GROUP A
Jes Carey
Roselynn Conrady
Torie Harmon
Neil O'Mara
Jennifer Soh
Marrisa Yang

Final Research Project: Survey

10th May 2023

OVERVIEW

From the opening Gregorian chant of the *Halo* series to the 8-bit theme of *Super Mario Bros.*, there is no doubt that many soundtracks in the gaming industry have gone on to become a staple of mainstream culture. The implementation of soundtracks can often create an immersive experience for users, but to what extent can they increase user engagement? This is the question we are seeking to answer in our survey proposal: "Can the engagement of video game users be influenced by adding a soundtrack?"

METHODOLOGY

Surveys give researchers the ability to sample large populations in a time effective manner. Additionally, this methodology will allow our team to focus directly on collecting the information that is most desirable to our research. It is our belief that conducting a

survey will provide us with the sample size and data necessary to accurately measure our results, thereby aiding in testing our hypothesis. Due to the rising popularity of video games, there is no shortage of video game enthusiasts for our group to survey. The popularity surrounding video games will also increase the chances of finding participants that are willing to complete a survey for our study. These two attributes will make conducting a survey a far more convenient methodology, and help us to gain the information that we need for our research.

UNIT OF ANALYSIS

The unit of analysis would be randomly selected participants recruited via email, text message, personal conversations and social media postings. Participants will be between the ages of 18 - 80 with at least some experience playing any type of video game. Additionally, participants must have had the ability to hear when playing video games in order to answer survey questions regarding audio and how it affects their experience with video games. Participants must also have access to an electronic device in order to fill out the survey.

SAMPLING

In order to feasibly complete this study in the remaining amount of time, our team opted to recruit participants from within our social circles, which included family members, friends, work acquaintances, and fellow Iowa State University classmates. Recruitment was carried out through emails, text/Microsoft Teams/Discord messages, and in person

conversations. To encourage participation, the team emphasized the short estimated completion time of the survey (around 5 minutes) so potential candidates would not feel that the task was too much of a burden.

Since our team members were based in different locations, participants were recruited across a variety of regions in the United States as a result. Although there was a higher representation of participants in the 18-35 age range (since many acquaintances were of similar age to the team members), the data gathered still yielded insights on how video game soundtrack impacts player engagement– just for a somewhat narrower age range.

MEASUREMENTS

This study will utilize a self-administered online survey to collect data from participants. The survey will consist of 14 questions that will measure participants' demographic information, gaming experience, and perceptions of the relationship between video game soundtracks, sound effects, and user engagement.

Variables:

Age: This demographic variable will be measured with a single closed-ended question.

Gender: This demographic variable will be measured with a single closed-ended question that includes inclusive gender options and an option to not answer.

Gaming experience level: This demographic variable will be measured with a single closed-ended question with three options: New gamer, Intermediate gamer, and Advanced gamer.

Genre of games played: This variable will be measured with a single closed-ended question with options including Action/adventure, RPG (including MMORPG), Puzzle, Racing, Sports, Horror, and Other.

Platform(s) used for playing video games: This demographic variable will be measured with a single closed-ended question with options including PC, Xbox, PlayStation, Nintendo Switch, Mobile, and Other.

Listening device used while playing video games: This variable will be measured with a single closed-ended question with options including Headset, Headphones/earbuds, External speakers, Built-in speakers, No audio, and Other.

Frequency and duration of video game play: This variable will be measured with two closed-ended questions: one asking about the number of days per week that the participant usually plays video games, and the other asking about the number of hours per day that the participant usually plays video games.

Impact of soundtrack/sound effects on enjoyment of the game: This variable will be measured using a 6-point Likert scale with response options ranging from "Not at all" to "A significant".

Importance of soundtrack/sound effects when choosing games to play: This variable will be measured using a 7-point Likert scale with response options ranging from "Extremely unimportant" to "Extremely important".

Influence of soundtrack/sound effects on emotional response while playing: This variable will be measured using a 6-point Likert scale with response options ranging from "Not at all" to "A significant amount".

Frequency of turning off soundtrack/sound effects while playing: This variable will be measured using a 7-point Likert scale with response options ranging from "Never" to "Always". If an option from “Occasionally” to “Always” is selected, this will trigger a follow-up open-ended question asking for details as to why.

Impact of soundtrack/sound effects on motivation to continue playing: This variable will be measured using a 6-point Likert scale with response options ranging from "Not at all" to "A significant amount".

