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Music as an Ergogenic Aid During Resistance Training in an Adult Population: A Pilot Study

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RESISTANCE TRAINING, MUSIC, AND MOTIVATION

CONCORDIA UNIVERSITY, ST. PAUL

ST. PAUL, MINNESOTA

COLLEGE OF KINESIOLOGY

Music as an Ergogenic Aid During Resistance Training in an Adult Population:

A Pilot Study

A GRADUATE PROJECT

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements

for the degree of

Master of Science in Exercise Science

by

David Boulais

St. Paul, Minnesota

Summer 2023

Acknowledgements

I would like to thank the faculty of this great Exercise Science program. The collaboration and feedback have been very helpful for my development and advancement in this field. Throughout my time in this graduate program, I have made an effort to reach out to all of the professors to ask questions related to my efforts of making a career change into the field of Exercise Science. I am very grateful for the extra support, advice, and suggestions I have received. I would especially like to thank Dr. Brenda Davies and Dr. Brian Serrano since I have had the most consultations with them and the insight, knowledge, and experience they have shared with me has been extremely helpful. Dr. Serrano has always made himself available to discuss future options I could pursue as well as great suggestions regarding my interests to continue on to a doctorate degree. Similarly, Dr. Davies has been instrumental in helping me finish this graduate program and preparing for the next steps in my career. I have many interests in this field so picking a capstone topic was a bit challenging. In fact, I originally had a completely different topic and research design developed. However, once I realized it would not be possible to carry out an actual research study with my original topic, I decided I would rather postpone my graduation and find a topic that I could conduct a research study. Thanks to the support and patience of Dr. Davies, I was able to create a great second research design, conduct an online study, and accomplish all of my goals I set out when I first enrolled in this graduate program. I look forward to future collaborations as I hope to continue to advance my career in the field of Exercise Science.

Dedications

I would like to thank the support I have received from my family, especially my wife Carmen. When we first started out on this journey of a career/life change around 5 years ago, I knew I was not happy with my current life situation, and something was missing from my life professionally. After many years of volunteering for different organizations and researching different schools and programs, it finally dawned on me that even though I have a lot of different interests, fitness, exercising, and nutrition were my main passions. Therefore, with the support of my wife, we began embracing the concept of following our passions which has led me to this graduate program. We both decided that we would not settle but make a conscious effort to live our lives with purpose and this graduate program is a wonderful milestone to accomplishing that goal. While this concept may seem obvious, it took me many years to figure this out and I hope this also serves as an inspiration for others so they know it is never too late to start over and go for your dreams.

Abstract

Music has been found to produce feelings and emotions of power, reduce physical pain, and manage mood and affect. Ergogenic aids are regularly used in the resistance training (RT) setting to help improve performance. While the ergogenic effects of music are widely documented in aerobic exercise, research is lacking in the RT setting. The aim of this study was to examine the possible ergogenic benefits of music during RT workouts. Twelve individuals (mean age in years 49.8 ± 17.5 years) participated in the present online study, with nine female participants (mean age in years 48.2 ± 17.7) and three male participants (mean age in years 54.3 ± 22.0). All participants performed RT training exercises while listening to three music conditions: general music (GM) playlist, self-selected (SS) music playlist, and empowering music (EM) playlist. Participants then completed online surveys where they rated different aspects of their workouts such as motivation, enjoyment, and focus on a scale of 1 to 4 (1 = terrible, 2 = bad, 3 = good, 4 = great). The playlists with the highest mean ratings included the SS playlist for quality of workout (3.50 ± 0.52), the GM playlist for enjoyment and motivation (3.58 ± 0.52 and 3.50 ± 0.52 , respectively), and the GM playlist (3.42 ± 0.52) and SS playlist (3.42 ± 0.6) for focus. In conclusion, music may have functioned as an ergogenic aid in RT workouts by increasing the quality of the workout, improving motivation, focus, and enjoyment, reducing the rate of perceived exertion, and creating a dissociation effect during the exercises. The practical applications of this study can be applied to a variety of RT exercisers ranging from the general population all the way to elite sports athletes.

Keywords: *ergogenic, motivation, resistance training, music*

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Chapter 1: Introduction

Athletes, both recreational and professional, are continuously looking for ergogenic aids to gain a competitive advantage to improve their health and optimize their physical and sports performance (Wax et al., 2021). Vicente-Salar et al. (2020) described ergogenic aids as training methods, mechanical devices, nutritional or pharmacological approaches, or psychological techniques that can improve exercise performance capacity and/or improve training adaptations. Nutritional ergogenic aids can be supplements taken orally containing ingredients intended to complement an individual's diet such as adding vitamins or minerals that may be lacking or insufficient. Additionally, ergogenic aids can range from anabolic-androgenic steroids (Hackett et al., 2013) or creatine (Kreider & Stout, 2021) to menthol (Barwood et al., 2020; Stevens & Best, 2016), carbohydrates (Cermak & van Loon, 2013), and/or caffeine (Vicente-Salar et al., 2020). There have been numerous studies conducted that support the positive benefits of nutritional ergogenic aids in exercise performance (Clarke et al., 2018; Naderi et al., 2016; Woessner et al., 2018); however, this may not be sustainable for many people over the long run in terms of monthly costs.

Music has also been suggested as an ergogenic aid for exercise. Music can have a very influential effect on humans and is utilized in all aspects of an individual's life (Kraus et al., 2015). Humans start to process music when they are in their mother's womb and listening to music is more popular than reading and watching television or movies, thus demonstrating the importance and relevance of music (Hsu et al., 2015). Furthermore, listening to music has been utilized to help individuals enhance learning and motivation in school as well as improve quality and performance in the workplace (Hsu et al., 2015). Music can even elicit psychological and

physiological responses such as managing mood and affect (Hallett & Lamont, 2017), reducing an individual's physical pain, decreasing negative symptoms of illnesses, and provoking feelings of power (Hsu et al., 2015). Furthermore, music has often been utilized by exercisers to increase enjoyment in their workouts (Hallett & Lamont, 2021).

Therefore, it would be reasonable to want to take advantage of the potential influential effects of music for exercise training. One reported benefit of listening to music with resistance training (RT) pertains to the rate of perceived exertion (RPE). Patania et al. (2020) conducted a study with 19 women who engaged in both high-intensity and endurance exercises. The participants performed the leg press exercise at 80% one repetition maximum (1RM) and also walked on a treadmill. At the end of the study, Patania et al. (2020) concluded that music could be considered an important tool in stimulating people engaging in physical exercise by improving performance and reducing the RPE during exercises. This was likely accomplished because music has an effect on the entire brain by influencing emotional responses, helping with automatic movements and coordination, and aiding in the organization and planning of movements (Patania et al., 2020).

Similarly, Silva et al. (2020) conducted a study involving 20 young men to see what impact music had on RPE while performing lat-pulldowns. The researchers included three listening conditions: preferred music, nonpreferred, and no music. Silva et al. (2020) found that listening to music, primarily preferred music, decreased the individual's RPE by producing a psychophysical effect on the perception of fatigue or by creating a dissociative effect during the exercises.

However, not all studies successfully report a reduction in RPE during RT. Biagini et al. (2012) conducted a study with RT exercises such as bench press to failure and they also incorporated plyometric exercises, such as squat jumps, while listening to music. The music conditions were no music and self-selected music. The participants were 20 collegiate men and the study produced mixed results regarding RPE. The bench press exercises did not produce any changes in RPE; however, the RPE following the squat jumps was greater for the group that did not listen to music when compared to the self-selected music group (Biagini et al., 2012). Albeit squat jumps may be considered to be more classified as plyometrics than true RT. Regardless, RPE was not improved by music while performing the bench press exercises in this study.

In addition to RPE, strength, power, and explosiveness are all important aspects of an RT workout. Silva et al. (2020) noted that listening to preferred music helped produce better strength training results. Biagini et al. (2012) reported similar results in that listening to self-selected music increased performance during explosive exercises and also found it to increase peak anaerobic power. The researchers, therefore, recommended the ergogenic effect of music during acute, high-intensity exercises. The mechanisms that likely are occurring are alterations with the association between central motor drive, central cardiovascular command, and perceived exertion, thus contributing to prolonged exercise durations at higher intensities along with a quickened heart rate recovery (Maddigan et al., 2018).

Another study examined the use of music with RT exercises in reference to strength endurance and maximal strength. Bartolomei et al. (2015) evaluated 31 resistance-trained men who completed bench press exercises at 60% 1RM to failure. Interestingly, music had no effect on maximal strength, but it did on strength endurance. When compared to the control group who did not listen to music, strength endurance was 5.8% higher for the group who did listen to

music. This was equated to one extra repetition in the bench press due to the ergogenic benefits of music (Bartolomei et al., 2015).

Similar results were recorded in another study involving maximal strength and strength endurance utilizing squat and bench press exercises. Moss et al. (2018) recruited 16 resistance-trained males with an average age of 22 years old to participate in the study. Explosive power was measured at 30% 1RM while progressive overloads included 60, 70, and 80% 1RM. Moss et al. (2018) found that explosive power exercises remained unchanged with the different music selections but repetitions to failure at low to moderate intensities were improved by music, especially with self-selected music.

During exercise, an individual can come across a variety of music settings. People can also bring their own personal music devices and smartphones permitting gym goers to have a great opportunity to select their own music. Kraus et al. (2015) conducted a study where they looked at how people listen to music and found that people were much more receptive when listening to music on personal devices, which promoted motivation, arousal, and engagement in activities. Ballmann (2021) also conducted a review examining music preference during exercise and concluded that nonpreferred music, music that the individual cannot choose, was deemed the least favorable and that preferred, or self-selected music, was the resounding preference of individuals, resulting in the most ergogenic effects during exercise.

It is important to consider not only the tempo of the music but also the quality of the song lyrics. Although the research is limited, incorporating songs with empowering and motivational lyrics could possibly aid the exerciser in engaging in positive self-talk. Psychological techniques and self-talk strategies have been promoted by coaches and athletes to enhance sports

performance, build confidence, sustain motivation and focus, and improve technique (Nedergaard et al., 2021; Shannon et al., 2012; Thelwell et al., 2008; Vargas-Tonsing et al., 2004). Therefore, the ergogenic effects of music could be arguably enhanced when the song contains lyrics that could promote positive self-talk.

Contributing to the debate as to whether or not music can produce ergogenic effects, Brupbacher et al. (2014) alleged that trained individuals do not profit from music as do untrained individuals. Brupbacher et al. (2014) reported that highly trained individuals choose an associated attention style focusing on inner perceptions of exertion. The researchers went even further to state that not only does music fail to provide ergogenic effects during resistance training, but that music can actually be a hindrance for highly trained individuals. This statement highlights the importance that more research is needed on the topic of the ergogenic effects of music during RT, especially with trained individuals.

There are some gaps in the literature regarding music and its ergogenic effects on exercise performance. The literature states that exercisers prefer and perform at their best when they utilize self-selected music (Ballmann, 2021; Ballmann et al., 2019; Ballmann et al., 2020; Bartolomei et al., 2015; Biagini et al., 2012; Moss et al., 2018; Rasteiro et al., 2020; Silva et al., 2021; Stork et al., 2015). However, these songs may not include very meaningful or empowering lyrics. If a study did examine the ergogenic effect of music during resistance training, many of the studies focused primarily on listening to music before exercising or during the warmup period of competition (Arazi et al., 2015; Ballmann et al., 2020; Ballmann et al., 2021). Also, the majority of the studies examining ergogenic aids in an exercise setting primarily included males, thus females have far less of a representation. Moreover, there have been multiple studies conducted on the effect of music on cardiovascular and aerobic exercise (Ballmann et al., 2019;

Calik-Kutukcu et al., 2016; Carlier et al., 2017; Clark et al., 2018; Dyer & McKune, 2016; Hutchinson & Karageorghis, 2013; Jebabli et al., 2020; Lopes-Silva et al., 2014; Maddigan et al., 2019; Rasteiro et al., 2020; Sanchez et al., 2014; Stork et al., 2015; Suwabe et al., 2021; Terry et al., 2020), and while there is significant research that supports the use of music as an ergogenic aid, the studies including resistance training are lacking.

