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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

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**CREATE: Creative Resources to Express Art through Engagement**

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# **CREATE: Creative Resources to Express Art through Engagement**

by

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Submitted in partial fulfillment of the requirements  
for the degrees of  
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Santa Clara University

Santa Clara, California  
June 11, 2021

# **CREATE: Creative Resources to Express Art through Engagement**

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June 11, 2021

## **ABSTRACT**

To address the current mental health crisis, we propose a platform for co-creative systems that users can utilize as art/music therapy. Art therapy can be an effective way of self-expression that results in psychological benefits and improved mood. We analyze the effectiveness of 8 different systems, 4 musical and 4 art-based. These systems allow the users to create while the computer interacts and responds to their input. The results are evaluated on a before and after emotional assessment that we issue to the user. We targeted college age students and distributed our platform to Santa Clara University students during a typically stressful time in the school year. Based on our initial collection of data, co-creativity shows promising results to improve overall mood of users. There was no clear distinction between musical and art systems, however, the results indicate that all of these systems can improve the well-being of college age students. This platform can continue to expand and add more applications as well as extend to new users.

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# Chapter 1

## Introduction

The pandemic has infringed on peoples' freedom, financial stability, and social lives which all ultimately impede on well-being. The mental health crisis has risen and yet there has not been an increase in resources or availability. According to the CDC, symptoms of anxiety disorder or depressive disorder, substance use to cope with COVID-19-associated stress, and serious suicidal thoughts in June of 2020 were most commonly reported by people who were 18–24 years old (2) . To help ease mental health, we aim to provide a therapeutic and creative outlet for these young adults. Our platform will serve as a resource while allowing users to express themselves.

Studies have shown the correlation between art therapy and improvement in well-being. While traditional therapy is beneficial, there are some patients who struggle with expressing themselves verbally out of fear of being judged (1). This struggle to put thoughts into words is common, and contributed to the rise of arts therapies. These different forms of art therapies have succeeded in helping some people engage their emotions and express themselves (3). Extending this to the tech world, computational creativity is a growing field between artificial intelligence, expressibility, and art. Co-creative systems allow humans to interact with AI by aiding in the generation of art. There have been case studies that use co-creative systems to help people deal with grief. Our project will expand on this idea of co-creative systems as a form of art therapy to create a resource where people can easily access different programs to express themselves creatively.

We built a website that integrates multiple co-creative systems to allow users to easily access therapeutic resources. The user takes an initial emotional and interest survey, which is analysed to display the options of co-creative systems that best match the user. Our systems range between visual arts, graphic arts, or music. The user will then have the opportunity to engage with the co-creative system for a maximum of 5 minutes. They also have the option to end early if that is what they want. Whenever the user finishes, they are prompted to take an exit emotional survey. This final survey will be compared against the initial one to evaluate the effectiveness of the system used.

## Chapter 2

# Art Therapy and Computational Creativity

Art therapy is a technique used to treat psychological disorders and enhance mental health (4). It is also known to foster healing, stress, and mental well-being. Doctors have found this type of therapy to be helpful in self-expression when communicating with words is difficult and has been used as a therapeutic field. While artists are creating, they may analyze what they've created and how it makes them feel. It allows people to explore themes and their own feelings. Overall, art therapy has many benefits including being beginner-friendly which is great for incorporating computational creativity. Computational creativity is a growing field between artificial intelligence, expressability, and art. Computers can be taught and fed an aesthetic or art theme and can generate art based on that data. The sophistication of computational creativity has grown over the years as it is difficult to distinguish art created by humans and by computers. Computers can create their own art and aid in human creativity and fostering art therapy.

Our system is built around co-creative systems. They can help engage users through an interactive experience which is especially helpful during these isolating times. Human beings are innately creative and having a computer as an art partner can help cultivate inspiration and overall creativity.

