5th Grade

Music’s Impact on Exercise

Signed Safety Form:

Who will be supervising your project?

My parents and my mentors

What is the question or problem being addressed?

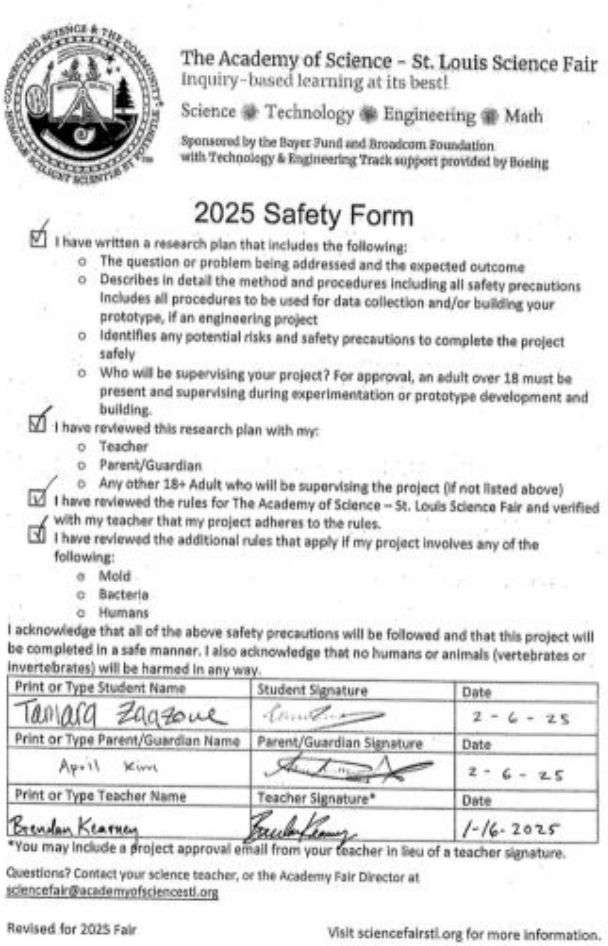
Does music affect exercise output?

Describe the method or procedure you will use to address the question or problem.

1. Gather volunteers for project
2. Volunteers workout for 15 minutes four times, 2 days with music and 2 days without
3. Gather all volunteer data (e.g., heart rate peak, average heart rate, calories burned, distance)
4. Create average of 2 days data (2 day music data, 2 days without music data)
5. Compare the two results

What safety considerations need to be in place? (ie - wear safety goggles, keep chemicals away from younger siblings, etc.)

My only safety concern is that the volunteers do not overexert themselves by doing too much workout or trying too hard.



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Science Technology Engineering Math
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2025 Safety Form

- ☑ I have written a research plan that includes the following:
  - The question or problem being addressed and the expected outcome
  - Describes in detail the method and procedures including all safety precautions Includes all procedures to be used for data collection and/or building your prototype, if an engineering project
  - Identifies any potential risks and safety precautions to complete the project safely
  - Who will be supervising your project? For approval, an adult over 18 must be present and supervising during experimentation or prototype development and building.
- ☑ I have reviewed this research plan with my:
  - Teacher
  - Parent/Guardian
  - Any other 18+ Adult who will be supervising the project (if not listed above)
- ☑ I have reviewed the rules for The Academy of Science – St. Louis Science Fair and verified with my teacher that my project adheres to the rules.
- ☑ I have reviewed the additional rules that apply if my project involves any of the following:
  - Mold
  - Bacteria
  - Humans

I acknowledge that all of the above safety precautions will be followed and that this project will be completed in a safe manner. I also acknowledge that no humans or animals (vertebrates or invertebrates) will be harmed in any way.

Print or Type Student Name	Student Signature	Date
Tamara Zagzoule		2-6-25
Print or Type Parent/Guardian Name	Parent/Guardian Signature	Date
April Kim		2-6-25
Print or Type Teacher Name	Teacher Signature*	Date
Brendan Kearney		1-16-2025

*You may include a project approval email from your teacher in lieu of a teacher signature.