What game has the best soundtrack and what makes it the best: This variable will be measured using an open-ended question.

To assess the reliability of the Likert scale questions, Cronbach's alpha coefficient will be calculated. A coefficient of 0.70 or higher will indicate good reliability. To assess the validity of the Likert scale questions, construct validity will be examined by conducting a factor analysis. The open-ended question will be analyzed using content analysis to identify common themes and patterns in the responses. We will also assess the face validity of the survey questions by pre-testing the survey with a small sample of participants to ensure that the questions are clear, understandable, and relevant to the research question. Lastly, we will monitor the data quality by examining the response patterns for each item, checking for missing data, and removing any incomplete surveys.

PROCEDURE/DESIGN

Participants that fall within the unit of analysis (see "Unit of Analysis" for more details) will be recruited via emails, text messages, and in person conversation (see “Sampling” for more details). Next, participants will be directed to take a self-administered Qualtrics survey (to see all survey questions, see Appendix section 3). The participants will voluntarily choose to agree or disagree to informed consent. Informed consent and survey responses will be collected from the participants via Qualtrics. Participants will be given guidelines and disclosures to read, and then they will press the “I consent, begin

study" button to indicate that they have given their consent or "I do not consent, I do not wish to participate" if they do not want to give their consent.

After informed consent, demographics of the participants (see "Measurements" section for more details on demographics variables) were gathered. Next, questions about the participants video game habits and audio preferences were collected (see "Measurements" section for more details on these variables):

At the end of the survey, participants were thanked for their time and were told that their responses have been recorded.

After the data was collected, the team recoded the responses in order to prepare the data for analysis. Answers that were not continuous variables were coded in incremental integers from "1," "2," and so forth until all items in that particular question had an integer (e.g., "Male," "Female," "Non-binary," and "Other" became "1," "2," "3," and "4," respectively). For example the answers "Not at all," "A minimal amount," "A small amount," "An average amount," "An above average amount," and "A significant amount" were recoded to "1," "2," "3," "4," "5," "6," and "7," respectively. Another example is with video genres "Action/Adventure," "RPG (including MMORPG)," "Puzzle," "Racing," "Sports," "Horror," and "Other" that were recoded to "1," "2," "3," "4," "5," "6," and "7," respectively. After recoding the responses, JASP and Microsoft Excel were used to perform data analysis.

RESULTS

A total of 115 responded to the survey, and 108 responses were used. Out of 115 responses, 7 responses were excluded (i.e., 1 participant did not give their consent to continue participating in the study and 6 participants did not finish the majority of the survey). After excluding participants, the team performed data analyses on several hypotheses related to the overarching research question.

QUANTITATIVE RESULTS/CLOSED ITEMS

The descriptive statistics for our complete ordinal data set can be found below.

Descriptive Statistics

Descriptive Statistics

	What is your gender?	What gaming experience level would you consider yourself to have?	How many days per week do you usually play video games?
Valid	108	108	108
Missing	0	0	0
Mean	1.463	3.120	4.130
Std. Deviation	0.554	0.883	2.162
Minimum	1.000	1.000	1.000
Maximum	3.000	4.000	7.000

Figure 1: Descriptive statistics for ordinal data set

(Encoded) On days that you do play video games, typically how long do you spend playing them?	(Encoded) What genre of games do you usually play?
108	108
0	0
1.389	6.157
0.624	2.802
1.000	1.000
3.000	8.000

Figure 2: Descriptive statistics for ordinal data set, continued

(Encoded) What platform(s) do you typically play video games on?	(Encoded) How do you typically listen to your game?	(Encoded) How much does the quality of a video game's audio impact your enjoyment of the game?
108	108	108
0	0	0
5.407	2.935	4.352
2.324	1.320	1.423
1.000	1.000	1.000
7.000	6.000	6.000

(Encoded) How important is the presence of a soundtrack (or sound effects) when choosing which video games to play?	(Encoded) How much does the presence of a soundtrack (or sound effects) impact your motivation to continue playing a video game?
108	108
0	0
4.639	3.750
1.705	1.511
1.000	1.000
7.000	6.000

Figure 3: Descriptive statistics for ordinal data set, continued

Reliability of the primary engagement Likert scale questions (“How much does the quality of a video game's audio impact your enjoyment of the game?”, “How important is the presence of a soundtrack (or sound effects) when choosing which video games to play?”, “Does the audio of a video game influence your emotional response while playing?”, and “How much does the presence of a soundtrack (or sound effects) impact your motivation to continue playing a video game?”). We ran a unidimensional reliability test on this data to determine if the Cronbach's alpha value was within the acceptable bound. The lower bound for this data set had a Cronbach's alpha value of 0.817, which is accepted as a “good” level of reliability.

