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Can focusing on music make hard exercise feel better?



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Abstract

Exercise is an important way to keep our bodies and brains healthy. Exercise is sometimes hard, but we have ways to make it more enjoyable. We know that music can make low- to medium-intensity exercise more enjoyable. But does paying attention to music affect mood and the brain during high-intensity exercise?

We ran two experiments to find out. In the first experiment, we had participants do four runs on the treadmill at two intensities. This was while music was playing. The participants focused on music or on their bodies. In the second experiment, we had new participants do three runs on a treadmill. This time they focused on different combinations of music playing and their bodies. We measured their brain activity using a special headband. In both experiments, we measured the participants' mood, enjoyment, and energy.

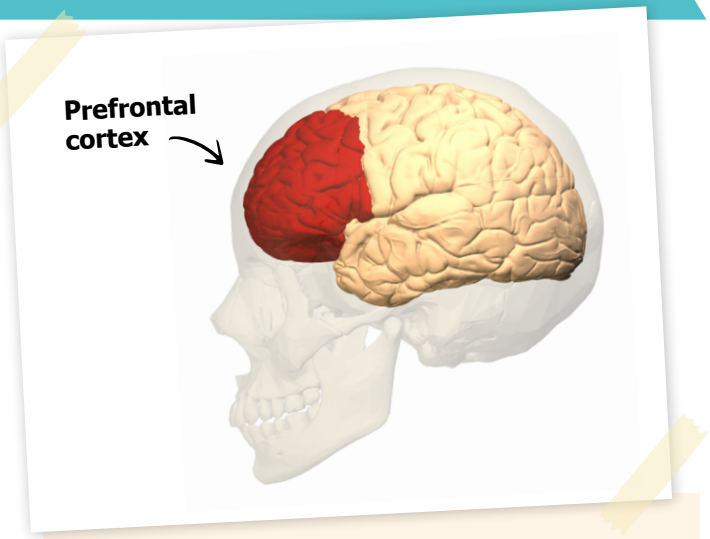
Our results show that focusing on music made running more enjoyable. We saw less brain activity with music playing when people focused on their bodies. This may help people stick to long-term workout programs.

Introduction

Have you ever found it hard to keep going when you are exercising? You know exercise is good for you, but it can feel difficult. Especially when you work out at a high intensity. This can make it hard to stay motivated.

We know music can help. It helps people's workouts feel more enjoyable, and they remember them more positively. Scientists think this is because music distracts people from how their bodies feel. The brain can only process so much information at a time. So if there is music playing while you exercise, your brain can't focus as much on how your body feels.

There is an area of the brain called the **prefrontal cortex**. It processes information from inside and outside the body. The prefrontal cortex uses this information to make decisions, control emotions, and direct attention. It can also help you deal with getting tired as you exercise.



Location of the prefrontal cortex (area of the brain). **Image:** BodyParts3D, © The Database Center for Life Science, CC BY-SA 2.1 JP.

Tuning out your body starts to become harder as exercise intensity increases. But what if we told someone specifically to pay attention to their music? Would that make the exercise seem more enjoyable or less difficult? We wanted to find out!

Methods

We asked participants to run on treadmills while focusing on different things. They were all Australian college students who exercised regularly and had no health issues.

Experiment 1

We asked 40 participants to complete four treadmill runs over two visits. Before the runs we had participants do a fitness test. We measured their **resting heart rate** and their **maximum heart rate**. We used these to calculate a 70% and 80% intensity level for each participant.

Each run was seven minutes long. We played music from the same playlist for all participants and all runs. The four runs were done in random order over two visits.

- Music focus at 70% intensity
- Body focus at 70% intensity
- Music focus at 80% intensity
- Body focus at 80% intensity

After each run, we used common surveys to measure four things for each participant.

1. How good their mood was
2. How much they enjoyed the run
3. How energized they felt
4. How hard the exercise felt

Finally, we compared these values for each focus and heart rate combination.

Experiment 2

Next, we wanted to find out how hard the brain was actually working during the different runs. We asked 25 new participants to complete three runs in one visit. There were three different focus and music combinations.

- Body focus, no music
- Body focus, with music
- Music focus, with music

All the runs were seven minutes long and at 80% intensity level. We used the same song for both of the runs with music. We had the participants wear a headband that measures blood flow and oxygen to the prefrontal cortex (Figure 1). If blood in the brain carries a lot of oxygen, it is working really hard. If blood in the brain does not carry much oxygen, then the brain is more relaxed. We compared brain activity for each focus and music combination. We also had the participants complete the same surveys as Experiment 1 (on mood, enjoyment, energy, and difficulty). Then we compared them for each focus and music combination.



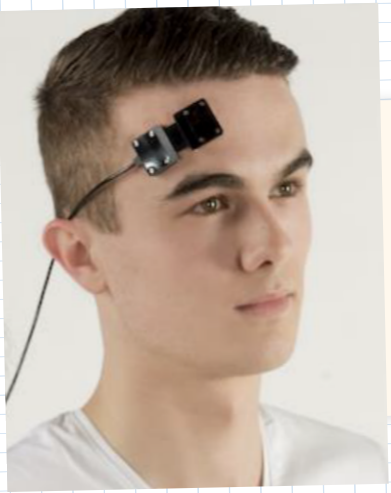


Figure 1: A) The experimental setup for the treadmill trials. B) The device that participants wore during the treadmill trials. It measures oxygen and blood flow in the brain. **Photo:** © 2019 Artinis Medical Systems.