Questions? Contact your science teacher, or the Academy Fair Director at sciencefair@academyofsciencestl.org

Revised for 2025 Fair

Visit sciencefairstl.org for more information.

Testable Question:

Does music affect exercise output?

Prediction:

I predict that music will positively affect exercise by increasing the heart rate, burning more calories, and other measurements of exercise outputs. This is based on prior studies that found that music positively affects exercise in multiple ways regarding mental and physical measurments.

Procedure:

1. Recruit volunteers for project
    a. Volunteers workout for four times, each time is 15 minutes.
    b. Two workouts are with music and 2 are without music.
    c. Each volunteer must stick to one type of workout
    d. Volunteers must do one exercise per day
    e. Volunteers must do their exercise at the same time each day
2. Collect all volunteer data (e.g., average heart rate/beats per minute (bpm), calories burned, distance covered)
3. Calculate the average of 2 workout data (2 workouts with music data, 2 workouts without music data)
4. Compare the two results

Background:

Working out has many scientifically proven benefits to people's health. According to studies, if you workout harder – achieve higher heart rate and burn more calories – you reap more benefits. So, if we can find something that motivates people to increase the workout intensity and output, it would help improve their health and prevent diseases.

Many people listen to music during exercises. According to studies, music helps exercise output. So, I wanted to test this out to see if music affect exercise by increasing your heart rate (and not feeling it), burning calories, how tired you feel after the workout, and more. This project is important because it teaches us about our workout patterns.

Data and Trials:

WITHOUT MUSIC CHART – DAY 1

	Age	Exercise Type	Distance	Calories Burned	Average Heart rate
Volunteer 1	34	Outdoor Running	1.46 mi	178	153 bpm
Volunteer 2	37	Indoor Cycling	3.34 mi	79	103 bpm
Volunteer 4	32	Outdoor Running	1.20 mi	122	164 bpm
Volunteer 3	31	Outdoor Running	1.00 mi	98	166 bpm

Data and Trials:

WITHOUT MUSIC CHART – DAY 2

	Age	Exercise Type	Distance	Calories Burned	Average Heart rate
Volunteer 1	34	Outdoor Running	1.50 mi	169	153 bpm
Volunteer 2	37	Indoor Cycling	2.98 mi	70	99 bpm
Volunteer 4	32	Outdoor Running	1.06 mi	108	157 bpm
Volunteer 3	31	Outdoor Running	1.44	144	181 bpm

Data and Trials:

WITH MUSIC CHART – DAY 1

	Age	Exercise Type	Distance	Calories Burned	Average Heart rate
Volunteer 1	34	Outdoor Running	1.46 mi	178	153 bpm
Volunteer 2	37	Indoor Cycling	3.98	106	120 bpm
Volunteer 4	32	Outdoor Running	1.13 mi	119	156 bpm
Volunteer 3	31	Outdoor Running	1.24 mi	124	169 bpm