Purpose Statement

The primary purpose of this study is to examine what impact music has on motivation, arousal, focus, and reported enjoyment during exercises during resistance training activities. A secondary purpose of this study is to identify if a preselected music playlist that includes powerful, positive statements can help individuals have a better workout session (as self-reported by the participants as having more enjoyment, motivation, focus, and a better quality of workout) than the other playlist options. The independent variable within this study is the type of music and the dependent variables are the perceived quality, enjoyment, motivation, and focus of the individuals during their exercise bouts.

There are also two hypotheses for this study. One hypothesis is that when individuals listen to music in a resistance training setting, they will experience heightened motivation and focus, which in return will lead to a more enjoyable and productive workout session. Furthermore, the second hypothesis states that if an individual is given a music selection that can better elicit an appropriate exercise-related emotional response (i.e.: empowering lyrics in a song), their motivation and enjoyment will increase as well, thus improving their perceived quality of the workout. Therefore, even though self-selected music has reportedly been the preferred option for exercisers, it is predicted that when the individual is presented with a more

purposeful gym music playlist, they will experience an enhanced psychological response than that which is produced by the self-selected music. To the best of our knowledge, this is the first study to incorporate empowering music with resistance training and to also attempt to produce increased motivation and enjoyment with a preselected (nonpreferred) empowering music playlist versus general and self-selected music.

Conclusion

As coaches, athletes, and recreational exercisers alike look to gain a competitive advantage in training performances, there continues to be a need to research the beneficial effects of ergogenic aids. Nutritional ergogenic aids can get costly over time so this may not be sustainable for many individuals. Music provides a realistic and affordable option and has been linked to increased enjoyment, decreased RPE, enhanced motivation, and increased workout intensity. This, in return, could support the notion that an individual would be more successful in their fitness and health goals.

Chapter 2: Methodology

Participants

A total of 12 adults (mean age in years 49.8 ± 17.5 years) were included in this study, with nine females (mean age in years 48.2 ± 17.7) and three males (mean age in years 54.3 ± 22.0). Participants were both English and Spanish-speaking adults over the age of 18 years old. The participants had a minimum of three years' experience in resistance training. The participants were initially recruited via word of mouth and Concordia University, St. Paul (CSP) communication forums. After about a month into the study, due to the lack of a substantial number of participants, flyers approved by the Institutional Review Board (IRB) were also disseminated throughout the CSP school campus and local gyms in the Twin Cities area to further recruit participants. Participants were excluded if they had any injury that would have impacted their resistance training performance and if they had any hearing impairments that could impact their ability to listen to music successfully for the study. This study was only open to United States residents only. The study was conducted from August 2022 to November 2022.

Instruments

Seven surveys were created on Google Forms to collect the data necessary for this study, such as inclusion criteria, informed consent, demographics information, feedback surveys for each of the three music playlists, and a final survey after the completion of the online study. The Google Forms surveys were first created in the English language and then translated into Spanish by the lead researcher. This resulted in a total of 14 surveys created for data collection.

For the creation of the music playlists, the research team sampled workout playlists that were created on YouTube, Spotify, Pandora, and Amazon Music. Three playlists were created:

(a) self-selected music (SS), (b) general music that might be played in a gym (GM), and (c) preselected, empowering music (EM). Many previous studies included a control group that did not listen to music. For this study, the GM playlist was meant to represent control conditions. To create the GM playlist, songs were randomly taken from the workout playlists on the above-mentioned music generators, making sure the songs did not contain any obvious motivational or empowering lyrics. Some of the more popular genres represented in the playlists were Rap/Hip Hop, Rock, Pop, and variations of Dance and Techno. Similarly, with the EM playlist, the same genres incorporated in the GM playlist were chosen, but only songs were chosen if they contained some type of empowering or motivational lyrics repeated throughout the song. For the SS playlist, the participants were informed that they could choose whichever songs they wanted to listen to during their workouts. The playlists for the GM and EM playlists are represented in Table 2 and Table 3.

Procedures

All processes and procedures of this study were reviewed and approved by CSP advisors and the IRB, which has adopted the Collaborative Institutional Training Initiative (CITI) to ensure the protection of human research participants. Once participants met the inclusion criteria and the consent forms had been digitally signed, emails were sent out to the participants to start the study. The participants were informed of the purpose of the study, any possible risks to participants, and the possible benefits of participation in the study. Participants entered this study voluntarily and were informed that they could leave the study at any point without any explanation or consequences.

All of the forms and surveys were sent to the participants via email. The participants were allowed to choose if they preferred to complete the surveys in English or in Spanish and they were also allowed to complete the surveys on whatever device they preferred, such as computers, smartphones, etc. Each survey consisted of a total of 11 quantitative and qualitative questions. All 12 participants engaged in both the qualitative and quantitative aspects of the study. The quantitative data collection consisted primarily of a 4-point Likert scale rating. The participants in the present study were asked to rate on a scale of 1 to 4 (1 = terrible, 2 = bad, 3 = good, 4 = great) different aspects of their workouts such as motivation, enjoyment, and focus. For the qualitative data collection, participants were asked to answer open-ended questions to provide further information for the study. The questions consisted of topics such as what type of resistance training exercises they performed, the equipment used during the workout, body parts exercised, and general feedback on their experience during the study. A total of three follow-up emails were sent to participants as necessary.

Participants were subjected to all three listening conditions (playlists) during resistance training with the order of the playlists randomized via a free online website called calculatorsoup.com. The orders of the playlists were randomized in an attempt to avoid any participant or order bias as the individuals progressed throughout the study. A log was created to keep track of participants where the participants were connected to subject numbers in relation to the order that they entered the study (i.e.: the first participant to respond to the study inquiries was given the subject number 01). The participants were informed to do similar weekly workouts (i.e.: if they did lower body for the first week, they should continue to do lower body for the next two workouts). Each week, the participants were randomly sent different playlists and the survey that pertained to that playlist. Participants were asked to complete their regular weekly workouts,

listen to the playlist chosen for that week, and then complete the post-workout survey. After week three, the participants were also sent a final survey to wrap up the study.

Design -& Statistical Analysis

Descriptive statistics were included in this study. The frequencies were described by identifying the number of male and female participants. The ages of the participants were counted, and the mean age was calculated. An alternative hypothesis was used since it is expected that the independent variable (music type) will influence the dependent variables (rate of perceived quality, enjoyment, motivation, and focus during workouts). The data were categorical since the study looked at differences between groups and discrete since the study only looked at the end results of the surveys, which are numerically based on a 4-point Likert scale. For statistical significance, the study compared the experimental conditions with the control conditions. A one-way analysis of variance (ANOVA) was utilized and data were analyzed with IBM SPSS Statistics Version 28.0 (IBM Corp., Armonk, New York). The means and standard deviations were calculated.

Conclusion

This study was conducted with men and women over the age of 18 years. Online surveys were utilized at the beginning of the study to identify if the participants met the inclusion requirements of the study. The participants were given three different music playlists to listen to during their chosen workouts. Participants were educated on what procedures to follow, and the results were recorded in the post-workout surveys completed by the individuals. Participants entered this study on a volunteer basis, informed consents were completed, and participants had

the freedom to leave the study at any time if they chose. All ethical considerations complied with Concordia University, St. Paul's IRB requirements.

Chapter 3: Results

Data collection occurred over a span of a five-month period (between August 2022 and December 2022). Both quantitative and qualitative data were collected. Of the 23 individuals who enrolled in the study, 52% ($n = 12$) fully completed the study.

Data Presented

The present online study incorporated 12 individuals who were able to fully complete all three surveys. Of the 12 people, 75% ($n = 9$) were female and 25% ($n = 3$) were male. The ages of the participants ranged from 24 years old to 73 years old (mean = 49.8 ± 17.5 years). Caucasian participants represented 75% of the total participants ($n = 9$), 16.7% were Hispanic ($n = 2$), and 8.3% were Asian ($n = 1$). Of all the study participants, one participant was Spanish-speaking and utilized the surveys provided in the Spanish language. Separate Friedman's tests were conducted to determine if the music types influenced the quality, enjoyment, focus, and motivation of the workout.

Quantitative Data

Research Question: How would you rate the quality of your workout today?

The first research question asked the participants to rate the perceived quality of their workouts with the different music types. The participants rated the quality of their workout with the GM an average of 3.42 ± 0.52 which suggests that in general, the participants rated the quality of the workout as being good. A total of 58.3% ($n = 7$) of the participants rated the quality of their workout with the GM as a 3 (good) and 41.7% ($n = 5$) of participants rated it as a rating of 4 (great). The average rating of the quality of the workout with the SS was 3.50 ± 0.52 which also suggests that the participants rated the quality of their workout with the SS as being good. The average rating of the quality of the workout with the EM was 3.17 ± 0.84 which

suggests that on average, the participants rated the quality of the workout with the EM as good. Twenty-five percent ($n = 3$) of participants rated the quality of the workout with the EM as a 2 (bad), 33.3% ($n = 4$) of participants rated it at a 3 (good), and 41.7% ($n = 5$) of participants rated it a 4 (great). There were no significant differences between music types for the perceived quality of the workout session ($p = 0.41$).

Research Question: How would you rate your enjoyment of your workout session today?

The second research question asked the participants to rate the perceived enjoyment of their workout session with the different music types. The average reported enjoyment for the workout with the GM was 3.58 ± 0.52 indicating that their enjoyment was good. Approximately 42% of participants ($n = 5$) rated their enjoyment with the GM as a 3 (good) and 58.3% of the participants ($n = 7$) rated their enjoyment with the GM playlist as a 4 (great). The mean reported enjoyment for the workout with the SS playlist was 3.42 ± 0.67 which also suggests that this workout was good. The average rating of enjoyment for the workout with the EM was slightly lower at 3.08 ± 0.80 but this still represents a good enjoyment of the workout session. Twenty-five percent of participants ($n = 3$) rated their enjoyment of the workout session with the EM a 2 (bad), 41.7% of participants ($n = 5$) rated it as a 3 (good) and 33.3% ($n = 4$) rated the enjoyment as a 4 (great). There were no significant differences between music types for the enjoyment of the workout session ($p = 0.27$).

Research Question: How would you rate your motivation during your workout session today?

The third research question pertained to the participants' level of motivation during their workout sessions. The average reported motivation for the workout incorporating the GM playlist was 3.50 ± 0.52 revealing that their motivation was good. Half of the participants ($n = 6$) rated their motivation during the GM workout as a 3 (good) and the other half ($n = 6$) gave a

rating of 4 (great). The average reported motivation with the SS playlist was 3.33 ± 0.19 indicating their motivation was good. The motivation levels of the SS playlist were rated as 41.7% (n = 5) with a 4 (great), 50% (n = 6) with a 3 (good), and 8.3% (n = 1) with a 2 (bad). The mean reported motivation with the EM playlist was 3.08 ± 0.90 which suggests the motivation during the workout was good. For the EM playlist, 41.7% (n = 5) rated their motivation during the workouts as a 4 (great), 25% (n = 3) gave a rating of 3 (good), and 33.3% (n = 4) gave a rating of 2 (bad). There were no significant differences between music types for the enjoyment of the workout session ($p = 0.48$).

Research Question: How would you rate your focus during your workout today?

