonomy (intensity*autonomy), mode and intensity (mode*intensity), intensity and music (intensity*music), mode, intensity, and autonomy (mode*intensity*autonomy), music, intensity, and autonomy (music*intensity*autonomy), mode, music, and autonomy (mode*music*autonomy), intensity, mode, and music (intensity*mode*music), or intensity, mode, music, and autonomy (intensity*mode*music*autonomy) (p>.05).

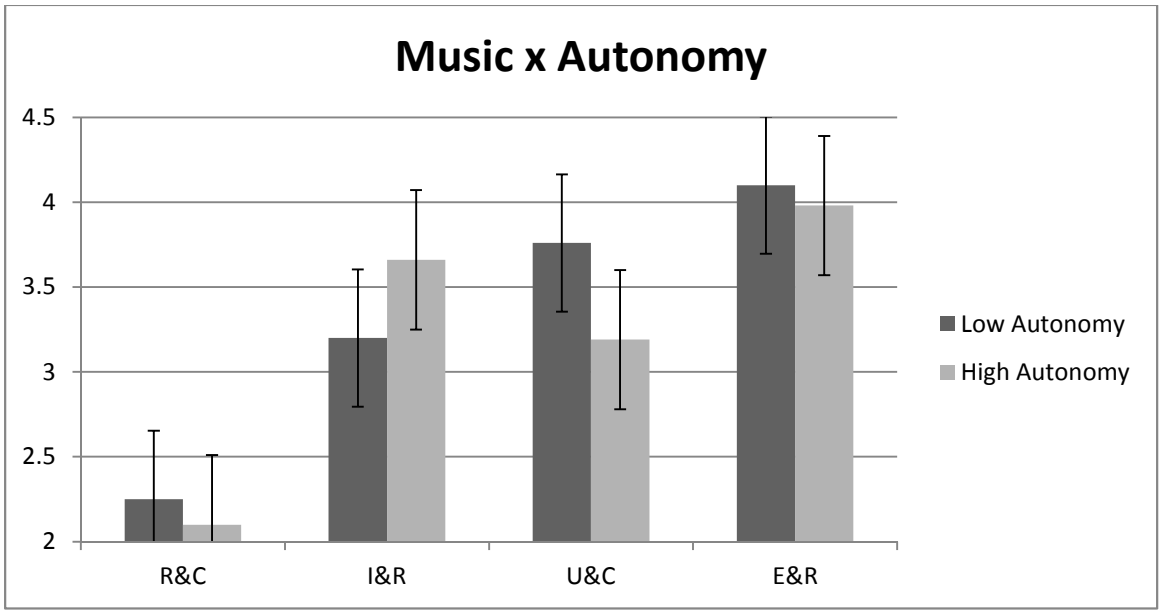
Table 5

*Marginal Means for Music *Autonomy*

	R&C		I&R		U&C		E&R	
	M	**SE**	**M**	**SE**	**M**	**SE**	**M**	**SE**
Low Autonomy	2.25	.15	3.20	.22	3.76	.16	4.10	.15
High Autonomy	2.10	.15	3.66	.22	3.19	.16	3.98	.16

Figure 5

Music x Autonomy



Descriptive Information for Music Preferences in Each Exercise Condition

For each of the four exercise conditions, participants were asked to indicate how many times during a 7-day period, on average, they engaged in that type of activity and,

subsequently, if they listened to music when doing so. Table 6 illustrates this descriptive information.

Table 6

Descriptive Statistics for Exercise Participation and Music Listening

Exercise Condition	Exercise Participation		Music Listening					
			'Usually'		'Sometimes'		'No'	
	N	%	N	%	N	%	N	%
Moderate Aerobic	107	89	78	72.9	25	23.4	4	3.7
Vigorous Aerobic	98	77.7	78	79.6	19	19.4	1	1
Moderate Resistance	100	88	77	77	20	20	3	3
Vigorous Resistance	90	75%	68	75.6	17	18.9	5	5.6

Exercise participation in each condition represents the number of participants who reported engaging in that type of exercise at least once per week. Of the participants who reported engaging in each type of exercise, the number and percentage of those who reported listening to music in that condition were recorded. Participants had the option to indicate that they usually listened to music, sometimes listened to music, or did not listen to music during each exercise condition.

Open-Ended Responses

Participants answered one open-ended question regarding preferred music in each exercise condition, as well as three open-ended questions on the Godin pertaining to physical activity habits (See Appendix C for detailed response tables for each item). All individual responses were listed and grouped into similar categories to identify emerging

themes for exploratory purposes. Some participants gave extensive responses that included references to multiple themes.

Music Preferences during Moderate-Intensity Aerobic Exercise. Following their response to the STOMPR for this particular exercise condition, participants were asked to list the specific music they would prefer to listen to during this type of exercise. Of the 112 responses, 36.8% indicated preferences for hip-hop/rap music, which was the most frequent theme that emerged. Other themes for specific music genres emerged as well, including a preference for pop music, which was the second most frequent theme (28.2%), and R&B music, which was third (17.9%). Themes related to music qualities, such as having a fast pace (17.9%), being happy or motivational (4.3%, n=5) and having strong lyrics or instrumentation (2.6%, n=3) were also seen. Interestingly, the theme of non-specific preferences, or the openness to listen to any kind of music (n=5, 4.2%), and the theme of preferring no music (3.4%, n=4) had higher frequencies in the moderate-aerobic exercise condition than in the other three conditions. In addition, 13.7% of the sample referenced specific songs, artists, or bands as their preference in this exercise condition.

Music Preferences during Vigorous-Intensity Aerobic Exercise. Following responses to the STOMPR for this exercise condition, participants were asked to list the specific music they would prefer to listen to during this type of exercise. Similar to responses in the moderate-aerobic condition, 41.7% indicated preferences for hip-hop/rap music, which was the most frequent theme. Other music genre themes that emerged include pop (24.1%), dance/electronica (16.7%), R&B (15.7%), and rock

(14.8%). Themes related to music qualities, such as having a fast pace (22.2%), being happy or motivational (2.7%), and having strong lyrical or instrumental components (6.5%) were more influential in this exercise condition. Interestingly, the theme of music being a positive distraction emerged in this condition, albeit infrequently (1.9%), where it had not emerged in the same exercise mode of a lower intensity. Some 11.1% responses included references to specific songs, artists, or bands as the preferred music.