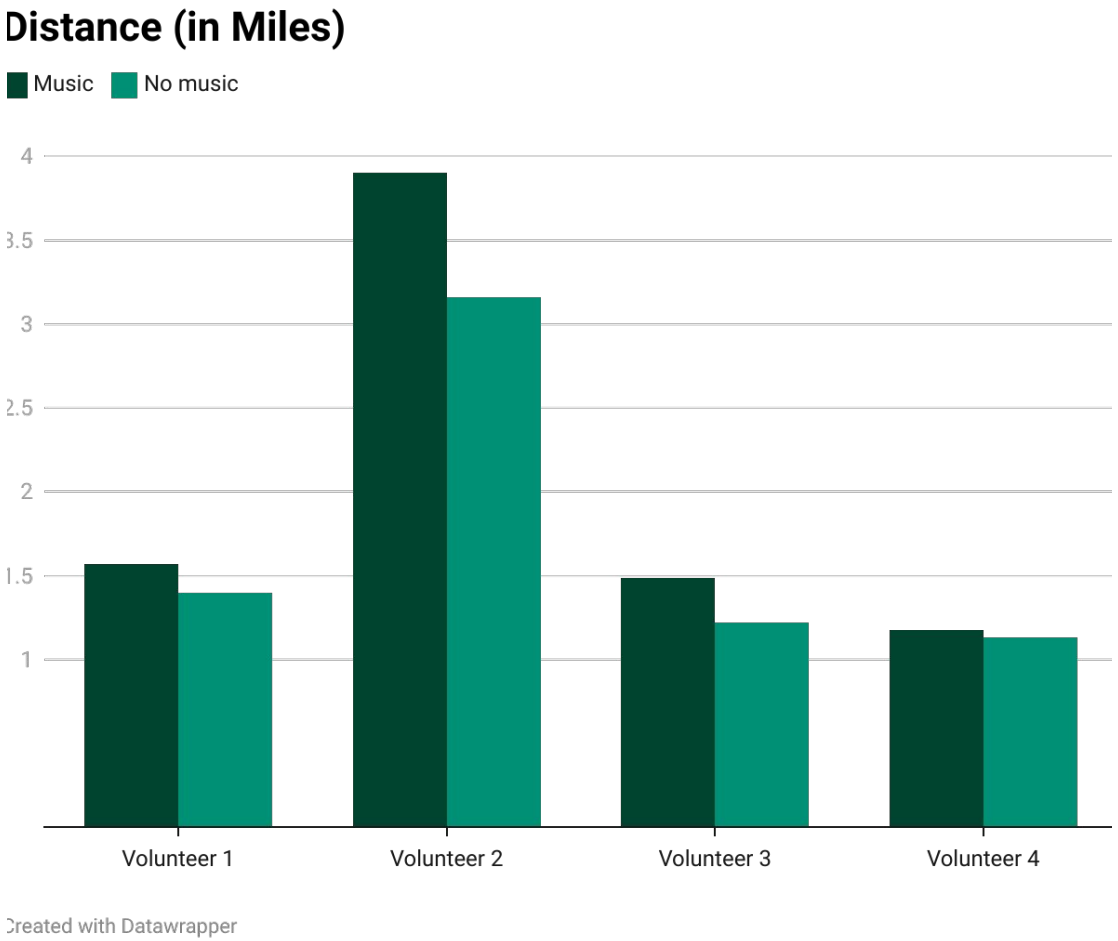
Data and Trials:

WITH MUSIC CHART – DAY 2

	Age	Exercise Type	Distance	Calories Burned	Average Heart rate
Volunteer 1	34	Outdoor Running	1.57 mi	181	154 bpm
Volunteer 2	37	Indoor Cycling	3.93 mi	95	112 bpm
Volunteer 4	32	Outdoor Running	1.22 mi	129	171 bpm
Volunteer 3	31	Outdoor Running	1.73 mi	169	171 bpm

Data and Trials:

