

How Do Video Games Impact Your Heart Rate

Grade Level:
4th Grade



Testable Question:

How do video games impact your heart rate?

Do they increase, decrease or have no impact on your heart rate?

Does the kind of game make a difference (passive or active) ?

Prediction:

I think video games will increase a person's heart rate.

I also think active games will increase a person's heart rate more than passive games

Procedure: 5pts - Describe the step-by-step process you have planned in a way that someone else could repeat the same process. Be detailed and as clear as possible. Use as many or as few steps as you need.

1. For each participant, I had a parent / guardian sign a human experiment consent form
2. Assigned a participant a participant number to protect their privacy
3. I selected a game
4. Measured resting heart rate before playing the game
5. Set a timer for 10 minutes
6. Played video game for 10 minutes
7. Measured heart rate at the ten minute mark
8. Set another timer for 10 minutes
9. Played for another 10 minutes
10. Measured heart rate at 20 minute mark
11. For each measurement, I recorded the heart rate

Background: 5 pts - Describe why this project was selected and share what you found out in your research. Explain why this project is important.

I chose this project because I like playing video games and I wanted to understand if the video games I play have a significant impact on my heart rate.

In my research I found out that heart rate can be a good predictor of person's health as well as their stress level. While some increase in heart rate can be good or acceptable, Excessive increase in heart rate can be dangerous. An example of that is a heart attack.

This project is important because helps me understand the impact of my activities on my health.

Constant Conditions: 10 pts - Identify your independent variable, dependent variable, and constant conditions. Be sure to measure in metric measurements.

Independent Variable: The independent variable for this experiment was the game we played.

Dependent Variable: The dependent variable that we measured was the heart rate of the participant.

Constant Conditions:

- Measurement times (0, 10, 20 minutes)
- Content rating (E for everyone)
- Skill level of players (gamers were familiar with the games)
- Kept the age range of participants the same (kids)

Data and Trials:

Games Used:

- Mario Kart 8 deluxe (Racing)
 - Passive
 - E Content Rating
- Mario Kart 8 deluxe (Battle Mode)
 - Passive
 - E Content Rating
- Ringfit Adventure
 - Active
 - E Content Rating
- Minecraft Dungeons
 - Passive
 - E Content Rating

Data and Trials: 15 pts & 5 pts -

Overall Summary of Results Average Change in Heart Rate

| Summary of Results | Mario Kart 8 Racing |
|--------------------|---------------------|
| Trial 1 | 14 |
| Trial 2 | -1 |
| Trial 3 | 5 |
| Total | 6 |

| Summary of | Ring Fit Adventure |
|------------|--------------------|
| Trial 1 | -2 |
| Trial 2 | 3 |
| Trial 3 | 16 |
| Total | 5.666666667 |

| Summary of | Mario Kart 8 Battle Mode |
|------------|--------------------------|
| Trial 1 | 23 |
| Trial 2 | -8 |
| Trial 3 | 15.5 |
| Total | 10.16666667 |

| Summary of | Minecraft Dungeons |
|------------|--------------------|
| Trial 1 | 6.5 |
| Trial 2 | -1 |
| Trial 3 | 13.5 |
| Total | 6.333333333 |

- Measurements are in Beats Per Minutes (BPM)

Data and Trials:

Mario Kart Racing (Passive Game)

| | | | | |
|---------------------|----|-----|-----|--------|
| Game | | | | |
| Mario Kart 8 Deluxe | | | | |
| Racing | | | | |
| Minutes | 0 | 10 | 20 | Change |
| P2 (1) | 74 | 94 | 104 | 30 |
| P3 (1) | 83 | 78 | 81 | -2 |
| Minutes | 0 | 10 | 20 | Change |
| P2(2) | 96 | 100 | 96 | 0 |
| P3(2) | 93 | 96 | 91 | -2 |
| Minutes | 0 | 10 | 20 | Change |
| P2(3) | 95 | 109 | 107 | 12 |
| P3(3) | 92 | 85 | 90 | -2 |

All Measurements in Beats per minute

Px

X indicates participant ID

(y)

Y indicates experiment number

Data and Trials:

Mario Kart Battle Mode (Passive Game)

| Minutes | 0 | 10 | 20 | Change |
|---------|----|-----|-----|--------|
| P2(1) | 67 | 100 | 113 | 46 |
| P3(1) | 72 | 78 | 72 | 0 |

| Minutes | 0 | 10 | 20 | Change |
|---------|-----|----|----|--------|
| P2(2) | 100 | 98 | 83 | -17 |
| P3(2) | 70 | 69 | 71 | 1 |

| Minutes | 0 | 10 | 20 | Change |
|---------|----|----|-----|--------|
| P2(2) | 77 | * | 107 | 30 |
| P3(2) | 75 | 73 | 76 | 1 |

All Measurements in Beats per minute

Px

X indicates participant ID

(y)

Y indicates experiment number

Data and Trials:

Ring Fit Adventure (Active Game)

| Minutes | 0 | 10 | 20 | Change |
|---------|----|----|----|--------|
| P2(1) | 87 | 75 | 99 | 12 |
| P3(1) | 94 | 95 | 78 | -16 |

| Minutes | 0 | 10 | 20 | Change |
|---------|----|----|----|--------|
| P2(2) | 98 | 93 | 99 | 1 |
| P3(2) | 75 | 74 | 80 | 5 |

| Minutes | 0 | 10 | 20 | Change |
|---------|----|----|-----|--------|
| P2(3) | 93 | 88 | 86 | -7 |
| P3(3) | 80 | 90 | 119 | 39 |

All Measurements in Beats per minute

Px

X indicates participant ID

(y)

Y indicates experiment number

Data and Trials:

Minecraft Dungeons (Passive)

| Minutes | 0 | 10 | 20 | Change |
|---------|----|----|----|--------|
| P2(1) | 87 | 75 | 99 | 12 |
| P3(1) | 94 | 95 | 78 | -16 |

| Minutes | 0 | 10 | 20 | Change |
|---------|----|----|----|--------|
| P2(2) | 98 | 93 | 99 | 1 |
| P3(2) | 75 | 74 | 80 | 5 |

| Minutes | 0 | 10 | 20 | Change |
|---------|----|----|-----|--------|
| P2(3) | 93 | 88 | 86 | -7 |
| P3(3) | 80 | 90 | 119 | 39 |

All Measurements in Beats per minute

Px

X indicates participant ID

(y)

Y indicates experiment number

Conclusion and Reflection: 10 pts -

I found out that:

- The summary results indicate an overall minor increase in heart rate
- Reviewing individual results indicates that the summary results are possibly misleading.
- One participant had large increases in heart rate while the other participant had decreases in heart rate. The large increases pulled the average up leading to the overall summary results being an increase.
- In summary based on the data the results of the project are inconclusive.
- This is true for both active and passive games

I was surprised that the data was not that obvious one way or the other. Heart rate readings were harder to get using the pulse oximeters I was using.

Conclusion and Reflection: 10 pts -

If I did this project again:

- Improve heart rate measurement
 - Use multiple/better pulse oximeters
- Expand the number of participants
- Have a wider variety of games
- More content ratings for games