Music Preferences during Moderate-Intensity Resistance Exercise. Following responses to the STOMPR for this condition, participants were asked to list the specific music they would prefer to listen to during this type of exercise. Of the 112 responses gathered, 42.3% included themes of hip-hop/rap music as being preferred. Other specific genre themes that emerged include pop (24.3%), rock (17.1%), and R&B (15.3%). These specific genre preferences were similar to those seen in both aerobic conditions. Themes for fast paced music were seen in 15.3% of responses, and strong lyrical or instrumental components were seen in 8.1% of responses. Interestingly, the theme of the music being happy or motivational occurred more frequently in this exercise condition (8.1%) than in the other conditions, but the theme of the music being a positive distraction was not observed at all. Some 13.5% of responses included references to specific songs, artists, or bands as being preferred for this exercise condition.

Music Preferences during Vigorous-Intensity Resistance Exercise. Following responses to the STOMPR for this condition, participants were asked to list the specific music they would prefer to listen to during this type of exercise. Similar to the previous three conditions, hip-hop/rap music appeared as a theme in 43.5%, which is the highest

frequency of all exercise conditions. Other themes for specific music genres include rock (24.3%), pop (20%), and R&B (12.2%). Themes of music that has a fast pace appeared in 21.2% of responses, and themes of music that is happy or motivational emerged in 6.1% of responses. Again, some 12.2% of responses included references to specific songs, artists, or bands as being preferred for this type of exercise. Very few participants indicated that preferences were the same across all conditions (<7%).

Specific Exercise Activities

Godin Leisure-Time Exercise Questionnaire – Strenuous. As part of the GLTEQ, participants were asked to list the specific strenuous activities they engaged in on a weekly basis. This was defined as activity in which the participant's heart beats rapidly. Examples of running/jogging/elliptical at a vigorous pace, martial arts, vigorous swimming, vigorous long distance bicycling, and heavy lifting were provided to indicate what constitutes strenuous activity. Of the 112 responses that were gathered, 59.5% included themes related to aerobic activity, such as running (49.5%), elliptical (11.7%), cycling (8.1%), swimming (6.3%), and walking (5.4%). Another 35.1% included themes related to anaerobic activity, such as weight-lifting (including power lifting and Olympic lifting) (32.4%), conditioning (9%), sprinting (5.4%), and CrossFit (2.7%). Another 28.8% of responses included themes related to sport-specific activity, including basketball, soccer, lacrosse, tennis, gymnastics, martial arts, dance, volleyball, softball, football, and horseback riding.

Godin Leisure-Time Exercise Questionnaire – Moderate. As part of the GLTEQ, participants were asked to list the specific moderate-intensity activities that they engaged

in on a weekly basis. This was defined as activity that is not exhausting to the participant. Examples of fast walking, jogging at moderate pace, easy bicycling, easy swimming, and weight training were provided as indications of this level of activity. Of the 112 responses that were gathered, 63.9% included themes of aerobic activity, including jogging (32.4%), fast walking (29.7%), cycling (15.3%), swimming (4.5%), and elliptical (2.7%). Of the 112 responses, 36% included themes related to anaerobic activity, including light weightlifting (29.7%) and body weight exercises (8.1%), and 27.9% contained themes related to sport-specific activities, including basketball, softball, soccer, dance, martial arts, horseback riding, volleyball, and golf. 4.5% of responses included themes of mindfulness-based activity, including yoga, Pilates, and stretching.

Godin Leisure-Time Exercise Questionnaire – Mild. As part of the GLTEQ, participants were asked to list the specific mild activities that they engaged in on a weekly basis. This type of activity was defined as that in which the participant only provides minimal effort. Examples of casual walking, stretching, and light resistance exercises were provided to indicate what constitutes mild activity. Of the 112 responses gathered, 67.6% contained themes pertaining to aerobic activities, including walking (61.2%), activities of daily living (21.6%), light jogging (9%), biking (4.5%), and swimming (1.8%). Far fewer responses (14.4%) contained themes related to anaerobic activities, including weight lifting (9%), body weight exercises (5.4%), and sport-specific activity (7.2%). In this exercise intensity, more responses included themes of stretching (24.3%) and mindfulness-based activity (12.6%), such as yoga and Pilates, than in both moderate and strenuous exercise.

Summary

The results from this study indicated that 'E&R' music was preferred more than all other music types in all exercise conditions, and that preferences for all music types were higher at baseline than during any of the four exercise conditions. Furthermore, preferences for 'U&C' music only were higher in moderate-intensity exercise than vigorous-intensity exercise, and were also higher in aerobic exercise than resistance exercise. Furthermore, the results indicated that autonomy influenced preferences for 'U&C' music, where preferences were significantly higher in the low autonomy group than in the high autonomy group. Lastly, preferences for 'U&C' music between autonomy groups were significantly different in the moderate-resistance, vigorous-aerobic, and vigorous-resistance exercise conditions.

CHAPTER V

DISCUSSION

The primary purpose of this study was to investigate recreational exercisers' preferred types of music during different exercise conditions. In other words, does the type of exercise influence preferences for certain kinds of music? It was hypothesized that 'Energetic & Rhythmic' ('E&R') music would be preferred in the moderate-intensity aerobic exercise condition, 'Upbeat & Conventional' ('U&C') and 'Intense & Rebellious' ('I&R') music would be preferred in the vigorous-intensity aerobic condition, and that 'I&R' music would be preferred for both the moderate- and vigorous-resistance conditions. These hypotheses were based on previous literature regarding the differential psychological and ergogenic influences of music during different exercise modes and intensities.

As hypothesized, 'E&R' music was the preferred music type in the moderate-intensity aerobic condition. Subsequent research can explore if that is due to the physiological benefits of listening to music with strong rhythmic properties during that type of exercise. However, 'E&R' music was also preferred in all other exercise conditions and at baseline, which was unexpected. The results from this study indicate that students in this sample (college-aged undergraduates) significantly prefer music that is energetic and rhythmic in nature (i.e., rap/hip-hop, dance, soul/R&B, reggae, and funk) while exercising at any intensity or mode. This information has valuable implications for

exercise facilities that service this age group, such as university recreation centers. It might be suggested that these establishments feature music from the 'E&R' music type as it is likely to be preferred by most patrons.

The significant preference for 'E&R' music was supported in the responses to the open-ended questions about what specific music they prefer to listen to when engaging in each music condition. The genres of music that contribute to 'E&R' music emerged as the most frequent themes of the open-response questions, particularly hip-hop/rap music. Interestingly, very few (<7%) of the responses indicated that they had no preference or that the preferred type of music was the same in all conditions. This lends support to the initial research hypothesis that music preferences may actually differ according to the type of exercise, but further exploration is necessary. The repeated emergence of rap/hip-hop preferences across exercise condition may be coincidental due to the composition of the participant sample; it is likely that the sample was not diverse enough to reflect differences across condition.