Frequentist Scale Reliability Statistics

Estimate	Cronbach's α
Point estimate	0.865
95% CI lower bound	0.817
95% CI upper bound	0.902

Figure 4: Reliability statistics and Cronbach’s alpha

We then ran an exploratory factor analysis on our complete ordinal data sets. The number of factors was based on a parallel analysis with an oblique rotation. The output from this exploratory factor analysis suggests that there exists a developable hypothesis regarding the relationship between our variables as most have values over 0.6.

Exploratory Factor Analysis

Chi-squared Test

	Value	df	p
Model	90.529	43	< .001

Factor Loadings

	Factor 1	Factor 2	Uniqueness
(Encoded) Does the audio of a video game influence your emotional response while playing?	0.823		0.297
(Encoded) How much does the quality of a video game's audio impact your enjoyment of the game?	0.785		0.294
(Encoded) How much does the presence of a soundtrack (or sound effects) impact your motivation to continue playing a video game?	0.782		0.434
(Encoded) How important is the presence of a soundtrack (or sound effects) when choosing which video games to play?	0.770		0.430
(Encoded) How often do you turn off the audio while playing a video game?	−0.694		0.489
What gaming experience level would you consider yourself to have?		0.930	0.005
How many days per week do you usually play video games?		0.621	0.621
What is your gender?		−0.421	0.831
(Encoded) On days that you do play video games, typically how long do you spend playing them?			0.860
(Encoded) What genre of games do you usually play?			0.939
(Encoded) What platform(s) do you typically play video games on?			0.971
(Encoded) How do you typically listen to your game?			0.899

Note. Applied rotation method is promax.

Figure 5: Exploratory factor analysis with Chi-squared Test and Factor Loadings

Our overall research question was “Can the engagement of video game users be influenced by adding a soundtrack?” While analyzing our data, we found an interesting trend. Within the data for participants who reported that the presence of a soundtrack (or sound effects) significantly increases their motivation to continue playing a video game, we discovered that this variable impacted the duration (hours per day) of gameplay, not the frequency (days per week) of gameplay.

We started with the analysis of our “soundtrack impact on motivation” variable (independant, nominal variable) and compared it to the reported frequency of gameplay (dependent, ordinal variable). Since this is non-parametric data, we performed a Kruskal Wallis test where we found our results were not statistically significant (p = 0.24).

ANOVA - How many days per week do you usually play video games?

Cases	Sum of Squares	df	Mean Square	F	p
How much does the presence of a soundtrack (or sound effects) impact your motivation to continue playing a video game?	32.529	5	6.506	1.419	0.224
Residuals	467.656	102	4.585		

Note. Type III Sum of Squares

Kruskal-Wallis Test

Kruskal-Wallis Test

Factor	Statistic	df	p
How much does the presence of a soundtrack (or sound effects) impact your motivation to continue playing a video game?	6.730	5	0.242

Figure 6: ANOVA and Kruskal Wallis test results on”soundtrack impact on motivation” and frequency of gameplay

We then moved on to analyze our “soundtrack impact on motivation” variable (independant, nominal variable) compared to the reported duration of gameplay (dependent, ordinal variable). It should be noted that for this particular test, our duration of gameplay data was collected as nominal data and was encoded to be used as ordinal data. With this also being a non-parametric dataset, we again performed a Kruskal Wallis test where we found our results were statistically significant in this instance (p = 0.036).