The fourth research question asked the participants to rate their focus during the workout. The mean reported focus during the workout with the GM playlist was 3.42 ± 0.52 showing that the focus was good. For the GM playlist, 41.7% of the participants (n = 5) gave a rating of 4 (great) and 58.3% (n = 7) gave a rating of 3 (good). The average reported focus for the SS playlist was 3.42 ± 0.67 . Of the total participants, 50% (n = 6) rated their focus during the SS workout as a 4 (great), 41.7% (n = 5) rated it as a 3 (good), and 8.3% (n = 1) the focus as a 2 (bad). Lastly, the mean reported focus for the EM workout was 2.92 ± 0.79 indicating that the focus of the workout was right on the cusp of good and bad. For the EM playlist, 25% of the participants (n = 3) rated their focus during their workout as a 4 (great), 41.7% (n = 5) gave a rating of 3 (good), and 33.3% (n = 4) gave a rating of 2 (bad). There were no significant differences between music types for focus during the workout session ($p = 0.25$).

End of Study Research Questions: Which workout session would you rank gave you the most motivation/energy during the exercises, which workout session would you rank gave you the most focus during the exercises, and which workout session would you rank for the best overall experience/performance during the study?

The research questions on the final survey requested participants to pick their favorite music playlist in different areas of interest. When asked to pick the playlist that provided the most motivation and energy during the study, 41.7% (n = 5) chose the EM playlist, 33.3% (n = 4) chose the SS playlist, and 25% (n = 3) chose the GM playlist. For the playlist that provided the most focus, 41.7% (n = 5) picked the EM playlist, 41.7% (n = 5) picked the SS playlist, and 16.7% (n = 2) picked the GM playlist. Finally, when asked to pick the overall best playlist, 41.7% of the participants (n = 5) chose the SS playlist, 33.3% (n = 4) picked the GM playlist, and 25% (n = 3) voted for the EM playlist.

Qualitative Data

Research Question: Were there any moments during your workout you felt heightened enjoyment/motivation/focus?

Multiple participants commented on moments of heightened emotions during their workouts with the GM playlist. One participant attributed the heightened emotional response to the beat of the music and responded to the research question by stating, “Yes, during certain upbeat songs.” Other participants added, “I felt renewed need for movement expression because of the music intensity”, “I feel the music helps with the enjoyment and motivation of my workouts”, and that one individual “did extra reps in songs I really enjoyed.” Another participant described that they were able to utilize the music during a rest period to regain motivation during their workout. The individual noted:

During the core portion of the workout, alternating V-ups was like our rest period in our circuit, so the music hit more as I was about to focus more in on the song playing and just enjoy it and regain motivation to start the new round.

The SS playlist also received comments of heightened emotions, specifically enjoyment. Many individuals reported “heightened enjoyment when a song I really liked came on”, “...when you like the music you listen to I think it makes your workout more enjoyable”, and “I felt heightened enjoyment during the warm-up portion of my workout. [I] felt the music I selected elevated my mood and made me excited for the workout.” Another participant stated that the joy of listening to the SS music helped them throughout their workout and also with doing more repetitions. The individual commented:

The beat/tempo of the music helps the workout. The barbell pumping tends to match the beat of the music and I can do more reps than I can do when there is no music. There is joy/pleasure derived from the music, so it is a diversion away from boring repetitions with the exercise.

Comments from the EM playlist were primarily directed toward feelings of motivation and enjoyment. However, most of the comments were directed toward the beat and tempo of the songs and not the lyrics. When asked about heightened emotional responses to the music, participants’ comments included, “Yes, the upbeat techno music got me more motivated to continue my set”, “Yes to enjoyment/motivation based on beat”, and “This workout was a practicing my weaknesses in exercise movements so wasn’t really structured. But the music tempo actually made me keep going.” Other comments were recorded in reference to motivation such as, “I felt the music motivated me and made my workout more enjoyable” and one participant commented on a sensation of a reduction in RPE. The individual shared:

I found the music especially the beat helped me to do more reps, and for a few machines I was able to increase the weight I used. I also did not feel it took as much effort to do my typical weights for some of the machines.

Research Question: Were there any moments of your workout where you were going to finish a set or stop your workout, but you decided to continue on?

Only a couple of participants provided responses to this research question for the GM playlist. One individual stated, “Yes – I did extra reps to finish songs – i.e. did extra reps for the music because music was great.” Another participant reported on being able to push through challenging times of their workout and reported:

Yes, the second half of my workout was upper body focused and it was very difficult to finish final reps since I was sore from a previous lift. I enjoyed the music selection and there were several songs I have not previously heard, so focusing on the beat and lyrics helped me push through the difficult sets.

The SS playlist also did not receive many responses when asking if the music helped participants get through challenging moments of their workouts or if they received any boosts of energy during the workout. One individual did note that they were able to receive an emotional boost from the music they chose for the study. The individual wrote, “Yes. I was using a Pandora mix of my favorite subject matter. Certain driving songs continued to play, so I did more exercises than I would have normally.”

When examining the EM playlist, similar to the GM playlist, a few participants reported extending their workout longer than they had anticipated due to the music. Some general comments were recorded such as one individual stating the “length of the playback helped” and another participant divulged the urge to stop the workout early but that the individual “managed

to continue”. However, more direct comments were received such as “Yes, did find I did extra sets for a few machines” and “Yes, [I] did more exercises to keep going unto the end of the song.”

Research Question: Please provide any further comments you may have regarding the music and/or your workout session.

For each playlist, a final, general feedback question was proposed to the participants. Many participants stated some general commentary such as they liked the music incorporated in the GM playlist and one individual stated they were going to use some of the music they listened to in future workouts. One participant commented that after getting accustomed to the songs, the playlist helped them “to push through my workout session”. Another individual noted that they liked the music which helped make the workout more “enjoyable”, but they primarily liked the fact that the lyrics were simple and did not cause “distractions trying to figure out what the song was saying”. Similarly, another participant discussed that music caused dissociation from fatigue and discomfort. The participant stated:

I did not know a lot of these songs on the playlist which I actually enjoyed. My attention was more focus on the music since I didn't know the songs which helped me enjoy my workout a bit more as I wasn't focusing so much on fatigue or sore muscles.

SS playlist comments continued to have some general comments such as “music makes my workouts more enjoyable”. However, more specifically to this playlist option, more direct comments included, “I cannot workout in quiet, so choosing a playlist that just kind of keeps up with my workout intensity helps drown the thoughts of wanting to quit or stop working out if I'm too tired.” Another participant had rated the other playlists lower because this individual

preferred more culturally and ethnically relevant music while exercising. For the SS playlist, the participant reported, “This type of music genre [previously described as urban music from Latin American artists] motivates me when I am working on my upper body. The rhythm of the music motivates me and gives me energy.”

The EM playlist received mixed reviews. Two individuals reported how they did not like the EM playlist and that they felt like they were being “yelled at” or that the music was “aggressive” and “dark”. Another participant made another interesting observation. While this individual did notice and make direct reference to the lyrics, the individual felt that music with motivational or empowering lyrics would be better for “younger or a less seasoned athlete”. The individual went on to add:

I had previewed the empowerment music. The lyrics and beats were motivational. I don't believe there was an effect on my workout motivation. However, I could see where the music would energize a younger or a less seasoned athlete. After 40 years of work outs, I know my abilities and limitations, I don't need any psychological push to get that extra rep or add that extra weight. I do it because I am disciplined. My focus is on form, breathing, resting appropriately between lifts etc. My goals are to steadily gain or maintain levels of fitness.

Additionally, others stated that for the songs they found enjoyable, the music motivated them during their workouts. One participant reported that “The music actually got me a bit more motivated in the beginning of my workout. There were a couple songs that I really enjoyed and ended up downloading. But the fast tempo helped keep the energy up to keep practicing exercise movements.” Another individual noted the ergogenic effects of the EM playlist and commented:

Although I don't typically listen to the type of music in this playlist, I did find I enjoyed it while doing my workout and felt like doing more reps. It also felt like I could lift my typical weights with more ease and I felt like doing more sets. I think I will change the type of music I use for doing strength training.

Tables and Figures

Table 1: Subject Characteristics

	Male (n = 3)	Female (n = 9)	Total (n = 12)
Age (Years):	54.3 ± 22.0	48.2 ± 17.7	49.8 ± 17.5
Ethnicity:			
Asian:	0	1	1
Caucasian:	2	7	9
Hispanic:	1	1	2

Note: Data regarding age are presented as means and SD

Table 2: EM Playlist

Song:	Artist(s):
Ain't Gonna Stop Me	Konata Small
A\$AP Ferg ft. Future - New Level (Encore Trap Remix)	Kunio Urameshi
Believe	DJ Anime
Born To Rule	UNSECRET & Vo Williams
Going for Greatness	Future Royalty
Greatness	Vo Williams
Heart of a Lion	Dubkiller & Mark Victor
Higher	UNSECRET & Vo Williams
Hustler	Skam & El Speaker
I Am	Fearless Motivation feat. Alpha
I Am the One	Vo Williams & DJ Ricky Luna
I'll Fight Back	Sullivan King
Invincible	Deadly Guns
Legends	Cesqueaux feat. Kalibwoy
Level	Kai Wachi
Never Stop	Hidden Citizens & Jung Youth
Nightcore - Unstoppable - TroyBoi	Nightcore Heaven
No Fear	Konata Small
Nothing I Can't Do	Tedashii feat. Lecrae & Trip Lee

Table 2: EM Playlist (continued)

Song:	Artist(s):
Stronger (HVRDKICK XTRA RAWTRAP REMIX)	Malice
Stronger & Better	Radical Redemption
Struggle Made Me Stronger	Fearless Motivation feat. Alpha
Superhuman	Vyceroy & Beacon Light
The Best	Future Royalty
The Strongest	Cesqueaux
Undefeated	KB feat. Derek Minor
Unstoppable	Deetox & Delete
Unstoppable	For The Fallen Dreams
Unstoppable	Windsor
Until I Win (Radio Edit)	Radical Redemption
Work	Apashe feat. Vo Williams
Your Dreams	DJ Anime

Table 3: GM Playlist

Song:	Artist(s):
123 (Dolly Song)	Imanbek feat. Karma Child
1x1	Galantis
21 Reasons	Nathan Dawe feat. Ella Henderson
abc (The Wild Remix)	GAYLE
Bad Habits	Ed Sheeran
Bones	Imagine Dragons
Break Up	twocolors & Pascal Letoublon
CTRL + ALT + DEL	Rêve
DO IT TO IT	Arye, Raven, & Kreyn feat. Dsnt Matter
Dynamite	Sean Paul feat. Sia
Give It To Me	Lucky Luke
Green Green Grass	George Ezra
Hard 2 Forget	Steps
How Long	Tove Lo
I See	Richard Orlinski, Nicky Jam, Tory Lanez feat. Dawty Music, Jon Z, & Preston Harris
Maybe You're The Problem	Ava Max
Numb	Marshmello & Khalid
One By One (Radio Edit)	Club Soda
Squid Games (Let's Play)	Alok
Summer In New York (Öwnboss & Fancy Inc Remix)	SOFI TUKKER
Sunshine	One Republic
Tell Me You Love Me	Cheat Codes
The Best Part of Life (Imanbek Remix)	SAINt JHN
The Motto	Tiësto & Ava Max
This Is What You Came For	Calvin Harris feat. Rihanna
Titans	Major Lazer feat. Sia & Labrinth
What A Night	Flo Rida
When I'm Gone	Alesso & Katy Perry

Chapter 4: Discussion (Conclusions and Practical Applications)

The present study used a mixed methods approach to understand the various emotional and physiological responses to different types of music during resistance training (RT) exercises. Trained, healthy, male and female adults residing in the United States participated in this study. The different emotional and psychological responses examined during this online study included the perceived quality of workouts, as well as increased motivation, enjoyment, and focus during exercise. The study included preselected and self-selected music.