Although it was not directly hypothesized, it was expected that 'R&C' music would be the least preferred of all the music types. Based on previous literature about the kinds of music that exert positive ergogenic and psychological influences during exercise, it could be inferred that all music categories except 'R&C' may be preferred for the purpose of inducing those positive influences in a given exercise condition. Music with strong rhythmic properties facilitates synchronization and dissociation during moderate-intensity aerobic exercise (Wales, 1986; Seath & Thow, 1995), and intense and rebellious music facilitates higher physiological arousal to meet the demands of high-intensity

aerobic activity (Rhea, Butcher-Mokha, & Ludwig, 2004; Simpson & Karageorghis, 2006). As the exercise intensity increases, music can be an effective distraction from the inherent discomfort associated with high-intensity or long-duration exercise (Yamashita et al., 2006). 'R&C' music lacks any noticeable similarities to music qualities that may positively influence exercise motivation or participation (e.g., fast tempos, strong rhythmic cadences, motivational lyrics, etc.). Genres in the 'R&C' music category that are either highly culturally impactful or had strong personal associations for the participants could be exceptions, but that was not explored in this study (Karageorghis et al., 1999). Nevertheless, this finding has important implications for owners and managers of health/fitness facilities as it confirms that this music type is strongly not preferred in exercise settings.

An additional unexpected finding from this study was that preferences for all music types were higher at baseline than during any of the exercise conditions. This suggests that people in this sample (undergraduate college students) prefer music more when they are not exercising compared to when they are exercising. This is particularly interesting given that the majority of participants reported finding music motivational during exercise, which leads to many questions about how music is truly being used in exercise and what its function actually is. It may be that this recreationally active sample does not use music for the same purpose as those who exercise less consistently. Beginning exercisers may have a greater need for music as a motivating external stimulus than regular exercisers do, which warrants continued exploration.

Additional findings from this study revealed that preferences for 'U&C' music were significantly higher during aerobic exercise than during resistance exercise, which may be due to the need for music with more pronounced beat and tempo qualities during repetitive aerobic activity. Furthermore, preferences for 'U&C' music were also significantly higher during moderate-intensity exercise than during vigorous-intensity exercise. This may be explained by 'U&C' music not having the necessary qualities to sufficiently stimulate motivation or performance to meet the demands of vigorous activities. There may also be aspects of 'U&C' music not explored in this study that detract from motivation and performance during higher intensities.

The secondary purpose of this study was to explore if exercise autonomy level influenced music preferences across exercise conditions. It was hypothesized that those with higher exercise autonomy would have higher average preference scores on each of the music categories due to a more deliberate effort to self-select music that complements and enhances the inherent interest, enjoyment and satisfaction of the exercise. Additionally, it was predicted that the low autonomy group would have lower average music preferences in each category due to the largely non-intentional nature of their exercise behavior (Ryan & Deci, 2000). Contrary to predictions, the 'high' autonomy group did not have higher music preference scores, particularly for 'U&C' music (e.g. country, gospel, oldies, pop, religious, soundtrack/theme song). Participants in the 'low' autonomy group reported a greater preference for this type of music than did the 'high' autonomy group.

This unexpected result may be explained by considering the dichotomizing of exercise autonomy using the continuum of self-determination. Participants in the low autonomy category scored higher in the amotivation, external regulation, and introjected regulation types of motivation, while those in the high autonomy category scored higher in the regulatory styles of identified regulation, integrated regulation, and intrinsic regulation. Therefore, those in the low autonomy category may not have any exercise motivation (i.e. amotivation), but it is more likely they are highly motivated by external factors. The fact that music is an external stimulus may explain why preference was higher in the low autonomy group. Those who are more intrinsically motivated engage in exercise because of its personal importance to them, and because they get interest, enjoyment, and inherent satisfaction from it (Ryan & Deci, 2000). These individuals are less likely to require an external stimulus, such as music, to motivate them through exercise. However, it is unclear why this effect was only seen in the 'U&C' music type. It may be that the genres that comprise 'U&C' music have greater stylistic differences than the genres in other outcome categories, which may be demotivational or negatively distracting to someone who is highly intrinsically motivated. For example, country music can be presented in a multitude of different ways, some of which have a fast tempo and motivational lyrics and some of which are very slow and sad. This may be a unique aspect of 'U&C' music that is not present in the other music types and necessitates further exploration.

While the preference for 'U&C' music was a main effect, it was particularly evident in certain exercise conditions. That is, preference for 'U&C' music was

significantly higher in the low autonomy group than the high autonomy group in the moderate-resistance, vigorous-aerobic, and vigorous-resistance conditions. Although 'E&R' music is most preferred overall, it may be that 'U&C' music provides comparable motivational qualities during resistance exercises, where actions are more deliberate and effort is more directed, and vigorous intensities, where motivational music can help elevate physiological arousal to meet the demands of the exercise. This may be applicable to the low autonomy group, as they rely on external stimuli (i.e., music) as a source of exercise motivation.

Limitations and Future Directions

The current study adds to our understanding of music and exercise motivation, but research is limited and many questions remain. Future research might continue to explore the influence of exercise condition on music preferences. It may be that the lack of hypothesized significant differences in music preferences across conditions was due to the incomplete representation of music preferences by the Short Test of Music Preferences-Revised (STOMPR), which only addresses genre as a contributing factor to music preference. A number of factors contribute to the development of preferences for certain types of music, but genre was the only component examined in this study. Genre is a common way people discuss music preferences; however, subgenres, broader terms related to the music (e.g., loud, fast), specific artists, and specific songs are also important considerations in the development of music preferences (Jellison & Flowers, 1991). Research has shown that liking a specific piece of music in a given genre and liking the entire genre of that music in general is often not the same thing (Lamont & Greasley,

2009; Rentfrow, Goldberg, & Levitin, 2011). As has been previously discussed, the 2009 publication date of the STOMPR reflects what has likely become an outdated conceptualization of music genres. Responses to open-ended questions indicated much conflation between multiple genres of music; therefore, continuing this line of research necessitates the development of a more updated measure of music preference that more accurately reflect current music trends. Additional studies may develop and explore a more complete framework of music preference so that its application to exercise conditions yields a more comprehensive understanding of music preferences.

A clear limitation of this study is that the descriptive survey design prevents drawing conclusions about causal relationships between exercise condition and music preference. Preferences for certain kinds of music are significantly higher in some exercise conditions, modes, and intensities, but it cannot be said that engaging in a certain type of exercise (e.g. moderate, vigorous, aerobic, resistance, or any combination) causes or predicts certain music preferences, or vice versa, and the factors underlying this relationship have not been fully explored. In addition, the assessment and dichotomizing of exercise autonomy with the BREQ and Relative Autonomy Index is a clear limitation. While participants categorized as 'low' may have no motivation or 'Amotivation', they may also be highly externally/extrinsically regulated. That is, they may not be highly autonomous in their exercise behavior, but this does not mean they have low motivation for exercise. Future studies might explore amotivation, extrinsic regulation, and intrinsic regulation as better indicators of autonomy (or lack thereof) and self-determined behavior rather than the arbitrary binary of high and low exercise motivation.