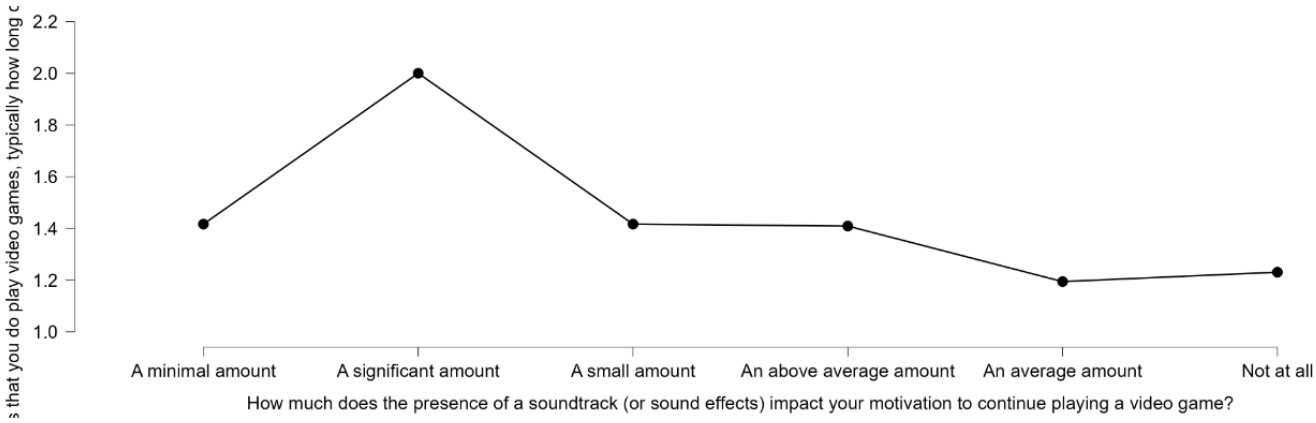
ANOVA - (Encoded) On days that you do play video games, typically how long do you spend playing them?

Cases	Sum of Squares	df	Mean Square	F	p
How much does the presence of a soundtrack (or sound effects) impact your motivation to continue playing a video game?	6.569	5	1.314	3.818	0.003
Residuals	35.098	102	0.344		

Note. Type III Sum of Squares

Descriptives

Descriptives plots



Kruskal-Wallis Test

Kruskal-Wallis Test

Factor	Statistic	df	p
How much does the presence of a soundtrack (or sound effects) impact your motivation to continue playing a video game?	11.925	5	0.036

Figure 7: ANOVA descriptive plot and Kruskal Wallis descriptives test results on “soundtrack impact on motivation” and duration of gameplay

To verify our discovery of the effects of our “soundtrack impact on motivation” variable (independant, nominal variable) on the duration of gameplay, we ran our “soundtrack impact on motivation” data against our gameplay data in its original nominal form. For this data set we conducted a Chi-square test as both variables were categorical. The result of our Chi-square test confirmed a statistical significance in this instance ($p = 0.007$).

Contingency Tables

On days that you do play video games, typically how long do you spend playing them?	How much does the presence of a soundtrack (or sound effects) impact your motivation to continue playing a video game?						
	A minimal amount	A significant amount	A small amount	An above average amount	An average amount	Not at all	Total
1-3 hours	8	5	8	14	29	10	74
4-6 hours	3	3	3	7	7	3	26
7 or more hours	1	5	1	1	0	0	8
Total	12	13	12	22	36	13	108

Chi-Squared Tests

	Value	df	p
X^2	24.411	10	0.007
N	108		

Figure 8: Chi-square test results on “soundtrack impact on motivation” and duration of gameplay

In the present study, an additional hypothesis that our team created aimed to explore the influence of audio quality in video games on user engagement, specifically comparing the experiences of users who utilize headsets while gaming to those who do not. Our hypothesis posited that the impact of audio quality on user enjoyment would be more pronounced for gamers who employ headsets, as opposed to those who engage with video games without using headsets. A Mann-Whitney U test was conducted to examine the differences of enjoyment scores between the two groups. The test revealed a significant difference between the distributions of headset users and non-headset users (W= 1711.500, p = 0.002). This result supports the hypothesis that the quality of a video game’s audio has a greater impact on user enjoyment for those who listen to video games with a headset compared to those who do not. Additionally, the Rank-Biserial Correlation was calculated to quantify the strength of the relationship between headset usage and the impact of audio quality on user enjoyment. A moderate positive relationship was observed (r = 0.360), indicating that headset usage is associated with higher self-reported impact of audio quality on enjoyment. The standard error of the Rank-Biserial Correlation was found to be 0.120. In conclusion, the findings of this study

suggest that the quality of a video game's audio has a greater impact on user enjoyment for users who listen to video games with a headset compared to users who do not. Further research could explore the factors that contribute to this difference in audio quality impact on enjoyment, such as the type of headset, the game genre, or individual preferences and expectations of the players.