For a closer look at this bar graph, click here



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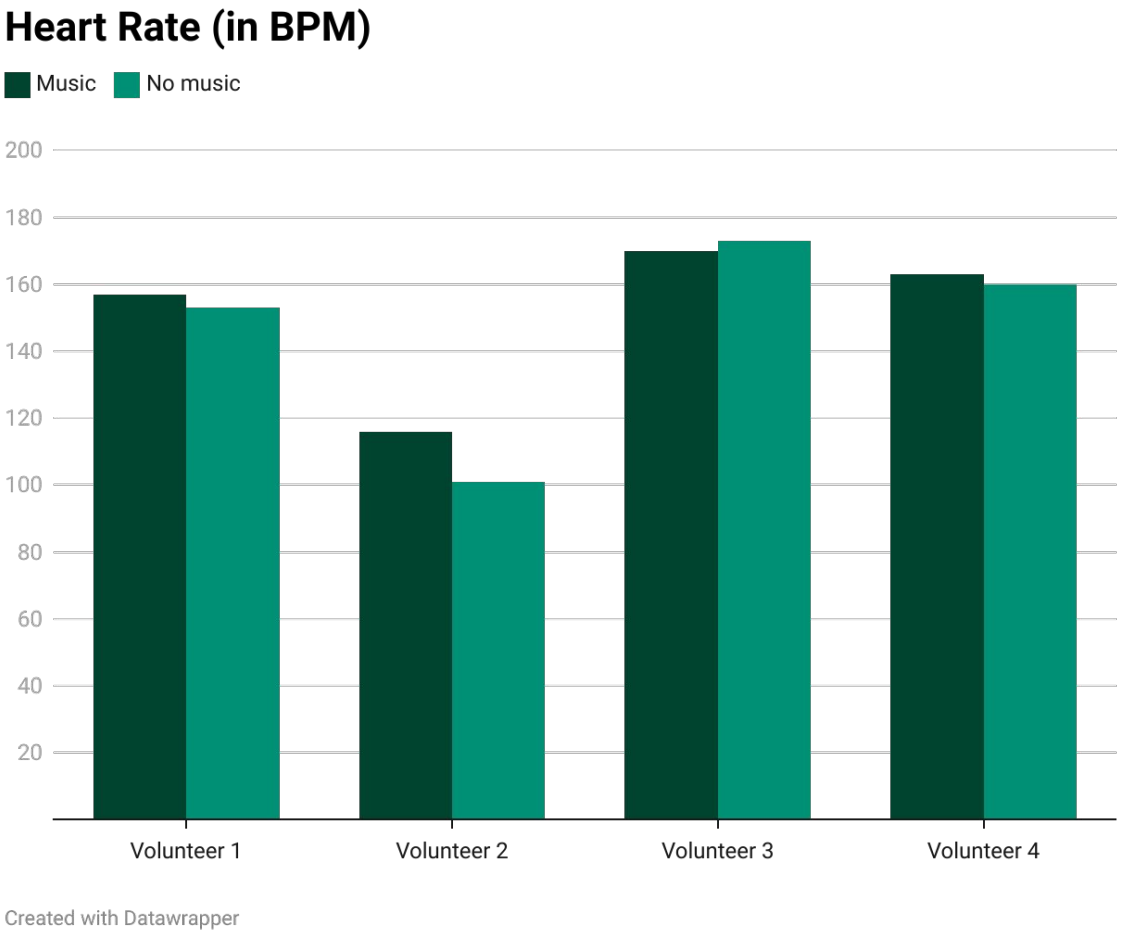