Our findings were similar to the literature regarding how music, in general, can decrease the rate of perceived exertion (RPE). For example, Ballmann (2021), Patania et al. (2020), and Silva et al. (2020) reported that the ergogenic aids from music could be examined in terms of improved performance and reduced perception of fatigue and exertion through dissociation and distraction during exercise. Participants in the current study reported all of these benefits through being able to do more repetitions and sets, a notion of being distracted from performing mundane exercises, and a sense of reduced fatigue and exertion. This was expressed by participants reporting being surprised that they could do more exercises or that their regular exercise routine felt easier than their normal workouts.

Ballmann (2021) found that improvements in performance could also be linked to improved mood and exercise enjoyment, which was also seen in the current study. Multiple participants in the present study reported these same improvements in mood, motivation, and enjoyment. Similar to the reduced RPE, participants reported improved exercise performance such as being able to do more repetitions and sets during the workouts; however, this time participants reported the increased exercise performance not because of dissociation, but because of increased enjoyment derived from the music playlists. This increase in reps and sets were

reported equally with all three playlists. All three playlists received the majority of the ratings of “good” or “great” when asked to rate the quality, enjoyment, and motivation during workout sessions. Regarding quality, enjoyment, and motivation, 100% of the GM playlist ratings were either “good” or “great”, 94.5% of the ratings for the SS playlist were either “good” or “great”, and 72.2% of the ratings for the EM playlist regarding quality, enjoyment, and motivation were either “good” or “great”. When asked to rate the playlist that produced the best overall motivational and energetic effects during the study, the EM playlist was rated the best with 41.7% of the votes, the SS playlist was second with 33.3% of the votes, and the GM playlist was ranked the third best with 25% of the votes. Therefore, for the best overall quality, enjoyment, and motivation, the GM playlist was rated the best, the SS playlist was the second best, and the EM playlist was the third best. Strictly examining motivation and energy received from the music, the EM playlist was rated the best, the SS playlist was the second best, and the GM playlist was the third.

Focus was another concept measured in this online study. Thelwell et al. (2008) reported increases in focus in athletes when engaged in psychological skills such as positive self-talk. One of the reasons for incorporating music with empowering and motivational lyrics was an attempt to get the participants to engage in positive self-talk. When asked to rate their focus during the workouts, 100% of the participants rated their focus during the GM playlist as “good” or “great”, 91.7% of the participants rated their focus during the SS playlist as “good” or “great”, and 66.7% of the ratings for the EM playlist were “good” or “great”. However, when asked to rate which playlist gave participants the most focus during the RT workouts, the EM and GM playlists tied as the best with 41.7% of the votes, and the SS playlist came in last with 16.7% of the votes.

Therefore, regarding which music produced the best effects on focus, the EM and GM playlists were tied in votes for the best and the SS playlist came in last.

The present study utilized both preselected (nonpreferred) music provided by the researchers, such as the GM and EM playlist, and self-selected (preferred) music during RT workouts. While the topic is understudied, self-selected music has typically received preference over preselected music (Ballmann, 2021; Biagini et al., 2012; Moss et al., 2018; Silva et al., 2020) and the current study produced similar results. After completing all three workout sessions, participants were asked to rate which playlist they felt gave them the best overall workout. The SS playlist was rated the best overall playlist for RT with 41.7% of the votes, the GM playlist came in second with 33.3% of the votes, and the EM playlist was rated third with 25% of the votes. In conclusion, when asked to rate their favorite playlist overall throughout the entire study, the SS playlist was rated the best, the GM playlist was rated the second best, and the EM playlist came in third.

Another benefit of this study was that 75% of the participants were female. This is another aspect of the ergogenic effects of music during RT that is poorly represented. The majority of the previous studies on this research topic primarily included males and the data from female RT exercisers is lacking. When looking at the overall preference differences between the male and females, regarding which playlist was voted for the best motivation and energy, the three males all gave one vote to each of the playlists without having any majority winner. However, the female participants' majority vote (44%) was for the EM playlist as the best for invoking energy and motivation during their workouts. For the playlist that gave the most focus, the majority of the male participants (67%) voted the GM playlist as the best and the majority of the females (56%) voted the EM playlist as the best. Finally, for the best overall playlist for RT

workouts, the majority of the votes from the males (67%) were again for the GM playlist while the majority vote of the female participants (44%) was for the SS playlist.

Practical Applications

Music is an extremely important aspect of everyday life and people spend hours listening to it in a multitude of settings such as at home, at work, in the gym, in the grocery store, in shopping malls, and cafés and restaurants (Rentfrow, 2012). With the prevalence of music and the easy access to it with personal handheld devices and phones, music provides a convenient and affordable ergogenic aid that can be utilized during resistance training. The results of this study are beneficial since the ergogenic effects of music during resistance training is an understudied topic and data is lacking. Moreover, there are no current studies to date that have examined the ergogenic effects of music with empowering and motivating lyrics during RT. The data collected during this study will serve to shed some light on an underrepresented line of research to learn more about music preferences during RT and what type of impact empowering music can have during RT workouts.

This study also provided interesting anthropological information regarding habits and patterns of how people select and use music during RT, illustrating that some people may need help on how to select music for workouts. Many people ranked the SS music, the music they chose for the study, very low. Some individuals noted that they would use music generators that produced music they did not like very much. One individual noted that “most of the time I listen to music from Alexa and she doesn’t have a lot of the songs that I like.” It was also very interesting to see the participants’ reactions to their experiences during the study and how, once they started paying more attention to the music they are listening to during workouts, they began to change their mindset on how to choose music selections. Multiple participants stated that after

their participation in the current study, they felt their music selections were not the best options for RT exercises and that they felt the preselected music playlists provided for the study were better choices. One participant reported, “I need to get better music!” Another comment included:

I think the songs with a stronger beat gave me more motivation like the ones in your playlist. It was interesting to compare the workouts with the different types of music. The music from your playlist I think were better for workouts and until doing the survey and comparing music I never really realized it. I will keep this in mind when picking music for future workouts.

As mentioned, the current study had a good representation of resistance-trained females. The information collected during this study can help to provide more understanding of how music impacts the RT workouts with females and the feedback provided by the female participants. When asked to choose the best, preferred music playlist listened to during the study, the male responses went against the literature since they chose a preselected playlist. On the other hand, the female responses coincided with the literature since they chose the self-selected music, providing intriguing data result differences between the male and female subjects.

Limitations

This research topic can be very challenging since music is subjective to each individual and personal preferences can strongly influence the enjoyment and results of listening to music during workouts. The participants were given limited information about the music that would be utilized during this study and for the two preselected playlists, the participants were listening to the music for the first time during their workouts. As noted by some of the participants, they were distracted by some of the music because they were trying to understand what the lyrics

were saying and therefore, their focus and intensity suffered during the workouts. Similarly, some individuals noted that their favorite music genres were not represented in this study and this highly influenced their enjoyment and the perceived quality of the workouts.

It was decided to not include a control group or condition with no music since nowadays, whether individuals are exercising in a public place, such as a gym, or at home, the individual is likely to be listening to some type of music. The data provided from this online study revealed that 91.7% (11 out of the 12 participants) listened to music during their workouts. Therefore, a general workout music (GM) playlist was created to represent a control condition. However, surprisingly, the participants enjoyed the GM playlist more than anticipated and it was more difficult to compare the SS playlist with the EM playlist since the GM playlist was rated so well.

Another notable limitation of this study was the sample size. The design of this study was created to encourage the maximal number of participants. The study was provided with the convenience of completing it online, in any state in the United States, with the option of two different languages. Nonetheless, despite the best efforts of the researchers, only 12 individuals fully completed the study resulting in a very small sample size.

Yau et al. (2022) reported that adherence to exercise programs appears to be relatively low across a variety of conditions, with less than half of the participants adhering to the exercise programs. Furthermore, Morgan et al. (2016) warned that physical inactivity levels are rising with major implications for the prevalence of non-communicable diseases and how the World Health Organization has identified physical inactivity as the fourth leading risk factor for global mortality. Most of the participants reported improvements in motivation, enjoyment, quality of workout, and focus during the RT sessions due to listening to music. With music being a

successful ergogenic aid, people might be more successful in achieving their short-term and long-term exercise and health goals, thus possibly resulting in more participation in an exercise program throughout their lifetimes.

Recommendations for Further Research

One of the most important recommendations for future research would be to include a control condition where participants did not listen to music during a workout. This study had a generalized workout music playlist; however, it was rated very well throughout the entirety of the study. Therefore, since the participants enjoyed the control music so much, it made it much more difficult to interpret the results for the self-selected and empowering music.

An effort was made to give study participants full autonomy during this research study. Support and follow-up were provided as requested by the participants, but apart from that, the instructions and procedures were explained in the different emails and surveys and participants were left to complete the study on their own. However, the results would suggest that the individuals could have benefited from more support and coaching. Hardly any of the participants made any comments about the impact of the lyrics and the majority of the participants only reported comments about the beat and tempo of the music. Also, it was very intriguing to learn that the empowering music was described as “aggressive” and “dark”, so it is uncertain if there were any possible misinterpretations of the song lyrics. These types of observations of the results lead to the questions of how well did the participants listen to the lyrics during the EM playlist and did they really receive the intended benefits of the motivational, empowering lyrics that were meant to encourage positive self-talk such as “I’m going to be the strongest” or “I’m unstoppable”. Future studies could benefit from more coaching, supervision, and follow-up during the course of the study.

Another recommendation for future studies would be to have a prescreening interview or survey to obtain more information about the music genre preference of the participants. As noted in the limitations section, this online study had a very small sample size so any participant that enrolled in this study and met inclusion criteria was allowed to partake in the study. Should future studies have the luxury and time to do more prescreening surveys, the researchers could ask what genres the participants preferred and therefore, either exclude the individual if they picked a genre that would not be utilized in the study or make an effort to make sure that all of the music genres were represented in the study. This would be most beneficial with the preselected, empowering playlist and could result in a better understanding of the impact of motivational music during RT exercises.

Finally, future studies would benefit from a large sample size. Since this is an understudied research topic, it would be beneficial to have a larger sample size to observe how the different music playlists impact resistance training. It would be beneficial to continue to have a good representation of female participants but also to include as many diverse races and ethnicities as possible.

Conclusion

An abundance of research has supported the health benefits of resistance training for all ages including increased strength, hypertrophy, and a reduction in all-cause mortality (Fisher et al., 2017). Ergogenic aids can improve exercise and sports performance and are therefore regularly utilized by all types of people, from the general population to professional athletes. Therefore, implementing effective, practical, and cost-effective ergogenic aids, such as music, can aid a vast variety of individuals in their fitness and health goals. Our results from this study

found that music is effective in increasing the perceived quality, enjoyment, motivation, and focus during resistance training workouts.