Soundtrack importance and participant's emotional response: a potential correlation

Another hypothesis we tested was whether the importance of the soundtrack/sound effects' presence was positively correlated with a participant's emotional response while playing a game, e.g., participants who felt the game's audio was important were more likely to feel an emotional response when playing. This potential correlation between these two variables was measured by Pearson's r and the p-value. Pearson's r was found to have a value of 0.609 and the p-value was less than 0.001, indicating a statistically significant result. This meant that, among the participants in this study, the importance of the presence of a soundtrack and the emotional response of participants were found to be positively correlated.

Pearson's Correlations ▼

Variable		Importance of soundtrack presence	Emotional response to audio
1. Importance of soundtrack presence	Pearson's r	—	
	p-value	—	
2. Emotional response to audio	Pearson's r	0.609***	—
	p-value	< .001	—

Note. All tests one-tailed, for positive correlation.
* p < .05, ** p < .01, *** p < .001, one-tailed

Figure 9: Pearson's correlation results on the importance of the presence of a soundtrack and emotional response

Tendency for turning off video game audio and its effect on age

An additional hypothesis that was tested was: Those who tend to turn off the video game audio are more likely to be older adults (40 years old and above). The independent variable (frequency of turning off video game audio) had seven levels (i.e., "Not at all," "A minimal amount," "A small amount," "An average amount," "An above average amount," and "A significant amount") that were encoded to integers one through seven, and the dependent variable (age) was continuous. Therefore, a one-way ANOVA was performed. The effect of frequency of turning off video game audio on age was found to be statistically significant ($F(6, 101) = 52.9$, $p < 0.01$, $\eta^2 = 0.369$). However, it should be noted that there was a large variation in age for those who turned off their audio "A significant amount" of time.

ANOVA - What is your age?

Cases	Sum of Squares	df	Mean Square	F	p	η^2
(Encoded) How often do you turn off the audio while playing a video game?	3132.028	6	522.005	9.864	< .001	0.369
Residuals	5344.713	101	52.918			

Note. Type III Sum of Squares

Descriptives

Descriptives - What is your age?

(Encoded) How often do you turn off the audio while playing a video game?	N	Mean	SD	SE	Coefficient of variation
1	26	30.115	6.532	1.281	0.217
2	40	28.550	8.143	1.287	0.285
3	18	27.444	6.032	1.422	0.220
4	7	35.429	6.399	2.419	0.181
5	8	25.000	5.952	2.104	0.238
6	6	38.667	5.989	2.445	0.155
7	3	56.333	14.154	8.172	0.251

Figure 10: One-way ANOVA results and descriptive statistics on tendency to turn off video game audio and age