## **Chapter 3**

### **Goals**

The purpose of our system was to create a resource for people. We wanted to keep the focus on the user's experience and well-being so we centered the platform's aesthetic on simplicity and being welcoming. With our platform, we were able to test if our co-creative systems had any effect on emotional relief and overall well-being. We also wanted to test the effectiveness across platforms and types of art. To test our goals, we compared the results of the before and after surveys and compared the systems to determine any correlation.



## **Chapter 4**

# **Development Timeline**

1. Gather co-creative systems
2. Compile before and after mood assessment questions
3. Create platform with initial mood assessment
4. Integrate co-creative systems
5. Connect specific co-creative systems based off of assessment results

## **Chapter 5**

# **Project Risks**

Collecting information from users always has privacy risks. Given that we are asking for a before and after survey of emotional state, it is critical that we ensure the privacy of our users. To alleviate this risk, we will not require any personal identifying information.

Although we are creating a platform targeting the issue of mental health, we are not affiliated with mental health professionals. This project is focused on the well-being, rather than the mental health, of the users. This is not a replacement of counseling for mental health and should not be relied on for a mental health emergency.

We want to make sure our platform is accessible to all users. We know that accessibility is a key concern for many platforms, so we will evaluate each application before integrating it into our website.

# Chapter 6

## Use Cases

- User in distress
- User seeking mood improvement
- User seeking self-expression

Similar to going on a walk, journaling, or playing a video game to “release” one’s emotions, users can use our platform to alleviate their feelings of boredom or isolation. The user would take a survey for our system to analyze their mental state in order to suggest appropriate computational programs for them to interact with. They would then engage with the program for a set period of time. Once they are done with this art therapy “session” the user would take a final survey to evaluate if there was a change in their emotional state.

### **6.1 Schools need more mental health resources**

Given the current strain on mental health professionals, schools might want to use our website as another option for mood improvement for students who cannot see a professional right away. They would make our website easily accessible to their students.

### **6.2 Developer of co-creative system**

This platform is also to evaluate the effectiveness of co-creative systems. If there is a new system out, developers can add it to our website and ask for our analysis of it.