Finally, the hypothetical nature of each of the conditions creates skepticism about the preference results as the participant sample wasn't subjected to any actual exercise conditions. Ideally, an experimental design in which participants engage in different exercise conditions and self-select music to listen to, as well as indicate motivational responses to that music, might better answer this study's research questions and establish relationships between exercise condition, motivation, and music preference. Future studies may also aim to explore changes in motivational responses to music or changes in music preferences at different time points during a workout. As fatigue and negative affect increase with increased exercise duration, the musical needs of the listener may be subject to change.

The sample included in this study is also a limitation. The students were from the same university and recruited from a few specific courses. That particular context may contribute to the development of music preferences. The music landscape of one's upbringing likely influences general music preferences, which may then contribute to music preferences during exercise. The southeastern location from which the sample was drawn may influence preferences in ways that may not be applicable in other geographic regions. In addition, music preferences have been shown to fluctuate across the lifespan, particularly in genres that have traditionally been favored in certain age groups (i.e., country music in older listeners; rap music in younger listeners) (LeBlanc, Sims, Siivola, & Obert, 1996), and musical genres are contextualized in a particular culture, time, and region (Stockfelt, 2004). It may be that the lack of significant differences in preferred

music across exercise conditions was due to a lack of diversity within the participant sample.

While there are limitations of the current research, this study attempted to address a noticeable gap in the music-motivation-exercise literature: music preference. There has been much research on the influence of music on psychological, ergogenic, psychophysical (i.e., RPE) outcomes during exercise, but many of these studies failed to consider music preference (for a review, see Karageorghis et al., 2012). In order to effectively help recreational exercisers optimize the exercise experience and maintain physical activity, music must be both influential and preferred. This current study is a preliminary step toward understanding how exercise type may influence preferences for a certain kind of music, and how music preferences may potentially contribute to the literature on the influence of music on motivation, and, subsequently, exercise adherence.

Summary

In conclusion, the findings from this study largely did not confirm the research hypotheses that music preferences would differ across exercise conditions, but yielded unexpected results that offer valuable practical implications. As music preferences were relatively consistent, and 'E&R' music was preferred across all conditions, it may be suggested that this music type be featured in exercise facilities catered toward this population where a variety of exercise types are engaged in. Future research can explore if the 'E&R' preferences in moderate-aerobic activity were predicted or caused by the physiological influences of that music type. Additionally, the reasons why music was more preferred outside of exercise than in any exercise condition require further

investigation. While some methodological limitations affected the ability to effectively answer the primary research questions, results from this study are promising and support the continued exploration of music preferences in the exercise domain.

REFERENCES

Ainsworth, B. E., Berry, C. B., Schnyder, V. N., & Vickers, S. R. (1992). Leisure-time physical activity and aerobic fitness in African-American young adults. *Journal of Adolescent Health, 13*(7), 606-611.

Arnett, J. J. (1991). Adolescents and heavy metal music: From the mouths of metalheads. *Youth Society, 23*, 76-98.

Batt-Rawden, K. & DeNora, T. (2005). Music and informal learning in everyday life. *Music Education Research, 7*(3), 289-304.

Batt-Rawden, K., & Tellnes, G. (2011). How music may promote healthy behavior. *Scandinavian Journal of Public Health, 39*(2), 113-120.

Benson, E. (2003). You are what you listen to. *Monitor on Psychology, 34*(7), 33.

Bishop, D. T., Karageorghis, C. I., & Loizou, G. (2007). A grounded theory of young tennis players' use of music to manipulate emotional state. *Journal of Sport & Exercise Psychology, 29*(5), 584-607.

Carlson, S. A., Fulton, J. E., Schoenborn, C. A., & Loustalot, F. (2010). Trend and prevalence estimates based on the 2008 physical activity guidelines for americans. *American Journal of Preventive Medicine*, 39(4), 305-313.

Copeland, B. L., & Franks, B. D. (1991). Effects of types and intensities of background music on treadmill endurance. *Journal of Sports Medicine and Physical Fitness, 31*(1), 100-103.

Corah, N. L., Gale, E. N., Pace, L. F., & Seyrek, S. K. (1981). Relaxation and musical programming as a means of reducing psychological stress during dental procedures. *Journal of the American Dental Association, 103*(1), 232-234.

Crust, L., & Clough, P. J. (2006). The influence of rhythm and personality in the endurance response to motivational asynchronous music. *Journal of Sports Sciences, 24*(2), 187-195.

Deci, E. L., and Ryan, R. M. (1985). The general causality orientations scale: Self-determination in personality. *Journal of Research in Personality, 19*(2), 109-134.

DeNora, T. (2000). *Music in everyday life.* Cambridge University Press.

Dwyer, J. J. (1995). Effect of perceived choice of music on exercise intrinsic motivation. *Health Values: The Journal of Health Behavior, Education & Promotion, 19*(2), 18-26.

Ferrer, R., Eerola, T., & Vuoskoski, J. K. (2013). Enhancing genre-based measures of music preference by user-defined liking and social tags. *Psychology of Music, 41*(4), 499-518.

Finnäs, L. (1989). How can musical preferences be modified? A research review. *Council for Research in Music Education, 102,* 1-59.

Frederick, C. M., & Ryan, R. M. (1993). Differences in motivation for sport and exercise and their relations with participation and mental health. *Journal of Sport Behavior, 16*(3), 124-146.

Georgi, R. von, Grant, P., Georgi, S. von, & Gebhardt, S. (Eds.) (2006). *Personality, emotion, and the use of music in everyday life: Measurement, theory, and neurophysiological aspects of a missing link.* Tönning: Der Andere Verlag.

Gfeller, K. (1988). Musical components and styles preferred by young adults for aerobic fitness activities. *Journal of Music Therapy, 25*(1), 28-43.

Godin, G. (2011). The Godin-Shephard leisure-time physical activity questionnaire. *The Health & Fitness Journal of Canada, 4*(1), 18-22.

Godin, G., & Shephard, R. J. (1985). A simple method to assess exercise behavior in the community. *Canadian Journal of Applied Sport Sciences, 10*(3), 141-146.

Gowensmith, W. N., & Bloom, L. J. (1997). The effects of heavy metal music on arousal and anger. *Journal of Music Therapy, 34*(1), 33-45.

Holbrook, M. B. & Schindler, R. M. (1989). Some exploratory findings on the development of musical tastes. *Journal of Consumer Research, 16*(1), 119-124.

Hutchinson, J. C., & Karageorghis, C. I. (2013). Moderating influence of dominant attentional style and exercise intensity on responses to asynchronous music. *Journal of Sport and Exercise Psychology, 35*(6), 625-643.