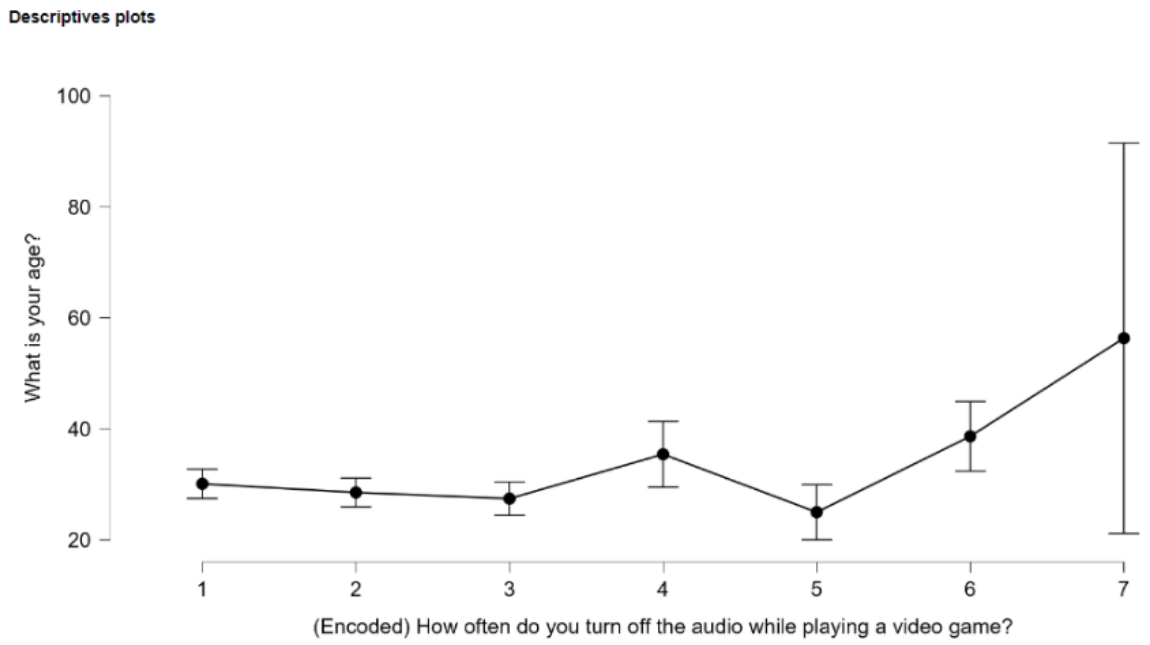


Figure 11: Descriptive plot of one-way ANOVA on tendency to turn off video game audio and age

Audio presence in video games: comparison of exclusive puzzle players

In addition to examining whether older adults are more likely to disable video game audio, we also investigated whether there is a significant difference in the presence of audio between individuals who exclusively play puzzle games and those who play other types of games. An Brown-Forsythe independent samples t-test was conducted to compare the usage of audio for people who exclusively played puzzle games and those who played other video games. There was a statistically significant difference in scores for those who exclusively played puzzle games and responded that they don't use audio (M = 0.98, sd = 0.141) and those who played other games and use some audio device to listen to the game soundtrack (M = 0.222 sd = 0.441); t(df) = 11.949, p = .001 or < 0.05.

These results suggest that genre (specifically - exclusively playing puzzle games) can impact an individual's preference for game audio.

Independent Samples T-Test

Independent Samples T-Test

	t	df	p
No Audio	11.949	106	< .001[a]

Note. Student's t-test.
[a] Brown-Forsythe test is significant ($p < .05$), suggesting a violation of the equal variance assumption

Descriptives

Group Descriptives

	Group	N	Mean	SD	SE	Coefficient of variation
No Audio	0	99	0.980	0.141	0.014	0.144
	1	9	0.222	0.441	0.147	1.984

Figure 12: Brown-Forsythe independent samples t-test results comparing usage of audio for gamers who exclusively played puzzle games.

Gender and its effect on the frequency that audio is turned off

We also tested the hypothesis that gender affects the frequency in which audio is turned off. Using a one-way ANOVA (IV = gender, three levels; DV = frequency of audio being turned off, 7 levels), we found that there is a significant difference in people of different genders muting the audio of their video games, $F(2, 105) = 2.43$, $p < 0.049$. According to

our data, people that identify as female are more likely to mute their audio while playing a video game than those that identify as male, non-binary, or other.

ANOVA - (Encoded) How often do you turn off the audio while playing a video game?

Cases	Sum of Squares	df	Mean Square	F	p
What is your gender?	15.171	2	7.586	3.114	0.049
Residuals	255.746	105	2.436		

Note. Type III Sum of Squares

Descriptives - (Encoded) How often do you turn off the audio while playing a video game?

What is your gender?	N	Mean	SD	SE	Coefficient of variation
1	61	2.328	1.411	0.181	0.606
2	44	3.091	1.776	0.268	0.575
3	3	2.333	0.577	0.333	0.247

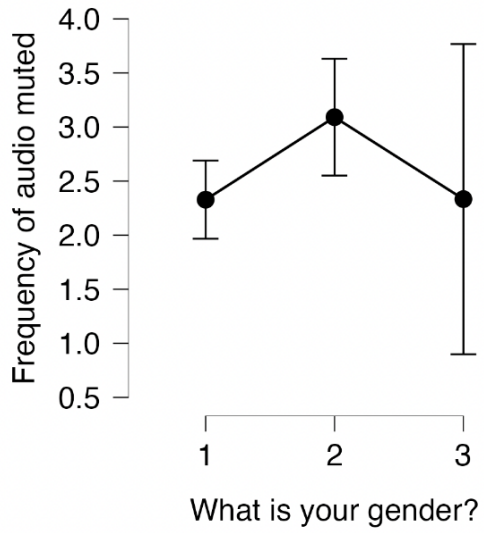


Figure 13: ANOVA results on gender and its effect on tendency to turn off video game audio

QUALITATIVE RESULTS/OPEN-ENDED ITEMS

Our analysis method for analyzing our qualitative data consisted primarily of a classic content analysis approach as well as a partial thematic analysis approach. We used an inductive, bottom-up approach while coding data. While doing so, we looked for similarity, difference, frequency, and sequence patterns. To limit bias we refrained from over-interpreting and based analysis on only what participants provided. Interrater reliability methods were used to provide consistency of measurement within our qualitative data.