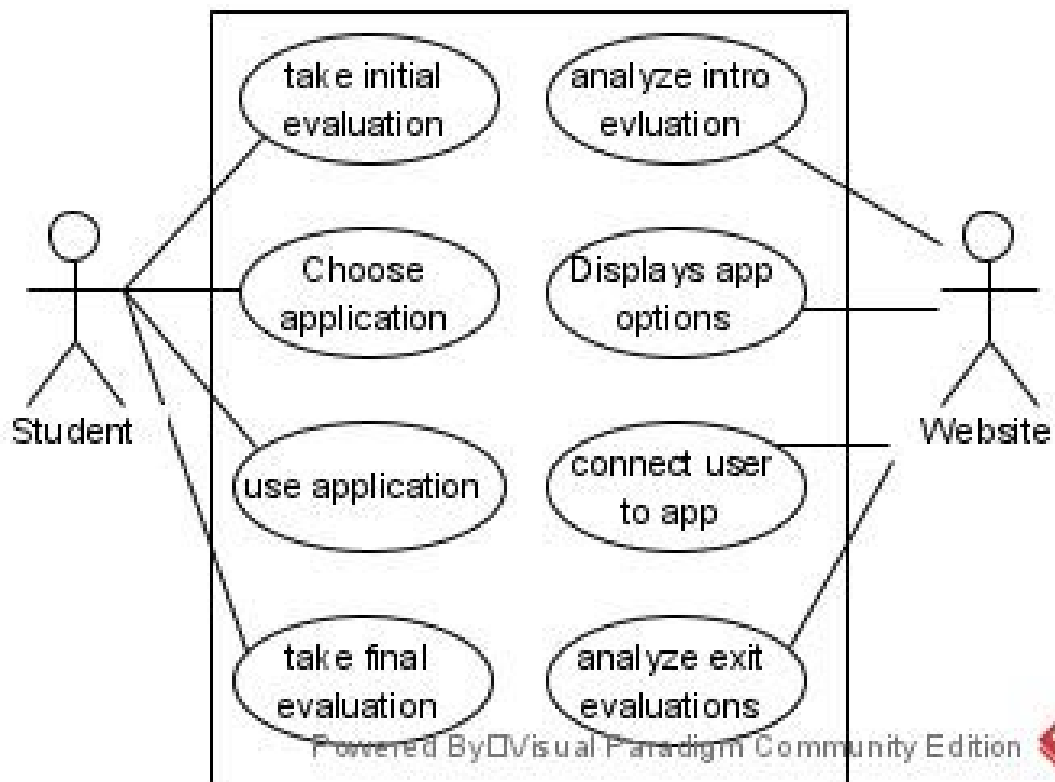


Figure 6.1: Use case diagram

# Chapter 7

## Conceptual Model

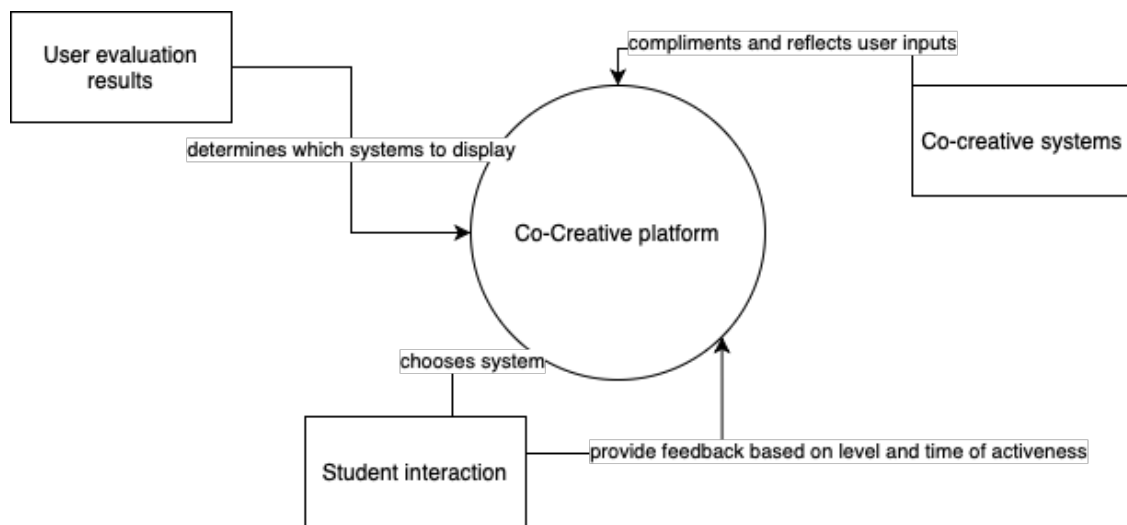


Figure 7.1: Data flow diagram

## **Chapter 8**

# **List of Requirements**

- User in need
- User motivation to create
- Emotion assessment
- Platform for application
- Pool of co-creative systems
- Exit assessment
- Non-Functional Requirement: Ease of use