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Tables:**Table 4: Quantitative and Qualitative Responses for Post-workout Surveys**

Subject Number and Playlist	Quality Rating	Enjoyment Rating	Motivation Rating	Focus Rating	Question 1: Were there any moments during your workout you felt heightened enjoyment/motivation/focus? Please explain. If not, please type "no".	Question 2: Were there any moments of your workout where you were going to finish a set or stop your workout, but you decided to continue on? Please explain. If not, please type "no".	Question 3: (optional) Please provide any further comments you may have regarding the music and/or your workout session.
01, GM playlist	4	4	4	4	Yes, during certain upbeat songs	No	(No response)
01, SS playlist	3	3	3	3	Heightened enjoyment when a song I really liked came on	No	N/A
01, EM playlist	3	3	3	3	No	No	(No response)
02, GM playlist	4	3	3	4	Towards the end I felt heightened	No	It was very different from what I'm used to listening to but I still managed to get into the music to push through my workout session
02, SS playlist	4	4	4	4	No	During the push ups. But I continued until I finished the set	I wasn't sure I was going to enjoy the second playlist so much
02, EM playlist	3	3	4	3	Yes, the upbeat techno music got me more motivated to continue my set	The workout I'm following requires 100 sit-ups. 100 squads and 100 push-ups. during the push up set I did want to stop but I managed to continue	some songs did slow my motivation so I changed them to the next to find a more upbeat music
04, GM playlist	3	4	3	3	I felt heightened focus at the start of my sets but as I began to fatigue I had to often remind	yes, the second half of my workout was upper body focused and it was	I plan on incorporating several of the songs in my own workout playlist

					myself to check my form, pacing, breathing, etc.	very difficult to finish final reps since I was sore from a previous lift. I enjoyed the music selection and there were several songs I have not previously heard, so focusing on the beat and lyrics helped me push through the difficult sets.	
04, SS playlist	4	4	3	4	I felt heightened enjoyment during the warm-up portion of my workout. I started off with some dynamic stretches and lightly jogging on the treadmill and felt the music I selected elevated my mood and made me excited for the workout.	no, I felt pretty consistent with motivation throughout the entirety of my workout	(No response)
04, EM playlist	2	3	2	2	Yes, during the compound set with KAS glute bridge straight into hip thrusts and a 10 second hold, I really focused on the music to match pace	No	(No response)
07, GM playlist	4	4	4	4	During the core portion of the workout, alternating V-ups was like our rest period in our circuit, so the music hit more as I was able to focus more in on the song playing and just enjoy it and regain motivation to start the new round.	No not today!	I did not know a lot of these songs on the playlist which I actually enjoyed. My attention was more focus on the music since I didn't know the songs which helped me enjoy my workout a bit more as I wasn't focusing so much on fatigue and sore muscles.
07, SS playlist	4	4	4	4	The workout I did today was a bit more challenging so I was much more focused to on the exercise movements today than anything else.	It was a partner workout, so internally when I wanted to stop, my partner definitely helped boost that motivation to keep going.	I know that when I do exercise movements that test my limits a bit, I don't tend to focus a whole lot on the music because my attention is towards my form, etc. but I cannot workout in quiet, so

							choosing a playlist that just kind of keeps up with my workout intensity helps drown the thoughts of wanting to quit or stop working out if I'm too tired.
07, EM playlist	4	4	3	3	This workout was a practicing my weaknesses in exercise movements so wasn't really structured. But the music tempo actually made me keep going	No	The music actually got me a bit more motivated in the beginning of my workout. There were a couple songs that I really enjoyed and ended up downloading. But the fast tempo helped keep the energy up to keep practicing exercise movements
12, GM playlist	3	3	3	3	I felt renewed need for movement expression because of the music intensity.	I generally desired to listen to the music and continue.	(No response)
12, SS playlist	4	2	4	4	The sport music video that goes along with the music was highly motivating.	There were times that were more difficult. No, this time I felt there wasn't an extra intentional musical motivator.	(No response)
12, EM playlist	4	4	4	4	Some lyrics focused on perseverance and courage.	The length of the playback helped.	I guess some of the words balance the ego!
14, GM playlist	3	3	3	3	Luego de la 3ra selección de música y haber saltado una canción// After the third selection of music and skipping a song	No	Fue un tanto difícil comenzar a escuchar una música que no utilizo para entrenar parte superior del cuerpo. Me costó algunas canciones el transicional y adaptarme al sonido// It was a bit difficult to start listening to music I don't use to train my upper body. It took a few songs for me to transition and adapt to the sound.

14, SS playlist	3	4	3	4	La música seleccionada urbana me motiva mucho cuando utilizo pesas y los cables.// The urban music selected motivates me a lot what using weights and cables.	Casi finalizando no iba a completar el set de cables para trabajar hombros. Pausé, respiré y continué hasta finalizar.// Near the end I almost did not complete the cable set for shoulders. I paused, breathed, and continued until I finished.	Este tipo de género me motiva cuando trabajo la parte superior del cuerpo. El ritmo de la música me permite motivarme y sentir energía.// This type of genre motivates me when working my upper body. The rhythm of the music allows me to become motivated and feel energized.
14, EM playlist	2	2	2	2	Hoy no me sentí tan motivada, como en otras ocasiones. Sentí la música muy pesada para mi gusto.// Today I did not feel as motivated, like on other days. I felt the music was very cumbersome for my taste.	Si. Termine el entrenamiento para no dejarlo inconcluso, por lo que me enfoque en la cantidad de sets para mantener el ritmo.// Yes. I finished the workout to not leave the results inconclusive, so I focused on the number of the sets to keep up the pace.	A diferencia de los días anteriores, sentí la música un tanto agresiva. Pienso que el factor de raza, edad y cultura es muy importante para mi a la hora de seleccionar la música.// Unlike previous days, I felt the music was a bit aggressive. I think that race, age, and culture are important factors for me when selecting music.
15, GM playlist	3	3	3	3	No	No	(No response)
15, SS playlist	4	4	4	3	Yes with a high RPE lift	No	(No response)
15, EM playlist	4	4	4	3	Yes to enjoyment/motivation based on beat. Some of music selection were songs used in previous gym workouts and/or CrossFit competitions.	No	(No response)
18, GM playlist	3	3	3	3	There were a few songs that I found the beat worked well with the exercise I was doing.	No	Music in general makes my workout more pleasurable.. I did enjoy listening to some different music than I typically listen to while doing my work outs.

18, SS playlist	3	3	3	3	No. No one particular moment.	No. I did my typical workout.	Music helps my enjoyment of my workout.
18, EM playlist	4	4	4	4	I found the music especially the beat helped me to do more reps, and for a few machines I was able to increase the weight I used. I also did not feel it took as much effort to do my typical weights for some of the machines.	Yes, did find I did extra sets for a few machines.	Although I don't typically listen to the type of music in this playlist, I did find I enjoyed it while doing my workout and felt like doing more reps. It also felt like I could lift my typical weights with more ease and I felt like doing more sets. I think I will change the type of music I use for doing strength training.
19, GM playlist	4	4	4	4	I feel the music helps with the enjoyment and motivation of my workouts.	No	I always listen to music while doing my workouts and the music makes it much more enjoyable and the time go by faster
19, SS playlist	3	3	3	3	Yes when you like the music you listen to I think it makes your workout more enjoyable.	No	Most of the time I listen to the music from Alexa and she doesn't have a lot of the songs that I like. I think songs with a stronger beat gave me more motivation like the ones in your playlist. It was interesting to compare the workouts with the different types of music. The music from your playlists I think were better for workouts and until doing the survey and comparing the music I never really realized it. I will keep this in mind when picking music for future workouts. Also I hadn't been honest in the previous surveys about mental health issues, and I felt I should be, so that's why this time I checked yes.

19, EM playlist	4	3	4	4	I felt the music motivated me and made my workout more enjoyable.	No	The songs I liked really motivated me but some of the songs I didn't care for as much.
20, GM playlist	4	4	4	4	Yes - did extra reps in songs I really enjoyed.	Yes - I did extra reps to finish songs - i.e. did extra reps for the music because music was great.	The music was good and it made workout much more enjoyable. The music was light, had a fast driving beat and lyrics were simple and repetitive so there was no distractions trying to figure out what the song was saying.
20, SS playlist	4	4	4	4	The beat/tempo of the music helps the work out. The barbell pumping tends to match the beat of the music and I can do more reps than I can do when there is no music. There is joy/pleasure derived from the music, so it is a diversion away from boring repetitions with the exercise.	Yes. I was using a Pandora mix of my favorite subject matter. Certain driving songs continued to play, so I did more exercises than I would have normally.	(No response)
20, EM playlist	3	2	2	2	No	Yes, i did more exercises to keep going until the end of the song.	I didn't care for the music today. It felt like I was being yelled at the whole time. Songs were loud and a lot of them had high tympanic sounds that hurt my ears and detracted from the exercise experience. I also felt, that because I didn't know the songs, I was trying to listen to the words and figure out what they were saying. This was a distraction to the work out.
21, GM playlist	3	3	3	4	No	No	I listened to the you Tube shuffle mix today. I did notice a couple songs between sets but generally I am not

							conscious of the songs when lifting.
21, SS playlist	3	3	2	3	No	No	The music was moderately loud, kind of non-specific gym compilation where they use 10-20 secs of samples for popular songs. When I am actually in a heavy lift, I don't think I hear the music. I'm focused on balance, form, muscles, weight distribution. I did 6 sets of 4 reps increasing weight 195 lb
21, EM playlist	3	3	3	3	No	No	I had previewed the empowerment music. The lyrics and beats were motivational. I don't believe there was an effect on my workout motivation. However, I could see where the music would energize a younger or a less seasoned athlete. After 40 years of work outs, I know my abilities and limitations, I don't need any psychological push to get that extra rep or add that extra weight. I do it because I am disciplined. My focus is form, breathing, resting appropriately between lifts etc. My goals are to steadily gain or maintain levels of fitness.
22, GM playlist	3	4	4	3	No	No	I liked the music, different from my normal
22, SS playlist	3	3	3	2	No	No	Music makes my workouts faster and more enjoyable.
22, EM playlist	2	2	2	2	No	No	did not like the music, very dark on a cold day

Table 5:End of Study Survey Responses

Subject Number	Best Playlist for Enjoyment and Motivation	Best Playlist for Focus	Best Overall Playlist	(optional) Please provide any further feedback for this study.
01	GM	GM	GM	I enjoyed the music on the general playlist so it was motivational.
02	EM	GM	GM	It was a very interesting study. I didn't realize how much the music that was provided to use will have such impact. Looking forward to learn the results at the end of this journey
04	SS	EM	SS	(no response)
07	EM	EM	EM	I think the self selected was the least overall best experience because I heard all the songs before so I wasn't focused much on the music or gave me any additional focus or energy. The EM I think because it was a fast tempo, and motivational it gave me a boost to push a bit harder
12	EM	GM	SS	I have to say that the two initial playlists actually motivated my drive on the final workout.
14	SS	SS	SS	En las observaciones anteriores mencioné, la importancia de la edad, la etnia y la cultura para entrenar. El escuchar el tipo de música urbana con artistas en su mayoría de Latinoamérica, me da energías y motivación cuando hago pesas o ejercicios de fuerza. Siento la música más “pegajosa” y me brinda motivación. Cuando hago piernas y cardio la música dance electrónica me da súper energía hasta el punto de en ocasiones, querer brincar o correr, aún cuando solo esté en la pista, trotadora o en elíptica. Me gustó mucho participar en este tipo de estudio ya que anteriormente había intentado otro tipo de música y siempre vuelvo a lo acostumbrado. Me reitero que la etnia a mi entender, tiene una gran influencia en la selección de música, al menos para mi. //

				In the previous observations I mentioned the importance of the age, ethnicity, and culture for working out. While listening to urban music with the majority of the artists being Latin American, it gives me energy and motivation listening to this music when I workout with weights or strength. I feel it more when the music is "catchy" and it fills me with motivation. When I do legs and cardio, dance/electronic music gives me so much energy that I want to jump or run even though I'm on the gym floor, treadmill, or elliptical machine. I really like participating in this type of study even though I previously have tried other types of music and I always go back to the music I am accustomed to. I reiterate that ethnicity, to my understanding, has a huge influence on the type of music people listen to, at least for me.
15	SS	EM	SS	(no response)
18	EM	EM	EM	I did find the music motivated me to do my strength training exercises better.
19	EM	EM	EM	(no response)
20	GM	GM	GM	Thx.
21	SS	SS	SS	(no response)
22	GM	GM	GM	i need to get better music!