Jellison, J. A., & Flowers, P. J. (1991). Talking about music: Interviews with disabled and nondisabled children. *Journal of Research in Music Education, 39*(4), 322-333.

Karageorghis, C. I., Priest, D. L., Terry, P. C., Chatzisarantis, N. L. D., & Lane, A. M. (2006). Redesign and initial validation of an instrument to assess the motivational

qualities of music in exercise: The Brunel Music Rating Inventory – 2. *Journal of Sports Sciences, 24*(8), 899-909.

Karageorghis, C. I., Priest, D. L., Williams, L. S., Hirani, R. M., Lannon, K. M., & Bates, B. J. (2010). Ergogenic and psychological effects of synchronous music during circuit-type exercise. *Psychology of Sport and Exercise, 11*(6), 551-559.

Karageorghis, C. I., & Terry, P. C. (1997). The psychophysical effects of music in sport and exercise: a review. *Journal of Sport Behavior*, *20*(1), 54-68.

Karageorghis, C. I. & Terry, P. C. (2011). *Inside sport psychology.* Champaign, IL: Human Kinetics.

Karageorghis, C. I., Terry, P. C., & Lane, A. M. (1999). Development and validation of an instrument to assess the motivational qualities of music in exercise and sport: The Brunel Music Rating Inventory. *Journal of Sports Sciences, 17*(9), 713-724.

Karageorghis, C. I., Terry, P. C., Lane, A. M., Bishop, D. T., & Priest, D. L. (2012). The BASES expert statement on use of music in exercise. *Journal of Sports Sciences, 30*(9), 953-956.

Kodzhaspirov, Y.G., Zaitsev, Y.M., & Kosarev, S.M. (1988). The application of functional music in the training sessions of weightlifters. *Soviet Sports Review, 23*, 39-42.

Lamont, A., & Greasley, A. E. (2009). Musical preferences. In S. Hallam, I. Cross, & M. Thaut. (Eds.), *Oxford handbook of music psychology* (pp. 160-168). Oxford: Oxford University Press.

Lamont, A. & Webb, R. (2010). Short- and long-term music preferences: What makes a favourite piece of music? *Psychology of Music, 38*(2), 222-241.

LeBlanc, A., Sims, W. L., Siivola, C., & Obert, M. (1996). Music style preferences of different age listeners. *Journal of Research in Music Education, 44*(1), 49-59.

Lee, K. P. (1989). The effects of musical tempos on psychophysical responding during sub-maximal treadmill running (Master's thesis, Pennsylvania State Universiity, 1987). *Microform Publications*, University of Oregon, Eugene, OR. (University Microfiche No. UNIVORE: U089205).

Lucaccini, L. F., & Kreit, L. H. (1972). Music. In W. P. Morgan (Ed.) *Ergogenic aids and muscular performance* (pp. 240-245). New York: Academic Press.

Markland, D., & Tobin, V. (2004). A modification of the Behavioral Regulation in Exercise Questionnaire to include an assessment of amotivation. *Journal of Sport and Exercise Psychology, 26*(2), 191-196.

McDermott, J., & Hauser, M. (2005). The origins of music: Innateness, uniqueness, and evolution. *Music Perception, 23*, 29-59.

McLachlan, S., Spray, C., & Hagger, M. S. (2011). The development of a scale measuring integrated regulation in exercise. *British Journal of Health Psychology, 16*(4), 722-743.

McNamara, L., & Ballard, M. E. (1999). Resting arousal, sensation seeking, and music preference. *Genetic, Social, & General Psychology Monographs, 125*(3), 229-250.

Mende, A. (1991). Musik und Alter: Ergebnisse zum Stellenwert von Musik im biographischen Lebensverlauf (Music and age: Results on the significance of music throughout biography). *Rundfunk und Fernsehen, 39*(3)*, 381*-392.

Mitchell, L. A., MacDonald, R. A. R., Knussen, C., & Serpell, M. G. (2007). A survey investigation of the effects of music listening on chronic pain. *Psychology of Music, 35*(1), 39-59.

Mullan, E., Markland, D., & Ingledew, D. K. (1997). A graded conceptualization of self-determination in the regulation of exercise behavior: Development of a measure using confirmatory factor analytic procedures. *Personality and Individual Differences, 23*(5)*,* 745-752.

Nakamura, P. M., Pereira, G., Papini, C. B., Nakamura, F. Y., & Kokubun, E. (2010). Effects of preferred and nonpreferred music on continuous cycling exercise performance. *Perceptual and Motor Skills, 110*(1), 257-264.

Noreau, L., Shephard, R. J., Simard, C., Paré, G., Pomerleau, P. (1993). Relationship of impairment and functional ability to habitual activity and fitness following spinal cord injury. *International Journal of Rehabilitation Research, 16*(4), 265-276.

North, A. C. & Hargreaves, D. J. (1999). Music and adolescent identity. *Music Education Research, 1*(1), 75-92.

North, A. C. & Hargreaves, D. J. (2000). Musical preferences during and after relaxation and exercise. *The American Journal of Psychology, 113*(1), 43-67.

North, A. C. & Hargreaves, D. J. (2007). Lifestyle correlates of musical preference: Relationships, living arrangements, beliefs, and crime. *Psychology of Music, 35*(1)*,* 58-87.

Pothoulaki, M., Natsume, M., & MacDonald, R. A. R. (2006, August). *The effects of preferred music listening in college students and renal failure patients.* Paper presented at the 9th International Conference on Music Perception and Cognition. ICMPC, Bologna, Italy.

Priest, D. L., & Karageorghis, C. I. (2008). Characteristics and effects of motivational music in sport and exercise. *European Physical Education Review, 14*(1), 351-371.

Rejeski, W. J. (1985). Perceived exertion: An active or passive process? *Journal of Sport Psychology, 7*(4), 371-378.

Rentfrow, P. J., Goldberg, L. R., & Levitin, D. J. (2011). The structure of musical preferences: A five-factor model. *Journal of Personality and Social Psychology, 100*(6), 1139-1157.

Rentfrow, P. J. & Gosling, S. D. (2003). The do re mi's of everyday life: The structure and personality correlates of music preference. *Journal of Personality and Social Psychology, 84*(6), 1236-1256.

Rentfrow, P. J. & Gosling, S. D. (2006). Message in a ballad: The role of music preferences in interpersonal perception. *Psychological Science, 17*(3), 236-242.