## Chapter 9

# System Sequence Diagram

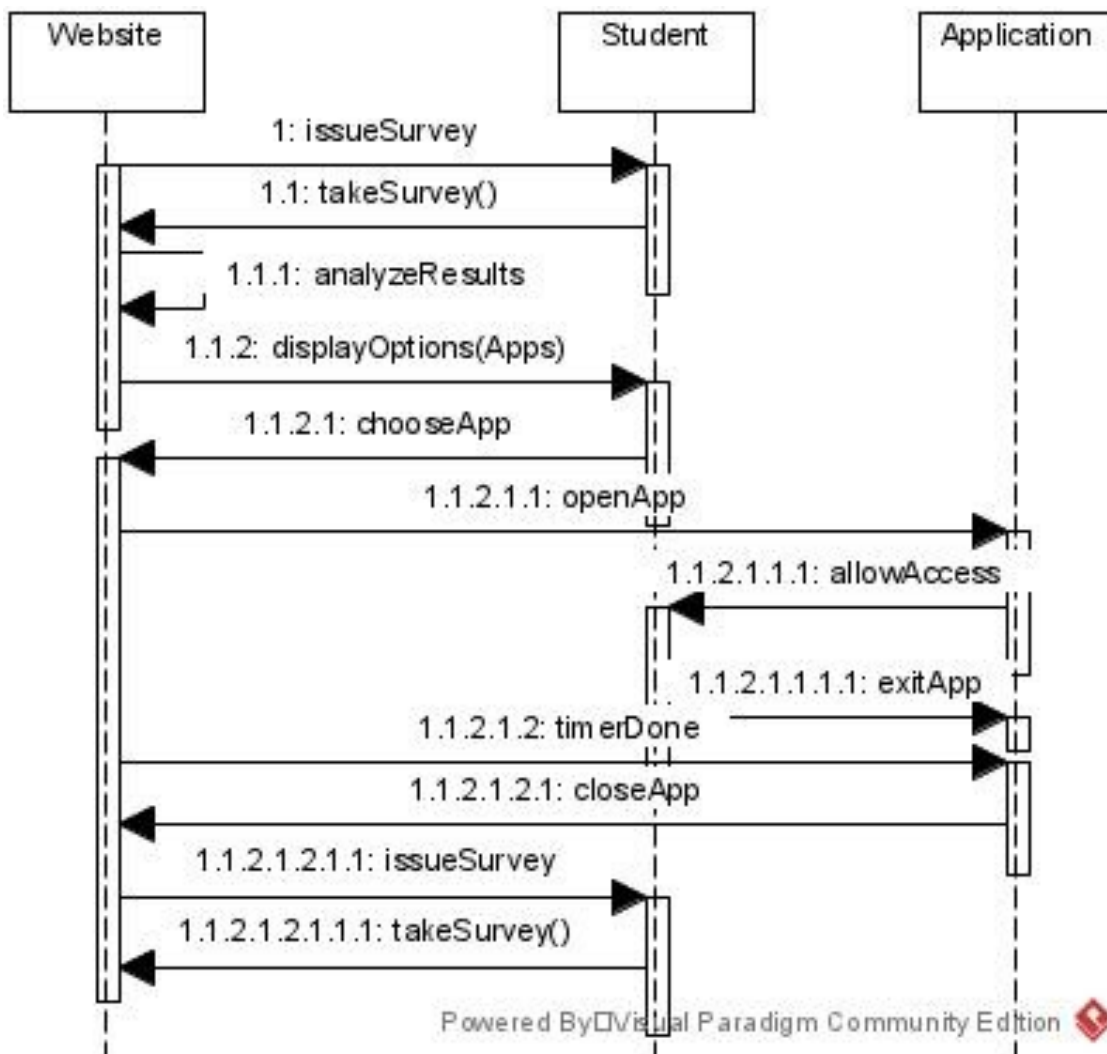


Figure 9.1: Sequence Diagram

## Chapter 10

# Architectural Diagram

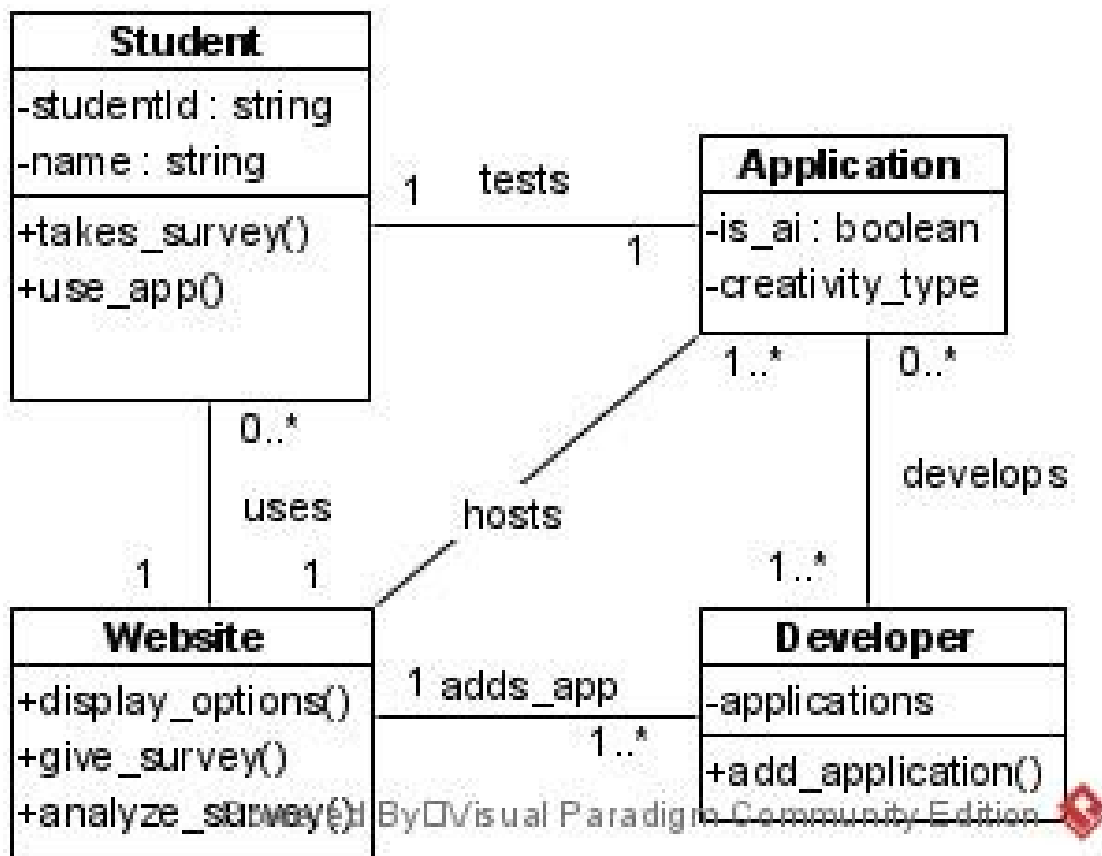


Figure 10.1: Class diagram



## **Chapter 11**

# **Design Rationale**

We designed the platform to be very simple and easy to use. Users can be declined to engage with our platform if the assessment, functionalities, or systems take too long to respond or to navigate towards. This can even lead to negative emotions and decline the users mood, which goes against our purpose. The systems we provide will be beginner-friendly and will guide the users to self-expression. The beauty of computational creativity is that users of all skill levels can engage with and start creating. The design is intended to be welcoming to all experience levels and give the users a positive and engaging interaction.

# Chapter 12

## Technologies Used

Web-based application

- HTML/CSS
- JavaScript
- Django (Python)
- Heroku
- Integrated co-creative systems