Figures:

Figure 1: Race/Ethnicity

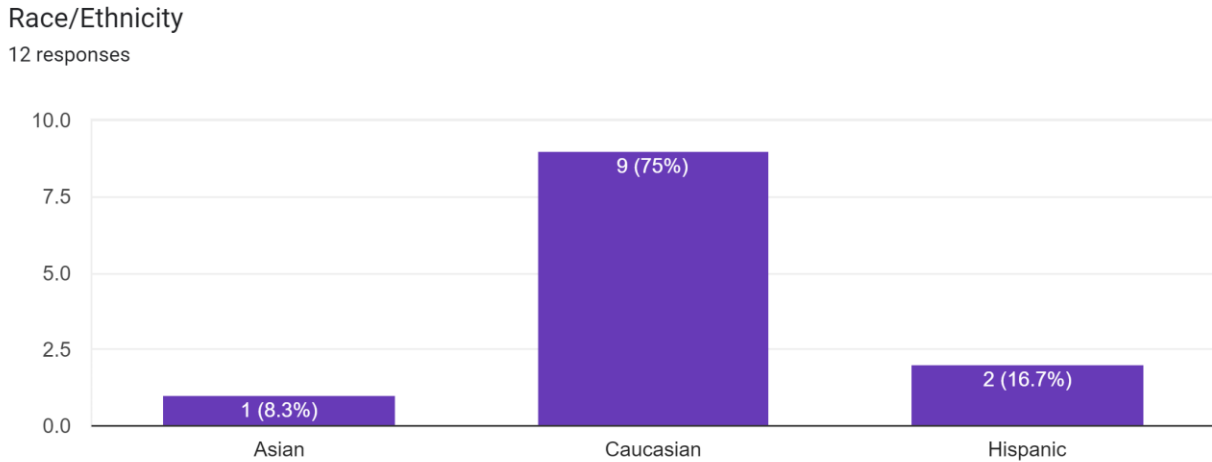


Figure 2: Playlist that Produced the Most Motivation and Energy

Which workout session would you rank gave you the most motivation/energy during the exercises?
12 responses

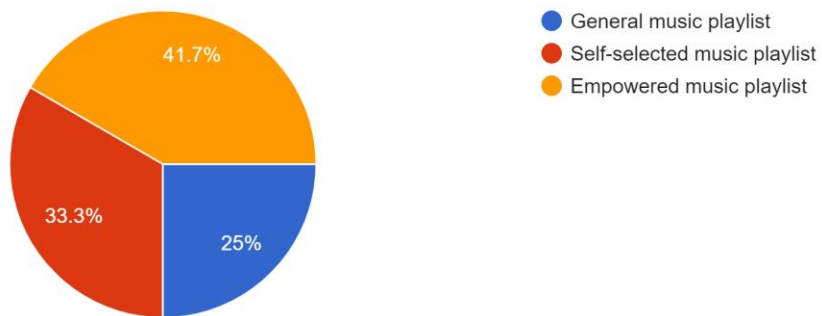


Figure 3: Playlist that Produced the Most Focus

Which workout session would you rank gave you the most focus during the exercises?

12 responses

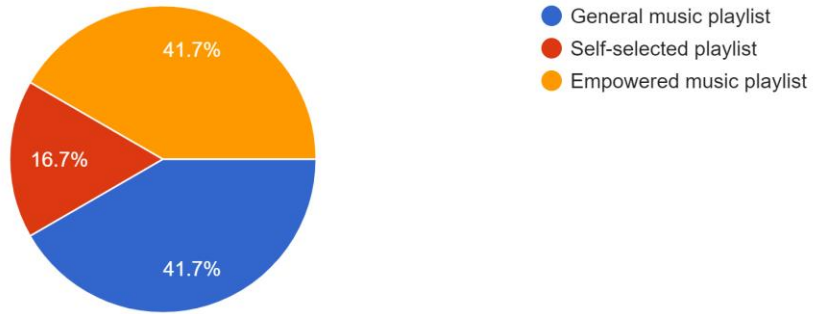
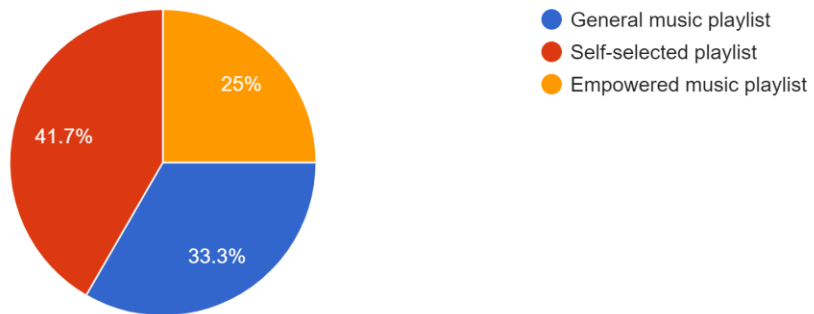


Figure 4: Best Overall Playlist

Which workout session would you rank for the best overall experience/performance during the study?

12 responses



Appendices

Institutional Review Board Form:

1/2/18rv

Use this form to answer evaluation criteria 1-9 of the Protocol Guidelines

Evaluation Criteria	Answer Questions Here
Subjects	50 males and 50 females residing in the United States over the age of 18 years old will be recruited. A minimum of 3 years' experience resistance training will be required for inclusion. Inclusion criteria will include factors such as years of experience, being openminded to multiple music genres, and individuals who engage in resistance training. Exclusion criteria will be if the individual has an injury that could impact their resistance training performance, any condition that would prevent a safe exercise environment, and individuals who are hearing impaired or have any other conditions that would impact listening to music.
Purpose Statement	The purpose of this study is to explore how music could increase an individual's motivation and arousal during exercise and therefore improve their perceived quality of the workout. Improvement in perceived quality of workout will be assessed by participants answering questions on the survey regarding feelings of increased energy, motivation, focus, and/or enjoyment during the workout session. This could also include if the individual felt they were able to complete or surpass any possible predetermined goals they had set for themselves at the beginning of each workout session.
Methods, Procedures, and Analysis	Information about the study and its minimal requirements (age, years of resistance training experience, and a general openness to multiple music genres) will be sent out to individuals via email or social media. This part of the study will also have a brief explanation of the study and a link will be provided for the individuals to enroll in the study. If individuals meet the inclusion criteria, they can enter the link. There, the study will be explained more in depth and an electronic consent will be provided for the individuals to complete. Contact information of the research personnel will be provided to the participants so they can ask any additional questions. Before the participants can continue with the study, the inclusion criteria will be assessed by the PI to confirm the information is acceptable. They will then be asked to fill out general demographic information (including age, race/ethnicity, gender, and state of residence), information about their years of experience resistance training along with general questions about how they divide their resistance training sessions each week, as well as questions about what types of music genres the participant listens to. Names and email addresses will be collected for distribution of emails, but this information will not be kept on record with the survey data. Individuals will be given subject numbers to use for identification purposes on the surveys. After all of the initial information has been completed, the participant can start the study. Once the participant starts the study, three email will be sent to them with the music selections randomly chosen, the instructions on what to do that workout session, and the link for the survey to be completed at the end of the workout session. The participants will be instructed to complete similar workout sessions to control the exercise experience as much as possible. So, for example, if the individual decides to do their first workout session on a leg workout day, they

	<p>will be instructed and expected to complete the final two sessions on days they do leg workouts. Depending on how the individuals break up their weekly workout sessions, this could imply the study will span over the course of three weeks.</p> <p>The music selections will be randomly assigned to each participant. One session will include general music and the participants will complete their chosen workout with general workout music provided by what is playing at their gym or from a source such as YouTube or Spotify (Condition: General Music). Another session will be with self-selected music and individuals will be able choose whatever music they prefer (Condition: Self-Selected Music). A third session will include pre-selected empowered music with a variety of empowering songs from a source such as YouTube or Spotify, for participants to listen to during their workout session (Condition: Empowered Music). After each workout session, the participants will immediately fill out the survey to rate their workout session in areas such as perceived performance, motivation, arousal, and enjoyment. Following the last workout session, the participants will complete a final survey to rate their overall experience during the study and which conditions they felt were the best for them personally and why.</p> <p>The written information, consents, and surveys will be provided in English and Spanish. Participants will be allowed to choose from the two languages depending on which language they feel most comfortable reading and writing in. However, the general workout and empowered music will be provided only in English. The self-selected music can be in any language or genre the individuals choose. This will be explained at the beginning of the study and bilingual participants will be expected to have enough of an understanding of English to understand the lyrics of the songs, otherwise they will be asked to remove themselves from the study. The surveys will be transcribed, translated to English as necessary by the PI, and evaluated to compare participant's responses.</p>
Risks	<p>Minimal risks-no greater than a normal training session. Participants will be advised to listen to music at safe volumes. This study is incorporating adults so when it comes to the music provided to them, an effort will be made to minimize any profanity, however, each individual will be advised to use their own discretion and find edited versions of the songs as necessary or skip any songs they do not like.</p>
Benefits	<p>Exercise and resistance training is utilized by a multitude of people ranging from the general population all the way up to professional athletes. The aim of this study is to confirm the positive ergogenic effects of music in workout sessions. If individuals are having workout sessions that they perceive to be more enjoyable and more effective, then the goal is they will be able to produce better results and increase longevity in an exercise program. Also, this study looks to add to the literature how psychological effects can elevate the body to greater expressions of energy.</p> <p>Subjects will not receive any direct benefits from this study.</p>
Costs to the	<p>No compensation will be given, and no additional costs will be placed upon the</p>

subjects	subjects.
Informed Consent	Electronic informed consents will be collected before individuals join the study. Participants will be allowed to remove themselves from the study at any point and time for any reason, including if they do not like the music provided.
Deception	No deception will be implemented.
Privacy	Participants will be kept anonymous. No identifying information will be utilized in the results of the study. Participants will be given subject numbers. Only research personnel will have access to the data. Email addresses will be connected to the subject numbers for the duration of the data collection but then erased once each subject has completed their three session and submitted the surveys.

**Concordia University, Saint Paul
Protocol Form
Research Involving Human Subjects**

Reviewed Classification Requested: Exempt Expedited
 Full Review

Type of Submission: New Renewal*

*Renewal refers to projects which are ongoing (i.e. class related project which are conducted each semester or annually). The principal investigator must inform the Human Subjects Review Committee regarding the projects being implemented on an annual basis.

1. Project Title: **Music as an Ergogenic Aid**

2. Principal Investigator:

Name David Boulais
first middle last

Phone # ██████████

College/Department CSP/KHS

Investigator's Address

██████████

██████████

CITI Training #: 44353763 (please attach a copy of your CITI completion report)

4

3. Check one:

- Faculty/staff research
 Fellow/post-doctoral research
 Undergraduate student research (*Please indicate program:*)
 Graduate student research (*Please indicate program:* MSES)

If the principal investigator is a student, please complete the following:

Advisor's Name Brenda Davics
please print
 Address 1282 Concordia Ave
St. Paul, MN 55104
 Telephone 651.603.6316

4. Please list co-investigators:

5. Approximate length of project: 0 years 3 months

[Protocol must be renewed annually]

6. Will this research be conducted at a location other than CSP?

No Yes: *If yes, attach approval documentation when needed.*

Identify location of the study: all throughout the United States, depending on the location of the participant.

7. Subjects (*please estimate numbers*):

<input type="checkbox"/> patients as experimental subjects	<input type="checkbox"/> prisoners
<input type="checkbox"/> patients as controls	<u>100</u> normal adult volunteers
<input type="checkbox"/> minors (under 18) not English	<input type="checkbox"/> persons whose 1 st language is
<input type="checkbox"/> CSP students/faculty/staff	<input type="checkbox"/> physically challenged
<input type="checkbox"/> pregnant women, unborn children	<input type="checkbox"/> other _____

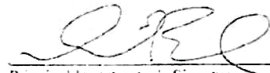
8. Procedures: [Attach relevant materials such as questionnaires, interview schedules, consent forms, etc.]