When reviewing the responses to the open-ended question of what games had the best soundtrack and why the participant thought those soundtracks were the best, we noticed some common themes. These themes were coded as emotional response (audio invoked emotions at significant moments), atmospheric/theme (audio fit the theme/aesthetics of the game), memorable audio (audio left a lasting impression and/or invoked nostalgic feelings), enjoyable audio (participant liked listening to the audio and/or appreciated its artistic qualities even outside the context of the game), no effect (participant was unaffected by the audio), and other (this included cases where the participant listed a game but didn't elaborate on why they enjoyed the audio). If a response mentioned aspects of more than one code (e.g., a game had a memorable soundtrack where the music reflected the calm atmosphere of the setting), the response was included in the counts for those multiple aspects.

We found that, for the responses that didn't fall into the codes as no effect and/or other (i.e., the participant elaborated on why they considered a certain soundtrack the best), the codes for emotional response, atmosphere, and enjoyability had the highest counts. They were also balanced among those three codes, indicating that factors related to those codes may have relatively equal importance on how a game's audio impacts the player.

Code	Description	Number of responses	Examples
Emotional response	Audio invoked an emotional response and/or engaged the participant in the story	36	"[Doom/Doom Eternal is] incredibly good at the core feelings that the game tries to provoke from the player: raw hatred and carnage for demons"
Atmospheric/theme	Participant felt the audio fit with the overall atmosphere/theme of the game	36	"Animal Crossing. Chill vibes"
Memorable audio	Audio left a lasting impression on the player and/or invoked nostalgia	13	"it was a game I played a lot growing up so it's nostalgic"
Enjoyable audio	Participant liked the game audio and/or appreciated the artistic qualities of it	35	"I really enjoy the background music [...] maybe because it's a simple melody"
No effect	Participant was unaffected by the game audio	3	"I always turn the volume off so I don't have a

			favorite soundtrack"
Other	Participant didn't respond, responded with N/A, or didn't provide details on why they liked the music	27	"no opinion", "Genshin Impact"

Figure 14: Qualitative analysis codebook and descriptions of participants' responses

DISCUSSION

Some of the limitations of our work is that the majority of the participants (81 out of over 100 participants) are in the 18-35 age range. This could mean that the findings from this study may not generalize well to people outside of that range, and there could be different and/or additional factors that affect how video game audio affects user engagement for that group of people.

Based on the data collected and the data analyses, the presence of a soundtrack (or sound effects) significantly impacts the user's motivation to continue playing a game. But it should also be noted that this variable impacted the duration (hours per day) of gameplay, as opposed to the frequency (days per week) of gameplay.

We also learned that there is a positive correlation between the importance of a video game soundtrack and the player's emotional response while playing a game. This finding supports the idea that the game's audio is relevant to the player's feelings of engagement. The results from the qualitative analysis also lend credence to this idea, as

participants mentioned how game audio would affect their emotional response at key points in the game.

Those that tend to turn off video game audio are more likely to be older adult women (40 years old and above) who play puzzle games. Common reasons for turning off video game audio revolve around not wanting to disturb other people. For example, one participant noted that they would turn off video game audio when their baby is in the room. Several other participants say that they turn off audio in public places or when they are trying to multitask (e.g., talk to and listen to friends, listen to their own music, and watch TV). Another common answer for turning off audio is because the game volume is too “loud” or “annoying.” It should be noted there was a large variation in age in those who answered they turn off video game audio “a significant amount” of time.

The findings of our study, particularly the insights into when and why users disable audio, could have important implications for a variety of stakeholders. For example, developers of popular puzzle games like Candy Crush and Merge Mansion could leverage these findings to enhance their products, gain a better understanding of their target audience, and encourage future research in this area to enhance the user experience and engagement while playing puzzle games. Moreover, these results could contribute to the vast body of research informing the development of brain training games like Lumosity and Elevate, which are designed to improve cognitive function in older populations. Ultimately, our research illuminates the factors that influence user experience and

engagement with video games, providing valuable insights for a range of stakeholders in the gaming industry.