# Chapter 13

## Component State Chart

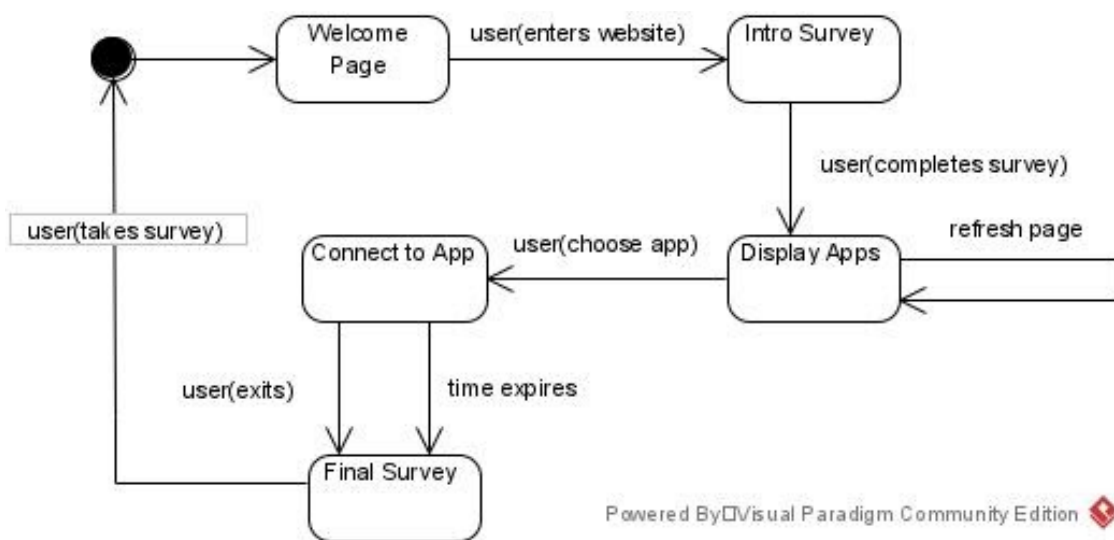


Figure 13.1: State machine

## **Chapter 14**

### **Test Plan**

College students are perfect test subjects during this isolating time. We distributed our platform in the middle of spring quarter which is during one of the most stressful times during a quarter with midterms occurring. We focused on students at Santa Clara to have a controlled test group that was in the age-range that shows the largest risk.

## **Chapter 15**

# **User Manual**

Fill in the circle next to the statement that correlates most to your current state for the initial survey. Then choose whether music or art, and press submit. The website will redirect you to a co-creative site which you can engage with for up to 5 minutes. If you want a new system, simply refresh the page. You can end this session early by clicking on the exit button. Fill in the same survey once you finish engaging with your system, then exit the web page or start again from the beginning.

# Chapter 16

## Test Results

We collected over 60 responses and analyzed 36 of the results, given that not everyone completed both the initial and final surveys. Each of the 8 systems were used at least 3 times each, giving us a good sample size to analyze the results. We documented the randomly generated user ID, the application used, and the values given for both surveys. Figure 16.1 shows a table of our raw data.

User	Initial Happy	Initial Sad	Initial Tired	Initial Jittery	Initial Scale	App Used	Final Happy	Final Sad	Final Tired	Final Jittery	Final Scale
d6daf6ab	0	0	0	-2	3	patatap	0	0	0	-1	3
d6daf6ab	0	-1	1	1	4	silk	0	0	0	-1	3
d6daf6ab	0	0	1	-1	3	piano genie	0	0	0	-1	3
d6daf6ab	2	0	-1	1	4	radar	0	0	0	-1	3
977930fb	0	-1	1	1	4	garoqa	0	-1	0	-2	4
977930fb	0	0	1	-1	3	ai duet	0	-1	0	-2	4
977930fb	0	1	2	-1	3	patatap	2	-1	0	-1	5
977930fb	2	-1	0	-1	5	ai duet	2	-1	0	-1	5
0a71f4b	-1	1	1	1	1	piano genie	-1	-1	-1	-1	2
baf70585	0	0	2	1	3	chris shier	1	0	1	1	5
baf70585	1	0	1	1	4	ai duet	1	0	1	0	4
22c26b19	0	0	2	1	3	semi conductor	1	0	2	1	3
22c26b19	0	0	2	1	3	ai duet	1	0	2	1	3
22c26b19	0	0	1	1	3	garoqa	1	0	2	1	3
22c26b19	-1	1	2	2	2	chris shier	1	0	2	1	3
22c26b19	-2	0	-1	2	1	chris shier	1	0	2	1	3
1ec7f303	2	-2	0	0	1	ai duet	2	-2	0	0	1
1ec7f303	2	-2	0	0	1	semi conductor	2	-2	0	0	1
7b726545	0	0	1	0	3	silk	0	0	-1	-1	3
7b726545	-1	0	1	0	3	radar	0	0	-1	-1	3
7b726545	1	1	1	1	4	garoqa	0	0	-1	-1	3
80e10c26	0	1	-1	-1	3	chris shier	0	0	1	0	3

Figure 16.1: Raw Before and After Data

We evaluated our website as a whole by looking at the percentage of increase or decrease in each emotion after using it. Figure 16.2 shows the percentage of increase and decrease in agreement from the initial to the final survey for each emotion and for the users overall mood. Most of the time, the users emotions remained the same. However, looking at the ways in which they increased or decreased gives insight into the general trend from using our platform.