Rhea, C.K., Butcher-Mokha, M., & Ludwig, K. Influence of up-tempo music on arousal and selected biomechanics during a near maximum bench press. *American*

Alliance for Health, Physical Education, Recreation, and Dance, New Orleans, LA, March 2004, national conference, podium. [Abstract published in *Research Quarterly for Exercise and Sport Supplement*, 75(1), A2]

Rhodes, R. E., & Courneya, K. S. (2003). Relationships between personality, an extended theory of planned behavior model and exercise behaviour. *British Journal of Health Psychology, 8*(1), 19-36.

Ryan, R. M. (1995). Psychological needs and the facilitation of integrative processes. *Journal of Personality, 63*(3)*,* 397-427.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68.

Ryan, R. M., Frederick, C. M., Lepes, D., Rubio, N., & Sheldon, K. M. (1997). Intrinsic motivation and exercise adherence. *International Journal of Sport Psychology, 28*(4), 335-354.

Sanchez, X., Moss, S. L., Twist, C., & Karageorghis, C. I. (2014). On the role of lyrics in the music–exercise performance relationship. *Psychology of Sport and Exercise*, *15*(1), 132-138.

Schäfer, T. & Sedlmeier, P. (2009). From the functions of music to music preference. *Psychology of Music, 37*(3), 279-300.

Seath, L. & Thow, M. (1995). The effect of music on the perception of effort and mood during aerobic type exercise. *Physiotherapy, 81*(10), 592-596.

Simpson, S., & Karageorghis, C. I. (2006). The effects of synchronous music on 400-m sprint performance. *Journal of Sports Sciences, 24*(10), 1095-1102.

Sloboda, J. A. & Juslin, P. N. (2001). Psychological perspectives on music and emotion. In P. N. Juslin and J. A. Sloboda (Eds.), *Music and emotion: Theory and research* (pp. 71-104). New York: Oxford University Press.

Sloboda, J. A., O'Neill, S. A., & Ivaldi, A. (2001). Functions of music in everyday life: An exploratory study using the Experience Sampling Method. *Musicae Scientiae, 5*(1)*,* 9-32.

Stockfelt, O. (2004). Adequate modes of listening. In Simon Frith (Ed.), *Popular music: Critical concepts in media and cultural studies. Vol. 1: Music and society* (pp. 375-391). London and New York: Routledge.

Vallerand, R. J. & Ratelle, C. F. (2002). Intrinsic and extrinsic motivation: A hierarchical model. In E. L. Deci, & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 37-63). Rochester NY: University of Rochester Press.

Wales, D. N. (1986). The effects of tempo and disposition in music on perceived exertion, brain waves, and mood during aerobic exercise. (Master's thesis, Pennsylvania State University, 1985). *Microform Publications,* University of Oregon. Eugene, OR. (University Microfiche No. UNIV ORE: U086 251-252).

Wilson, P. M., Rodgers, W. M., Blanchard, C. M., & Gessell, J. (2003). The relationship between psychological needs, self-determined motivation, exercise attitudes and physical fitness. *Journal of Applied Social Psychology, 33*(11), 2373-2392.

Wilson, P. M., Rodgers, W. M., & Fraser, S. N. (2002). Examining the psychometric properties of the behavioral regulation in exercise questionnaire. *Measurement in Physical Education and Exercise Science, 6*(1)*,* 1-21.

Yamashita, S., Iwai, K., Akimoto, T., Sugawara, J., & Kono, I. (2006). The effects of music during exercise on RPE, heart rate and the autonomic nervous system. *Journal of Sports Medicine and Physical Fitness, 46*(3), 425-430.

APPENDIX A

SURVEY SCRIPT

Demographics

Age: _____

Sex: Male / Female

Race/Ethnicity:

___ White/Caucasian ___ Hispanic or Latino ___ Black or African American

___ Native American or American Indian ___ Asian or Pacific Islander ___ Other

Class / Year:

___ Freshman ___ Sophomore ___ Junior ___ Senior ___ Other

What is your major?

_____

Do you usually listen to music during exercise?

___ Yes ___ Sometimes ___ No

If yes, do you find music motivational during exercise?

___ Yes ___Sometimes ___ No

Short Test of Music Preferences - Revised

Please describe your **basic** music preferences by indicating how much you like or dislike each of the following music genres, in general, using the scale provided.

1	2	3	4	5	6	7
Dislike Strongly	Dislike Moderately	Dislike a little	Neither like nor dislike	Like a little	Like Moderately	Like Strongly

1. ___ Alternative
2. ___ Bluegrass
3. ___ Blues
4. ___ Classical
5. ___ Country
6. ___ Dance/Electronica
7. ___ Folk
8. ___ Funk
9. ___ Gospel
10. ___ Heavy Metal
11. ___ International/Foreign
12. ___ Jazz
13. ___ New Age
14. ___ Oldies
15. ___ Opera
16. ___ Pop
17. ___ Punk
18. ___ Rap/hip-hop
19. ___ Reggae
20. ___ Religious
21. ___ Rock
22. ___ Soul/R&B
23. ___ Soundtracks/theme song

During a typical 7-Day (a week) period, how many times on average do you participate in **moderate-intensity aerobic exercise** (for example: walking fast, riding a bike on level ground or with few hills) for more than 20 minutes?

Average # times/week: _____

Please indicate how much you would like each of the following music genres using the scale provided if you were to engage in **moderate-intensity aerobic exercise** (for example: walking fast, riding a bike on level ground or with few hills).

1	2	3	4	5	6	7
Dislike Strongly	Dislike Moderately	Dislike a little	Neither like nor dislike	Like a little	Like Moderately	Like Strongly

1. ___ Alternative
2. ___ Bluegrass
3. ___ Blues
4. ___ Classical
5. ___ Country
6. ___ Dance/Electronica
7. ___ Folk
8. ___ Funk
9. ___ Gospel
10. ___ Heavy Metal
11. ___ International/Foreign
12. ___ Jazz
13. ___ New Age
14. ___ Oldies
15. ___ Opera
16. ___ Pop
17. ___ Punk
18. ___ Rap/hip-hop
19. ___ Reggae
20. ___ Religious
21. ___ Rock
22. ___ Soul/R&B
23. ___ Soundtracks/theme song

Do you usually listen to music during moderate-intensity aerobic exercise?

___ Yes ___ Sometimes ___ No

What music do you prefer to listen to during moderate-intensity aerobic exercise? Please be as specific as possible.

During a typical 7-Day (a week) period, how many times on average do you participate in **vigorous-intensity aerobic exercise** (for example: jogging or running, riding a bicycle fast or on hills) for more than 20 minutes?

Average # times/week: _____

Please indicate how much you would like or dislike each of the following music genres using the scale provided if you were to engage in **vigorous-intensity aerobic exercise** (for example: jogging or running, riding a bicycle fast or on hills).