REFERENCES

IJsselsteijn, W. A., de Kort, Y. A. W., & Poels, K. (2013). *The Game Experience Questionnaire*. Technische Universiteit Eindhoven.

APPENDIX

1. Codebook Details

Codebook details for the responses to the open-ended question

Code	Description
Emotional response	Audio invoked an emotional response and/or engaged the participant in the story
Atmospheric/theme	Participant felt the audio fit with the overall atmosphere/theme of the game
Memorable audio	Audio left a lasting impression on the player and/or invoked nostalgia
Enjoyable audio	Participant liked the game audio and/or appreciated the artistic qualities of it

No effect	Participant was unaffected by the game audio

2. **Informed Consent Script**

We are interested in understanding the relationship between video game audio and user engagement. For this study, you will be asked to answer some questions about your gaming experiences. Your responses will be kept completely confidential.

The survey should take you around 5 minutes to complete. Your participation in this research is voluntary. You have the right to withdraw at any point during the study. The Principal Investigators of this study can be contacted at:

Jessica Carey (jescarey@iastate.edu)

Roselynn Conrady (rconrady@iastate.edu)

Torie Harmon (trharmon@iastate.edu)

Neil O'Mara (nomara@iastate.edu)

Jennifer Soh (jcsoh@iastate.edu)

Marrisa Yang (marrisay@iastate.edu)

By clicking the button below, you acknowledge:

You are at least 18 years of age.

Your participation in the study is voluntary.

You are aware that you may choose to terminate your participation at any time for any reason.

This study will not be reviewed by the Institutional Review Board (IRB) of Iowa State University and is being conducted solely for educational purposes.

3. Survey Questions

1. What is your age?
2. What is your gender?
    i. Single answer choices were: “Male,” “Female,” “Non-binary,” “Other,” and “Prefer not to say”
3. What gaming experience level would you consider yourself to have?
    i. Single answer choices were on scale: “New gamer,” “Beginner gamer,” “Intermediate gamer,” and “Advanced gamer”
4. How many days per week do you usually play video games?
    i. Single answer choices were: “1,” “2,” “3,” “4,” “5,” “6,” and “7”
5. On days that you do play video games, typically how long do you spend playing them?
    i. Single answer choices were: “1-3 hours,” “4-6 hours,” and “7 or more hours”

6. What genre of games do you usually play?
    i. Multiple answer choices were: “Action/Adventure,” “RPG (including MMORPG),” “Puzzle,” “Racing,” “Sports,” “Horror,” and “Other”
7. What platform(s) do you typically play video games on?
    i. Multiple answer choices were: “PC,” “Xbox,” “PlayStation,” “Nintendo Switch,” “Mobile Device,” and “Other”
8. How do you typically listen to your game?
    i. Single answer choices were: “Headset,” “Earbuds,” “External speakers,” “Built-in speakers,” “No audio,” and “Other”
9. How much does the quality of a video game's audio impact your enjoyment of the game?
    i. Single answer choices were on scale: “Not at all,” “A minimal amount,” “A small amount,” “An average amount,” “An above average amount,” and “A significant amount”
10. How important is the presence of a soundtrack (or sound effects) when choosing which video games to play?
    i. Single answer choices were on scale: “Extremely unimportant,” “Moderately unimportant,” “Slightly unimportant,” “Neutral,” “Slightly unimportant,” “Moderately important,” and “Extremely important”
11. Does the audio of a video game influence your emotional response while playing?

    i. Single answer choices were on a scale: “Single answer choices were: “Not at all,” “A minimal amount,” “A small amount,” “An average amount,” “An above average amount,” and “A significant amount”

12. Does the audio of a video game influence your emotional response while playing?
    i. Single answer choices were on a scale: “Never,” “Rarely,” “Occasionally,” “About half of the time,” “Frequently,” “Almost Always,” and “Always”
13. How often do you turn off the audio while playing a video game?
    i. If the answer to the above question is “Occasionally,” “About half of the time,” “Frequently,” “Almost Always,” and “Always,” then the following open-ended question will be asked: “Under what circumstances are you most likely to turn off the sound while playing a game?”
14. How much does the presence of a soundtrack (or sound effects) impact your motivation to continue playing a video game?
    i. Single answer choices were on a scale: “Single answer choices were: “Not at all,” “A minimal amount,” “A small amount,” “An average amount,” “An above average amount,” and “A significant amount”
15. In your opinion, what video game has the best soundtrack? What makes it the best?