- | | |
|--|---|
| <input checked="" type="checkbox"/> survey questionnaire | <input type="checkbox"/> investigational device |
| <input checked="" type="checkbox"/> interview, phone - in person | <input type="checkbox"/> placebo |
| <input type="checkbox"/> medical or other personal records | <input type="checkbox"/> payment of subjects |
| <input type="checkbox"/> filming, taping, recording | <input type="checkbox"/> observation |
| <input type="checkbox"/> participant observation | <input type="checkbox"/> anthropological fieldwork |
| <input type="checkbox"/> psychological intervention | <input type="checkbox"/> incomplete disclosure of purpose |
| <input type="checkbox"/> blood, tissue, secretia samples | <input checked="" type="checkbox"/> consent and/or assent forms |
| <input type="checkbox"/> other _____ | |

9. Do you have any apparent conflicts of interest in this research?


No Yes: *If yes, attach completed Conflict of Interest (COI) Disclosure Form*

10. I have read and understand the Belmont Report on Ethical Principles and Guidelines for the protection of human subjects. This is available at _____

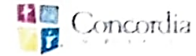

Principal Investigator's Signature

4/20/22
Date

11. While students may be listed as a principal investigator, advisors shoulder the responsibility for students engaged in independent research. The IRB expects that advisors have reviewed the proposal, and accept the roles and responsibilities required to oversee the conduct of this research, prevent harms to subjects, and foster benefits to the subjects.


Advisor's Signature

04/20/2022
Date

Institutional Review Board Modification Request Form:**Request for Modification or Addendum to Previously Approved Study**

Concordia University, St. Paul Institutional Review Board

*Instructions: Please complete and send the form and any attachments electronically to irb@csp.edu.**If you have any questions, contact the IRB at (651) 641-8723.**Note: If your changes are limited to personnel only, you do not need to complete this form. Personnel changes can be sent via email to irb@csp.edu.*Principal Investigator: **David Boulais**IRB # Study Title: **Music as an Ergogenic Aid: A Mixed Methods Study****2022_047****1. Modification/Addendum Description (check all as appropriate)**

<input type="checkbox"/>	Modification to currently approved protocol
<input type="checkbox"/>	Modification to currently approved informed consent
<input checked="" type="checkbox"/>	Other type of modification (e.g., recruitment method)
<input type="checkbox"/>	Addendum: an addition of a new element to the study

2. Check one:

<input checked="" type="checkbox"/>	This modification/addendum does not increase risks to subjects enrolled in the study.
<input type="checkbox"/>	This modification/addendum increases risks to subjects enrolled in the study.

3. Describe modification/addendum: Due to the current limited number of participants in my online research study, I am proposing to use the attached flyer to help promote the research study on the CSP campus and at local gyms.

By submitting this request, the Principal Investigator (and responsible faculty member if PI is a student) accepts responsibility for ensuring that all members of the research team: 1) complete the required CITI training and any other necessary training to fulfill their study responsibilities, 2) follow the study procedures as described in the IRB approved application and comply with *Concordia University, St. Paul's Protocols and Procedures for Research Involving Human Subjects* and all IRB communications and 3) uphold the rights and welfare of all study participants.

The parties (i.e., the IRB and the Principal Investigator and responsible faculty member if PI is a student) have agreed to conduct this application process by electronic means, and this application is signed electronically by the Principal Investigator and by the responsible faculty member if a student is the PI.

My name and email address together constitute the symbol and/or process I have adopted with the intent to sign this application, and my name and email address, set out below, thus constitute my electronic signature to this application.

David Boulais

 PI Name
Brenda Davies

 Responsible Faculty Name if PI is a student

boulaisd@csp.edu

 PI Email Address
davies@csp.edu

 Responsible Faculty Email address if PI is a student

For modifications and addendums, attach *revised* protocol and/or consent form. Please highlight all changes and submit any new material. *Note: please submit as separate files.*

<input type="checkbox"/>	Copy of grant/contract/agreement wording (if changed or new)
<input type="checkbox"/>	Updated consent form(s)
<input type="checkbox"/>	Letter(s) of Agreement (if changed or new)
<input checked="" type="checkbox"/>	Instruments (Survey questions, interview questions, etc.) (if changed or new)
<input type="checkbox"/>	Other (please describe): _____

Inclusion criteria survey (English version):

Inclusion Questions

* Required

1. Have you been resistance training (exercising with weights, machines, dumbbells, kettlebells, etc.) for at least 3 years?

Mark only one oval.

- Yes
 No

2. Are you currently experiencing any medical conditions or injuries that could affect your ability to successfully perform resistance training?

Mark only one oval.

- Yes
 No

3. Do you have any hearing conditions that would impact your ability to successfully listen to music while working out?

Mark only one oval.

- Yes
 No

4. Do you live in the United States? *

Mark only one oval.

- Yes
 No

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Inclusion criteria survey (Spanish version):

Cuestionario de Requisitos

* Required

1. Ha estado haciendo entrenamiento de resistencia (ejercicios con pesas, máquinas, mancuernas, mancuernas rusas, etc.) por al menos 3 años?

Mark only one oval.

- Sí
- No

2. En el momento actual, tiene alguna condición médica o alguna lesión que pudiera afectar tu habilidad de hacer entrenamiento de resistencia con éxito?

Mark only one oval.

- Sí
- No

3. Tiene algún problema o conción auditiva que pudiera afectar tu habilidad de escuchar música mientras entrenas?

Mark only one oval.

- Sí
- No

4. Vive en los Estados Unidos? *

Mark only one oval.

- Sí
- No

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Consent form (English version):**Music as an Ergogenic Aid**

You are invited to participate in a research study exploring what kind of impact music can have on resistance training. You were selected as a possible participant of this study because of your age, possible music interests, and years of experience resistance training. We ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by: David Boulais, Graduate Student, Concordia University-St. Paul and Brenda L. Davies, Assistant Professor (faculty advisor) – Department of Kinesiology and Health Sciences, Concordia University-St. Paul.

Background Information

The purpose of this study is to get a better understanding of the psychological effects that occur when individuals listen to music while performing resistance training. Moreover, motivation and enjoyment could support long-term success in an exercise program so data will be collected to get a better understanding of what factors can influence these emotional responses.

Procedures:

If you agree to be in this study, you would be agreeing to the following procedures for three workout sessions. You will be instructed to complete three similar workout sessions with different music playlist choices such as general music, empowered music, and self-selected music. Before each session, you will receive an email giving you a playlist to listen to during the workout session. After each workout session, you will be asked to fill out survey questions rating your workout experience.

Risks and Benefits of being in the Study

The study has a minimal amount of risk. You will be participating in your normal workout routines with no modifications to any of the exercises you normally perform.

While the information collected for this study may be beneficial for society as a whole, the participants of this study are not anticipated to receive any direct benefits from their participation in this study.

Compensation:

We thank you for your participation in this study, however, you will not receive compensation for your participation in this study.

Confidentiality:

The records of this study will be kept private. In any sort of report we might publish, we will not include any information that will make it possible to identify you. Research records will be stored securely and only the researchers in this study will have access to the records.

Voluntary Nature of the Study:

Participation in this study is voluntary. If you decide to participate, you are free to not answer any question or withdraw at any time.

Contacts and Questions:

The researcher conducting this study is: David Boulais. If you have questions throughout the study, you are encouraged to contact him at boulaisd@csp.edu. Dr. Brenda Davies can also be contacted at davies@csp.edu or 651-603-6316.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), you are encouraged to contact Steve Ross, chair, Human Subjects Review Committee, at irb@csp.edu or 651-641-8723.

Statement of Consent:

I have read the above information. I have asked questions and have received answers. I consent to participate in the study.

Informed Consent

* Required

1. Please type your name if you consent to participate in this study *

Email

2. Please type your email address so the consent forms can be matched to your email. *

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Google Forms

Consent form (Spanish version):**Music as an Ergogenic Aid**

Está siendo invitado a participar en un estudio de investigación donde se explorará qué impacto puede tener la música en el entrenamiento de resistencia. Usted fue seleccionado como un posible participante para este estudio debido a su edad, intereses musicales y años de experiencia en el entrenamiento de resistencia. Le aconsejamos que lea este formulario y nos haga saber si tiene alguna duda o pregunta antes de aceptar participar en este estudio.

Este estudio está siendo llevado a cabo por: David Boulais, estudiante en el programa de graduado de Concordia University-St. Paul y Brenda L. Davies, profesora asistente (consejera de la tesis) - Department of Kinesiology and Health Sciences, Concordia University-St. Paul.

Información del estudio

El propósito de este estudio es conocer mejor sobre los efectos psicológicos que pueden ocurrir cuando un individuo escucha música mientras está haciendo entrenamiento de resistencia. Además, la motivación y el disfrute podrían apoyar el éxito a largo plazo en un programa de entrenamiento, por lo que se recogerá data para llegar a conocer mejor qué factores pueden influenciar en estas respuestas emocionales.

Procedimientos:

Si está de acuerdo en participar en este estudio, estará aceptando los siguientes procedimientos de tres sesiones de entrenamiento. Se le pedirá que complete tres sesiones de entrenamiento similares con diferentes listas de música como serían música general, música de empoderamiento y música auto-seleccionada. Antes de cada sesión, usted recibirá un correo electrónico donde estará incluida la lista de música que escuchará durante la sesión de entrenamiento de ese día. Después de cada sesión de entrenamiento, tendrá que rellenar un cuestionario para puntuar cómo fue su experiencia durante el entrenamiento.

Riesgos y beneficios de participar en este estudio

Este estudio tiene el mínimo riesgo asociado. Usted estará llevando a cabo su rutina normal de entrenamiento sin tener que modificar ninguno de los ejercicios que normalmente realice.

Mientras la información que se reciba para este estudio puede que sea beneficiosa para la sociedad, los participantes de este estudio no están anticipados a recibir beneficios directos por participar en dicho estudio.

Compensación:

Le damos las gracias por participar en este estudio, pero queremos aclarar que no estará recibiendo una compensación por participar en el estudio.

Confidencialidad:

Los registros de este estudio se mantendrán privados. En el caso de que publicáramos el estudio, no incluiríamos ninguna información que le identifique. Los registros de los datos recabados se mantendrán en un sitio seguro y solamente los investigadores de este estudio tendrán acceso a ellos.

Voluntariedad.

La participación en este estudio es voluntaria. Si usted decide participar, es libre de no contestar algunas preguntas o darse de baja en cualquier momento.

Contactos y preguntas:

El investigador que lleva a cabo este estudio es: David Boulais. Si tiene alguna pregunta durante el estudio, se le recomienda que se comunique con él a través de este correo: boulaisd@csp.edu. Dr. Brenda Davies también puede ser contactada en el siguiente correo: davies@csp.edu o 651-603-6316.

Si tiene alguna pregunta o preocupación sobre este estudio y le gustaría comunicarse con alguien que no sean los investigadores, se le recomienda que se ponga en contacto con Steve Ross, chair, Human Subjects Review Committee, at irb@csp.edu o 651-641-8723.

Declaración de consentimiento:

He leído la información de este consentimiento. He preguntado las dudas que hubiera podido tener y recibido las respuestas. Doy mi consentimiento para participar en este estudio.

Formulario de Consentimiento

* Required

1. Por favor, escriba su nombre si da su consentimiento para participar en este estudio. *

Correo electrónico

2. Por favor, escriba su correo electrónico para juntar el consentimiento con el correo correcto. *

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Demographics survey (English version):

Demographics

* Required

1. Subject number *

2. Gender *

Mark only one oval.

Male

Female

Prefer not to say

3. Age *

4. Race/Ethnicity

5. What type of working out do you enjoy? (resistance training [i.e.: exercising with weights, dumbbells, machines, kettlebells, etc.], Powerlifting, CrossFit, HIIT classes, other) You may select more than one.

6. What type of equipment do you prefer? (barbells, dumbbells, kettlebells, machines, resistance bands, etc.) You may select more than one.

7. What type of routine do you follow? (Split routine, full body, 3 day on:1 day off, exercise every other day, other) Please explain.

8. How important is music to you in your daily life? *

Mark only one oval.

1 2 3 4

Not

Very important

9. Do you experience an emotional response when listening to music? (ie: happiness, sadness, energized, etc.)

Mark only one oval.