1	2	3	4	5	6	7
Dislike Strongly	Dislike Moderately	Dislike a little	Neither like nor dislike	Like a little	Like Moderately	Like Strongly

1. ___ Alternative
2. ___ Bluegrass
3. ___ Blues
4. ___ Classical
5. ___ Country
6. ___ Dance/Electronica
7. ___ Folk
8. ___ Funk
9. ___ Gospel
10. ___ Heavy Metal
11. ___ International/Foreign
12. ___ Jazz
13. ___ New Age
14. ___ Oldies
15. ___ Opera
16. ___ Pop
17. ___ Punk
18. ___ Rap/hip-hop
19. ___ Reggae
20. ___ Religious
21. ___ Rock
22. ___ Soul/R&B
23. ___ Soundtracks/theme song

Do you usually listen to music during vigorous-intensity aerobic exercise?

___ Yes ___ Sometimes ___ No

What music do you prefer to listen to during vigorous-intensity aerobic exercise? Please be as specific as possible.

During a typical 7-Day (a week) period, how many times on average do you participate in **moderate-intensity strength/resistance exercise** (for example: using body weight, resistance bands, or weights to exercise the major muscle groups of the body at 60-70% of the 1RM (the most weight that a muscle or muscle group can move for one complete repetition with good form), or a weight that can be lifted for approximately 8-12 repetitions) for more than 20 minutes?

Average # times/ week: _____

Please indicate how much you would like or dislike each of the following music genres using the scale provided if you were to engage in **moderate-intensity strength/resistance exercise** (For example: using body weight, resistance bands, or weights to exercise the major muscle groups of the body at 60-70% of the 1RM (the most weight that a muscle or muscle group can move for one complete repetition with good form), or a weight that can be lifted for approximately 8-12 repetitions).

1	2	3	4	5	6	7
Dislike Strongly	Dislike Moderately	Dislike a little	Neither like nor dislike	Like a little	Like Moderately	Like Strongly

1. ___ Alternative
2. ___ Bluegrass
3. ___ Blues
4. ___ Classical
5. ___ Country
6. ___ Dance/Electronica
7. ___ Folk
8. ___ Funk
9. ___ Gospel
10. ___ Heavy Metal
11. ___ International/Foreign
12. ___ Jazz
13. ___ New Age
14. ___ Oldies
15. ___ Opera
16. ___ Pop
17. ___ Punk
18. ___ Rap/hip-hop
19. ___ Reggae
20. ___ Religious
21. ___ Rock
22. ___ Soul/R&B
23. ___ Soundtracks/theme song

Do you usually listen to music during moderate-intensity strength/resistance exercise?

___ Yes ___ Sometimes ___ No

What music do you prefer to listen to during moderate-intensity strength/resistance exercise? Please be as specific as possible.

During a typical 7-Day (a week) period, how many times on average do you participate in **vigorous-intensity strength/resistance exercise** (For example: using body weight, resistance bands, or weights to exercise the major muscle groups of the body at ≥80% of the 1RM, or for a maximum of 6 reps per set; power lifting, Olympic lifting) for more than 20 minutes?

Average # times/week: _____

Please indicate how much you would like or dislike each of the following music genres using the scale provided if you were to engage in **vigorous-intensity strength/resistance exercise** (For example: using body weight, resistance bands, or weights to exercise the major muscle groups of the body at ≥80% of the 1RM, or for a maximum of 6 reps per set; power lifting, Olympic lifting).

1	2	3	4	5	6	7
Dislike Strongly	Dislike Moderately	Dislike a little	Neither like nor dislike	Like a little	Like Moderately	Like Strongly

1. ___ Alternative
2. ___ Bluegrass
3. ___ Blues
4. ___ Classical
5. ___ Country
6. ___ Dance/Electronica
7. ___ Folk
8. ___ Funk
9. ___ Gospel
10. ___ Heavy Metal
11. ___ International/Foreign
12. ___ Jazz
13. ___ New Age
14. ___ Oldies
15. ___ Opera
16. ___ Pop
17. ___ Punk
18. ___ Rap/hip-hop
19. ___ Reggae
20. ___ Religious
21. ___ Rock
22. ___ Soul/R&B
23. ___ Soundtracks/theme song

Do you usually listen to music during vigorous-intensity strength/resistance exercise?

___ Yes ___ Sometimes ___ No

What music do you prefer to listen to during vigorous-intensity strength/resistance exercise? Please be as specific as possible.

BREQ-2 and Additional Integration Subscale

Reasons for Engaging in Exercise

The following questions relate to the reasons underlying peoples' decisions to engage, or not engage, in physical exercise. Using the scale below, please indicate to what extent each of the following items is true for you. Please note that there are no right or wrong answers and no trick questions. We simply want to know how you personally feel about exercise.

	Not True for me		**Sometimes true for me**		**Very true for me**
I exercise because other people say I should	0	1	2	3	4
I feel guilty when I don't exercise	0	1	2	3	4
I value the benefits of exercise	0	1	2	3	4
I exercise because it's fun	0	1	2	3	4
I don't see why I should have to exercise	0	1	2	3	4
I take part in exercise because friends/family/partner say I should	0	1	2	3	4
I feel ashamed when I miss an exercise session	0	1	2	3	4
It's important to me to exercise regularly	0	1	2	3	4
I can't see why I should bother exercising	0	1	2	3	4
I enjoy my exercise sessions	0	1	2	3	4
I exercise because others will not be pleased with me if I don't	0	1	2	3	4
I don't see the point in exercising	0	1	2	3	4
I feel like a failure when I haven't exercised in a while	0	1	2	3	4
I think it is important to make the effort to exercise regularly	0	1	2	3	4
I find exercise a pleasurable activity	0	1	2	3	4

I feel under pressure from my friends/family to exercise	0	1	2	3	4
I get restless if I don't exercise regularly	0	1	2	3	4
I get pleasure and satisfaction from participating in exercise	0	1	2	3	4
I think exercising is a waste of time	0	1	2	3	4
Exercise is essential to my identity and sense of self	0	1	2	3	4
Exercise is genuinely part of me	0	1	2	3	4
Exercise is consistent with my values, goals, and aims in life	0	1	2	3	4
Doing exercise and being myself are inseparable	0	1	2	3	4

Godin Leisure-Time Exercise Questionnaire

Exercise Behavior

Lastly, in this section, we would like to ask you about your current physical activity and exercise habits that you perform regularly. Thinking about the last 6 months, please answer the following questions as accurately as possible. When answering, consider the definitions of strenuous, moderate, and mild exercise (listed below).

STRENUOUS EXERCISE (HEART BEATS RAPIDLY): e.g. – running/jogging/elliptical at vigorous pace, martial arts, vigorous swimming, vigorous long distance bicycling, heavy lifting, etc.
MODERATE EXERCISE (NOT EXHAUSTING): e.g. – fast walking/jogging at moderate pace, easy bicycling, easy swimming, weight training, etc.
MILD EXERCISE (MINIMAL EFFORT): e.g. – casual walking, stretching, light resistance exercises, etc.