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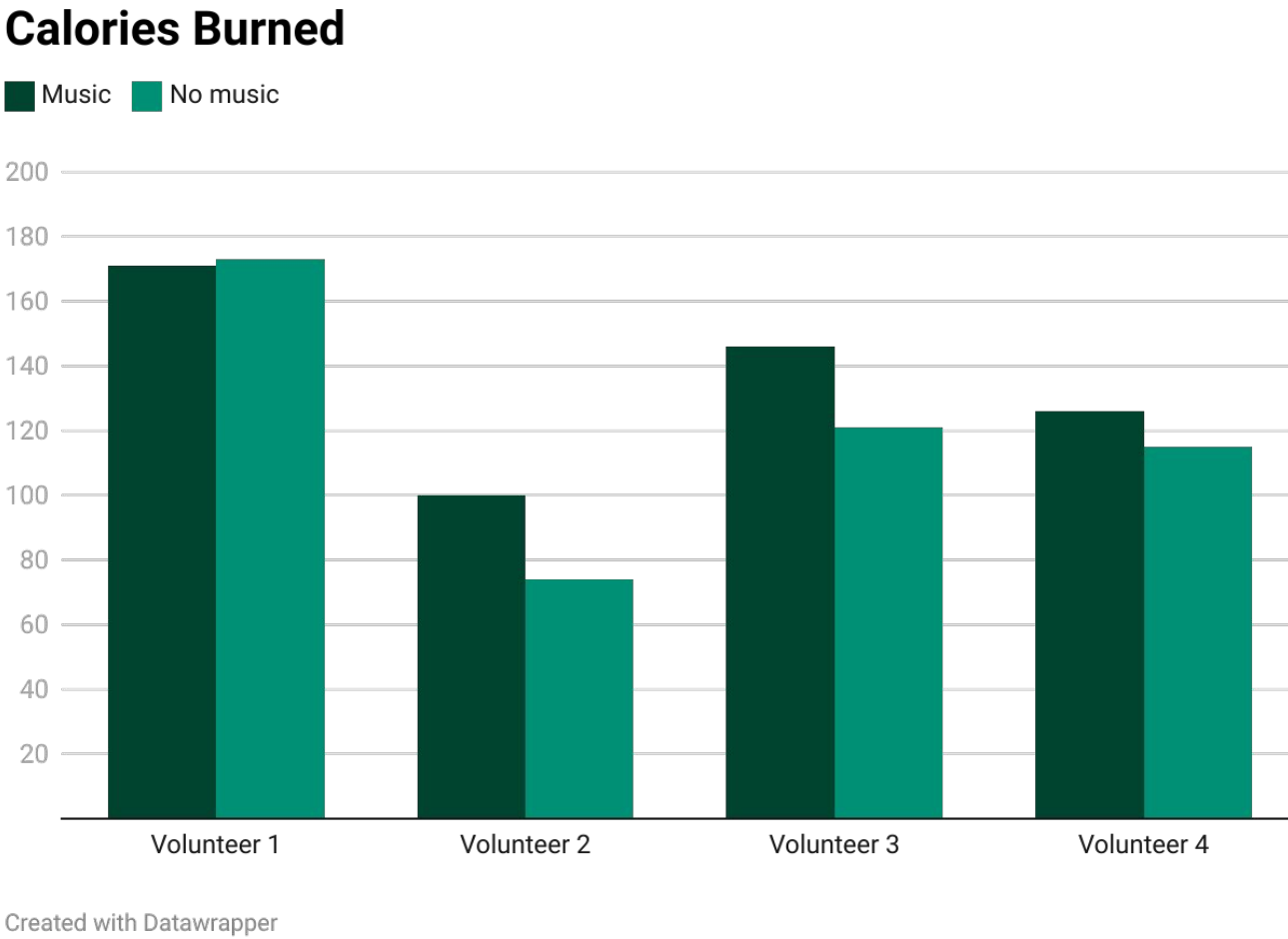

Conclusion and Reflection:

I found out that music does help exercise. The extent of effect differs from one person to another. In volunteer 2's case, they cycled 0.84 miles more in musical exercise than non-musical exercise. But in volunteer 4's case, they ran only 0.045 miles more in musical exercise than non-musical exercise. I did not include this in the presentation (because this was qualitative) but I had my volunteers tell me how energized they felt after the exercise. All of them felt better (or the same) after the workout and they outdid themselves.

The limitations of this study include the small sample size, the impact of different weather on volunteers who ran outside, and the different tempo and genre of the music used by each volunteer. Also, the choice of sport performed was not the same between the volunteers.

If I continue to study this I would increase the sample size, make all the exercise the same and potentially the music genre throughout the sample.

Credits:

- My mentor, April Kim, for giving me advice on what to measure and supporting all the way through.
- My science teacher, for encouraging me and finding a spot for me in the mentor club.
- Datawrapper, for all the graphs I have created.
- My volunteers, for volunteering to workout for my science fair project and encouraging me.
- Farah Yousry and Mohamed Zaazoue (my mom and dad), for helping me edit and always encouraging me.

Sources:

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