Results

Experiment 1

We found that focusing on music put the participants in a more positive mood. They also enjoyed their runs more. We didn't see any differences in the participants' energy or how hard they thought the run was.

Exercise intensity did make a difference. Overall, the participants felt the run was harder at 80% intensity than at 70% intensity.

Experiment 2

We found that the participants had more energy after runs with music. But we didn't see any other differences in how the participants felt. When the participants focused on their body, we saw that the left prefrontal cortex was more active without music than with music (Figure 2). We didn't see any significant differences in the brain between the two music runs. We found that brain activity didn't match how the participants felt about their exercise.

Which combination of music and focus resulted in the greatest brain activity? Why?

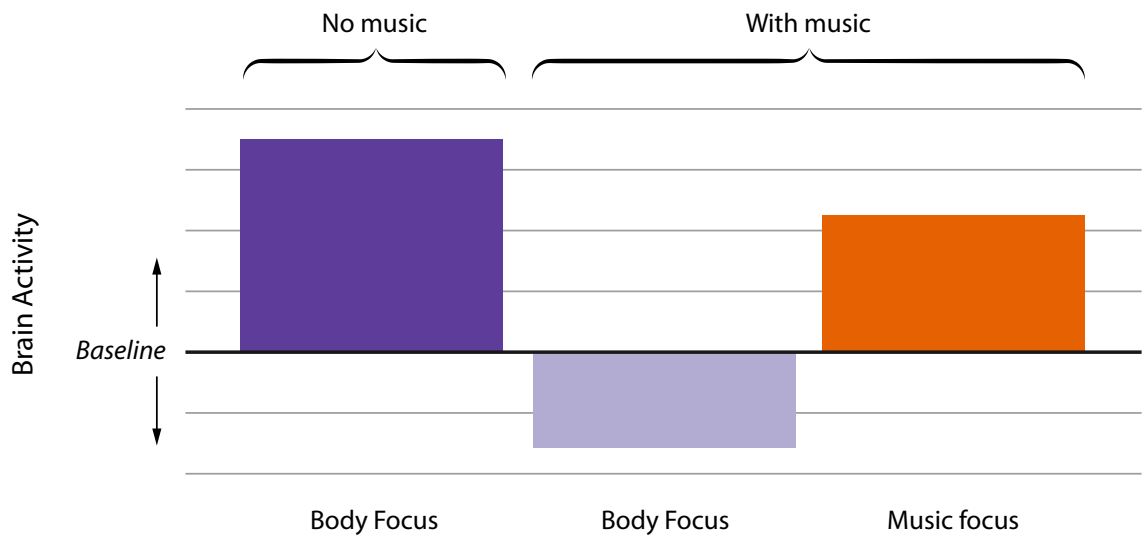


Figure 2: Brain activity during Experiment 2. This was measured using the oxygen concentration in blood cells in the left prefrontal cortex. Values above baseline indicate greater brain activity and values below baseline indicate reduced brain activity.

Discussion

Our results show that focusing on music can make hard exercise more enjoyable. We saw that participants had much higher brain activity during the body focus runs without music. And less during the body focus runs with music. Asking participants to focus on their bodies means the brain has to work hard. It is actively controlling the body's movements and emotions. When music is playing, we think that the brain gets distracted from the body. The body will run more on "autopilot" instead of the brain controlling each movement. This makes exercise less mentally taxing. This means that it is easier to push through a workout when your body is tired.

We were surprised by some results in Experiment 2. We had **hypothesized** that the music-focused runs would reduce activity in the brain the most. But that's not what we saw. This might be because of our experimental design. We told participants to count the beats of the music to focus. But the music beats didn't match the participants' steps. Focusing on the music this way might actually take more mental effort.

Conclusion

We know that feeling good about exercise can help people work out. This is important for long-term health. And paying attention to music makes people feel better. We recommend listening to music and focusing on it as a good strategy to make exercise feel more enjoyable. Music also helps the brain calm down. When do you listen to music? During exercise? What about during other activities? How does that music make you feel? Does music make difficult tasks more enjoyable to you? Next time you exercise, try listening to music and notice how your body and brain feel!

Glossary of Key Terms

Hypothesize - to make a hypothesis, a proposed and testable explanation for the relationship between things.

Maximum heart rate - the maximum number of beats your heart can make each minute. This is determined by running at increasingly faster speeds and inclines until your heart rate doesn't increase any more.

Prefrontal cortex - area in the front of the brain that controls emotions, decision-making, and self-control. It's the part of the brain that forms the latest in life – even after the age of 20.

Resting heart rate - the number of heartbeats per minute when someone is not active. We measured this while participants sat quietly for 5 minutes.

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Check your understanding

1. Why did we have the participants exercise at high intensity?

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2. What did the headband measure during Experiment 2? Why was this important to measure?

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3. All experiments have limitations and weaknesses. What is one limitation, or weakness, of this study? And what could we have done differently so it was no longer a limitation?

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4. Using the results from Experiment 2, make a hypothesis about why there might be a difference in how people feel listening to slow vs. fast music while they exercise. Justify your hypothesis.

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5. Music can change our mood even in everyday life. When was one time music changed your own mood? Did it make you feel better or worse? Why do you think that was?