During a typical 7-Day period (a week), how many times on the average do you participate in strenuous exercise for more than 20 minutes? Record the number of times you participate in this type of activity both within a sport that you play and/or outside of sports.

Average # of times/week _____

Please list strenuous physical activities that you participate in regularly.

During a typical 7-Day period (a week), how many times on the average do you participate in moderate exercise for more than 20 minutes? Record the number of times you participate in this type of activity both within a sport that you play and/or outside of sports.

Average # of times/week _____

Please list moderate physical activities that you participate in regularly.

During a typical 7-Day period (a week), how many times on the average do you participate in mild exercise for more than 20 minutes? Record the number of times you participate in this type of activity both within a sport that you play and/or outside of sports.

Average # of times/week _____

Please list the mild physical activities that you participate in regularly.

APPENDIX B

INFORMED CONSENT

You are being asked to take part in an online research study. You must be 18 or older to participate. Your participation in the study is voluntary. You may choose not to join, or you may withdraw your consent to be in the study, for any reason, without penalty. If you do withdraw, it will not affect you in any way. If you choose to withdraw, you may request that any of your data which has been collected be destroyed unless it is in a de-identifiable state. Extra credit will be offered for your participation, and a non-research option for extra credit that is equivalent to the time and effort of this project will be offered to those who do not wish to participate.

We are interested in the music preferences of exercisers during different modes and intensities of exercise. In the following survey, please indicate your baseline music preferences as well as your preferences during each of the described exercise conditions. Additionally, we would like to know your overall motivation to engage in exercise behaviors. Please note that there are no right or wrong answers, and your responses will be held in confidence and used only for our research purposes. All responses will be completely anonymous.

Given the online nature of this research, please note that absolute confidentiality of data provided through the Internet cannot be guaranteed due to the limited protections of Internet access. Please be sure to close your browser when finished so no one will be able to see what you have been doing.

By checking the 'Yes' box, you are agreeing that you have read this consent form, or it has been read to you, you fully understand the contents of this document, and are openly willing consent to take part in this study. All of your questions concerning this study have been answered. By checking 'Yes', you are agreeing that you are 18 years of age or older and are agreeing to participate.

If you have questions, want more information or have suggestions, please contact Stephanie Barrett at slbarret@uncg.edu or Diane Gill at dlgill@uncg.edu. If you have any concerns about your rights, how you are being treated, concerns or complaints about this project or benefits or risks associated with being in this study, please contact the Office of Research Integrity at UNCG toll-free at (855)-251-2351.

- o I have read and understood this consent form and am voluntarily participating in this study.

APPENDIX C

PARTICIPANT RESPONSES TO OPEN-ENDED ITEMS

Table 7

Specific Music Preferences – Moderate Aerobic Exercise

Response Category	N
Genre	
Pop	33
Country	14
Dance/Electronica	12
Alternative	11
Rock	18
Rap/Hip-Hop	43
R&B	21
Punk	3
Dubstep	2
Heavy Metal	5
New Age	1
Jazz	1
Folk	2
Gospel	1
Music Quality	
Fast pace/up-tempo	21
Strong lyrics or instrumentation	3
Pandora	7
Music that is happy or motivational	5
Anything	5
None	4
Same as another exercise condition	3
Specific band, artist, song	16

N=112

Table 8

Specific Music Preferences – Moderate Resistance Exercise

Response Category	N
Genre	
Pop	27
Country	13
Dance/Electronica	10
Alternative	8
Rock	19
Rap/Hip-Hop	47
R&B	17
Heavy Metal	5
Punk	1
Dubstep	4
New Age	1
Gospel/Religious	5
Music Quality	
Fast pace/up-tempo	17
Strong lyrics or instrumentation	9
Music that is happy or motivational	9
Pandora	5
Same as another exercise condition	6
Anything	4
None	2
Specific band, artist, song	15

N=112

Table 9

Specific Music Preferences – Vigorous Aerobic Exercise

Response Category	N
Genre	
Pop	26
Country	10
Dance/Electronica	18
Alternative	10
Rock	16
Rap/Hip-Hop	45
R&B	17
Heavy Metal	6
Punk	3
Dubstep	2
New Age	1
Gospel/Religious	6
Music Quality	
Fast pace/up-tempo	24
Strong lyrics or instrumentation	7
Music that is happy or motivational	3
Pandora	4
Same as another exercise condition	2
Distracting from the exercise	2
None	2
Specific band, artist, song	12

N=112

Table 10

Specific Music Preferences – Vigorous Resistance Exercise

Response Category	N
Genre	
Pop	23
Country	9
Dance/Electronica	10
Alternative	5
Rock	28
Rap/Hip-Hop	50
R&B	14
Heavy Metal	9
Punk	1
New Age	1
Gospel/Religious	4
Music Quality	
Fast pace/up-tempo	25
Strong lyrics or instrumentation	4
Music that is happy or motivational	7
Pandora	3
Same as another exercise condition	8
None	3
Specific band, artist, song	14

N=112

Table 11

GLTEQ – Strenuous Physical Activity

Response Category	N
Aerobic	66
Running	55
Cycling/Biking	9
Swimming	7
Elliptical	13
Jumping Rope	1
Vigorous Walking	6
Anaerobic	39
Sprinting	6
Weight Training	32
Power/Olympic lifting	4
CrossFit	3
Conditioning	10
Sport Participation	42
Group Exercise Class	2
Mindfulness-based exercise (yoga, Pilates, etc.)	3
Non-specific gym workout	3
None	4
Uncodable	1

N=112

Table 12

GLTEQ – Moderate Physical Activity

Response Category	N
Aerobic	71
Running/jogging	36
Cycling/biking	17
Swimming	5
Elliptical	3
Jumping rope	1
Vigorous walking	33
Anaerobic	40
Weight training	33
Bodyweight exercises	9
Conditioning	2
Sport Participation	31
Group Exercise Class	2
Mindfulness-based exercise (yoga, Pilates, etc.)	5
Non-specific gym workout	5
None	2
Activities of daily living	3
Exercise videos	2

N=112

Table 13

GLTEQ – Mild Physical Activity

Response Category	N
Aerobic	75
Light jogging	10
Cycling/biking	5
Swimming	2
Walking	68
Anaerobic	16
Weight training	10
Bodyweight exercises	6
Intervals	1
Stretching	27
Sport Participation	8
Activity as part of a class	1
Mobility exercises	1
Activities of daily living	24
Mindfulness-based exercise (yoga, Pilates, etc.)	14
Non-specific gym workout	1
None	5
Foam Roll	1

N=112