1 2 3 4 5

No €

I always have an emotional response when I list

10. Do you normally listen to music during your workouts? *

Mark only one oval.

Yes

No

11. What type of music genres do you prefer to listen to while exercising?
You may identify more than one.

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Demographics survey (Spanish version):

Datos Demográficos

* Required

1. Numero del sujeto *

2. Género *

Mark only one oval.

- Hombre
 Mujer
 Prefiero no decir

3. Edad *

4. Raza/etnicidad

5. Qué tipo de entrenamiento le gusta más?(entrenamiento de resistencia [ejem: ejercicios con pesas, mancuernas, máquinas, mancuernas rusas,etc.] levantamiento de peso, CrossFit, clases de HIIT, otros)
Puede seleccionar más de una opción.

6. Qué tipo de máquinas prefiere? (barras, mancuernas, mancuernas rusas, máquinas, gomas de resistencia, etc.) Puede seleccionar más de una opción.

7. Qué tipo de rutina sigue? (rutina partida, entrenamiento de cuerpo completo, 3 días de entrenamiento y uno de descanso, entrenamiento de un día sí, otro no, otros) Por favor explique.

8. **Cúanto de importante es la música en su vida diaria? ***

Mark only one oval.

1 2 3 4

Nad

Muy importante

9. **Experimenta una reacción emocional cuando escucha música? (Ejm: felicidad, tristeza, energía, etc.)**

Mark only one oval.

1 2 3 4 5

Ninç

Siempre tengo una respuesta emocional cuando

10. **Escucha música normalmente durante sus entrenamientos? ***

Mark only one oval.

Sí

No

11. **Qué estilos de música prefiere escuchar cuando está entrenando?**
Puede seleccionar más de uno.

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GM playlist survey (English version):

Questions for Survey: General

* Required

1. Subject number *

2. How would you rate the quality of your workout today? *

Mark only one oval.

1 2 3 4

Terr

Great

3. Do you feel the music selection helped you to have a good workout? *

Mark only one oval.

Yes

No

- 4. Do you feel the music selection attributed to having a bad workout? *

Mark only one oval.

- Yes
- No

- 5. How would you rate your enjoyment of your workout session today? *

Mark only one oval.

- 1
 - 2
 - 3
 - 4
- Terr Great

- 6. How would you rate your motivation during your workout session today?

Mark only one oval.

- 1
 - 2
 - 3
 - 4
- Terr Great

7. How would you rate your focus during your workout today? *

Mark only one oval.

1 2 3 4

Terr

Great

8. Were there any moments during your workout you felt heightened enjoyment/motivation/focus? Please explain. If not, please type "no".

.....
.....

9. Were there any moments of your workout where you were going to finish a set or stop your workout, but you decided to continue on? Please explain. If not, please type "no".

.....
.....

10. Are you currently experiencing any mental health hardships such as depression, stress, anxiety, grief, etc. that could have affected your workout today?

Mark only one oval.

- Yes
- No

11. What body parts did you exercise today? *

12. (optional) Please provide any further comments you may have regarding the music and/or your workout session.

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GM playlist survey (Spanish version):

Cuestionario General

* Required

1. Número del sujeto *

2. Cómo calificaría la calidad de su entrenamiento hoy? *

Mark only one oval.

1 2 3 4

Terrible

Genial

3. Siente que la lista de música seleccionada le ayudó a tener un buen entrenamiento?

Mark only one oval.

Sí

No

4. Cree que la selección de música podría haber afectado negativamente a su entrenamiento?

Mark only one oval.

Si

No

5. Cómo calificaría el disfrute de su sesión de entrenamiento hoy? *

Mark only one oval.

1 2 3 4

Terr

Genial

6. Cómo calificaría su motivación durante la sesión de entrenamiento hoy?

Mark only one oval.

1 2 3 4

Terr

Genial

7. Cómo calificaría su enfoque durante la sesión de entrenamiento de hoy?

Mark only one oval.

1 2 3 4

Terr

Genial

8. Hubo algún momento o momentos durante la sesión de entrenamiento donde se sintió muy motivado/enfocado/satisfacción? Por favor, explique su respuesta.

9. Hubo algún momento o momentos durante la sesión de entrenamiento cuando iba a terminar su set o parar de entrenar, pero decidió continuar con el entrenamiento? Por favor, explique su respuesta.

10. Está pasando o experimentando algún problema de salud mental como depresión, estrés, ansiedad, pérdida de un ser querido, etc. que hubiera podido afectar su entrenamiento de hoy?

Mark only one oval.

- Sí
- No

11. Qué parte/partes del cuerpo entrenó hoy? *

12. (Opcional) Por favor, de algún comentario en relación a la música y/o su sesión entrenamiento.

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SS playlist survey (English version):

Questions for the Survey: Self-Selected

* Required

1. Subject number *

2. How would you rate the quality of your workout today? *

Mark only one oval.

1 2 3 4

Terr

Great

3. Do you feel the music selection helped you to have a good workout? *

Mark only one oval.

Yes

No

4. Do you feel the music selection attributed to having a bad workout? *

Mark only one oval.

Yes

No

5. How would you rate your enjoyment of your workout session today? *

Mark only one oval.

1 2 3 4

Terr

Great

6. How would you rate your motivation during your workout session today?

Mark only one oval.

1 2 3 4

Terr

Great

7. How would you rate your focus during your workout today? *

Mark only one oval.

1 2 3 4

Terr

Great

8. Were there any moments during your workout you felt heightened enjoyment/motivation/focus? Please explain.

9. Were there any moments of your workout where you were going to finish a set or stop your workout, but you decided to continue on? Please explain.

10. Are you currently experiencing any mental health hardships such as depression, stress, anxiety, grief, etc. that could have affected your workout today?

Mark only one oval.

Yes

No

11. What body parts did you exercise today? *

12. What music or genres did you listen to during your workout? *

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SS playlist survey (Spanish version):

Auto Seleccionado

* Required

1. Número del sujeto *

2. Cómo calificaría la calidad de su entrenamiento hoy? *

Mark only one oval.

1 2 3 4

Horrr

Genial

3. Siente que la selección musical le ayudó a tener un buen entrenamiento?

Mark only one oval.

Sí

No

4. Siente que la selección musical podría haber afectado su entrenamiento negativamente?

Mark only one oval.

- Sí
 No

5. ¿Cuánto ha disfrutado su sesión de entrenamiento hoy? *

Mark only one oval.

- 1 2 3 4
Muy Muchísimo

6. ¿Cuánta motivación ha tenido durante su sesión de entrenamiento? *

Mark only one oval.

- 1 2 3 4
Muy Muchísima

7. Cuánto enfoque diría que ha tenido durante su sesión de entrenamiento de hoy?

Mark only one oval.

1 2 3 4

Muy

Muchísimo

8. Hubo algún/algunos momentos durante el entrenamiento donde se sintió disfrutando mucho, muy motivado, muy enfocado, etc.? Por favor, explique su respuesta.

9. Hubo alguna ocasión donde iba a parar su entrenamiento o set de repeticiones, pero decidió continuar? Por favor, explique su respuesta.

10. Está pasando en este momento por alguna dificultad como podría ser depresión, estrés, ansiedad, pérdida de un ser querido, etc. que pudiera haber afectado su entrenamiento de hoy?

Mark only one oval.

Sí

No

11. Qué partes del cuerpo ha entrenado hoy? *

12. Qué música o géneros musicales escuchó durante su entrenamiento?

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EM playlist survey (English version):

Questions for Survey: E.M. Playlist

* Required

1. Subject number *

2. How would you rate the quality of your workout today? *

Mark only one oval.

1 2 3 4

Terr

Great

3. Do you feel the music selection helped you to have a good workout? *

Mark only one oval.

Yes

No

4. Do you feel the music selection attributed to having a bad workout? *

Mark only one oval.

- Yes
 No

5. How would you rate your enjoyment of your workout session today? *

Mark only one oval.

- 1 2 3 4
Terr Great

6. How would you rate your motivation during your workout session today?

Mark only one oval.

- 1 2 3 4
Terr Great

7. How would you rate your focus during your workout today? *

Mark only one oval.

1 2 3 4

Terr

Great

8. Were there any moments during your workout you felt heightened enjoyment/motivation/focus? Please explain. If not, please type "no".

.....
.....

9. Were there any moments of your workout where you were going to finish a set or stop your workout, but you decided to continue on? Please explain. If not, please type "no".

.....
.....

10. Are you currently experiencing any mental health hardships such as depression, stress, anxiety, grief, etc. that could have affected your workout today?

Mark only one oval.

- Yes
- No

11. What body parts did you exercise today? *

12. (optional) Please provide any further comments you may have regarding the music and/or your workout session.

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EM playlist survey (Spanish version):

Cuestionario E.M.

* Required

1. Número del sujeto *

2. Cómo calificaría la calidad de su entrenamiento hoy? *

Mark only one oval.

1 2 3 4

Terr Genial

3. Siente que la lista de música seleccionada le ayudó a tener un buen entrenamiento?

Mark only one oval.

Sí

No

4. Cree que la selección de música podría haber afectado negativamente a su entrenamiento?

Mark only one oval.

Sí

No

5. Cómo calificaría el disfrute de su sesión de entrenamiento hoy? *

Mark only one oval.

1 2 3 4

Terr

Genial

6. Cómo calificaría su motivación durante la sesión de entrenamiento hoy?

Mark only one oval.

1 2 3 4

Terr

Genial

7. Cómo calificaría su enfoque durante la sesión de entrenamiento de hoy?

Mark only one oval.

1 2 3 4

Terr

Genial

8. Hubo algún momento o momentos durante la sesión de entrenamiento donde se sintió muy motivado/enfocado/satisfacción? Por favor, explique su respuesta.

9. Hubo algún momento o momentos durante la sesión de entrenamiento cuando iba a terminar su set o parar de entrenar, pero decidió continuar con el entrenamiento? Por favor, explique su respuesta.

10. Está pasando o experimentando algún problema de salud mental como depresión, estrés, ansiedad, pérdida de un ser querido, etc. que hubiera podido afectar su entrenamiento de hoy?

Mark only one oval.

- Sí
- No

11. Qué parte/partes del cuerpo entrenó hoy? *

12. (Opcional) Por favor, de algún comentario en relación a la música y/o su sesión entrenamiento.

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End of study survey (English version):

End of Study Questions

* Required

1. Subject number *

2. Which workout session would you rank gave you the most motivation/energy during the exercises?

Mark only one oval.

- General music playlist
- Self-selected music playlist
- Empowered music playlist

3. Which workout session would you rank gave you the most focus during the exercises?

Mark only one oval.

- General music playlist
- Self-selected playlist
- Empowered music playlist

4. Which workout session would you rank for the best overall experience/performance during the study?

Mark only one oval.

- General music playlist
- Self-selected playlist
- Empowered music playlist

5. (optional) Please provide any further feedback for this study. You may also contact the lead researcher to discuss any thoughts or feedback at boulaisd@csp.edu.

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End of study survey (Spanish version):

Final del Estudio

* Required

1. Número del sujeto *
2. En cuál sesión de entrenamiento diría que tuvo más energía o motivación durante los ejercicios?

Mark only one oval.

- Música general de gimnasio
- Música auto-seleccionada
- Música de empoderamiento

3. En qué sesión de entrenamiento diría usted que estuvo más enfocado/a durante los ejercicios?

Mark only one oval.

- Música general
- Música auto-seleccionada
- Música de empoderamiento

- 4.Cuál de las sesiones de entrenamiento diría que fue la mejor en cuanto a experiencia/rendimiento durante el estudio?

Mark only one oval.

Música general

Música auto-seleccionada

Música de empoderamiento

5. (opcional) Por favor, provea algún tipo de feedback para este estudio. También puede ponerse en contacto con el investigador líder para discutir cualquier idea o pensamiento que tenga a: boulaisd@csp.edu

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