Happiness increased about 34 percent of the time and decreased only 11 percent. Sadness, tiredness, and jittery feelings decreased by at least 40 percent of users and increased significantly less of the time. Overall mood increased

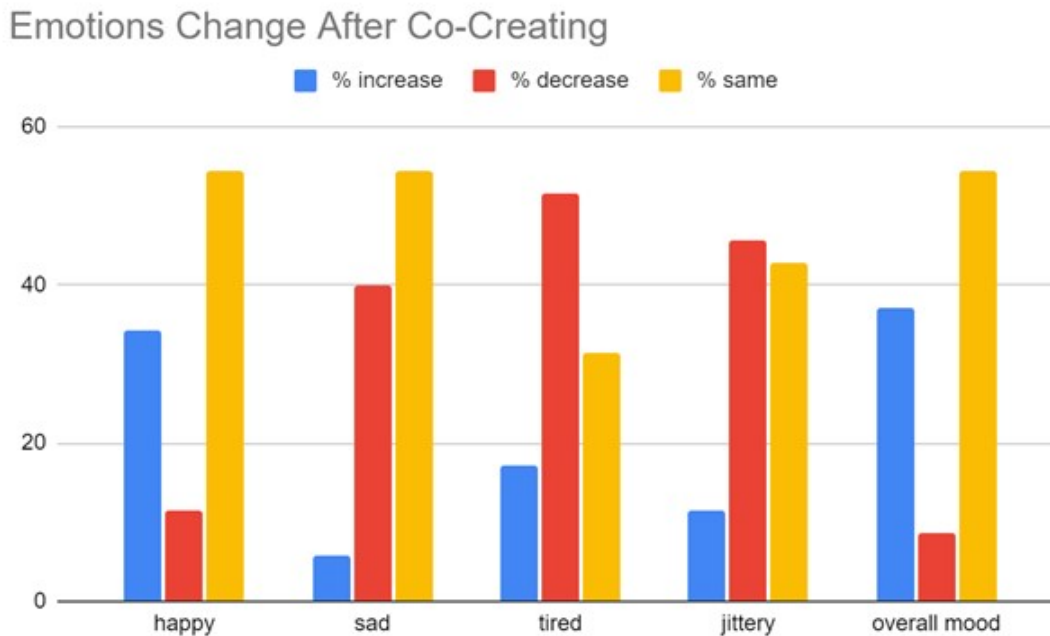


Figure 16.2: Before and After Emotions

about 30 percent more of the time than it decreased, showing a positive response to co-creativity.

Each system was used at least 3 times, however, this was too small of a sample size to compare each application individually. Instead, we grouped them into art and music systems to compare. Figure 16.3 shows our comparison.

The scale used in this graph is how strongly each user agreed or disagreed with each emotion before and after using the application, based on what they filled out in the surveys. We can see the trends from the previous graph in each of these. For example, people tend to agree more that they are happy after using the systems and disagree more with sadness, tiredness, and jittery feelings after creating. Another way to compare was to look at the overall mood before and after using the different types of systems. Figure 16.4 shows the overall mood of the user before and after, where 1 is unpleasant and 5 is pleasant.

From these results, there is not a clear distinction between art and music systems, as both follow similar trends but one does not always increase or decrease by more than the other. Again, we see an increase in overall mood before and after. Art does show a slightly greater average increase of 0.5 versus 0.36 of music, but there is not enough evidence to suggest that one form of co-creativity has a greater impact on users mood than another. Most likely, it has to do with the preference of the user.

### Comparison of Art and Music Systems on Emotions

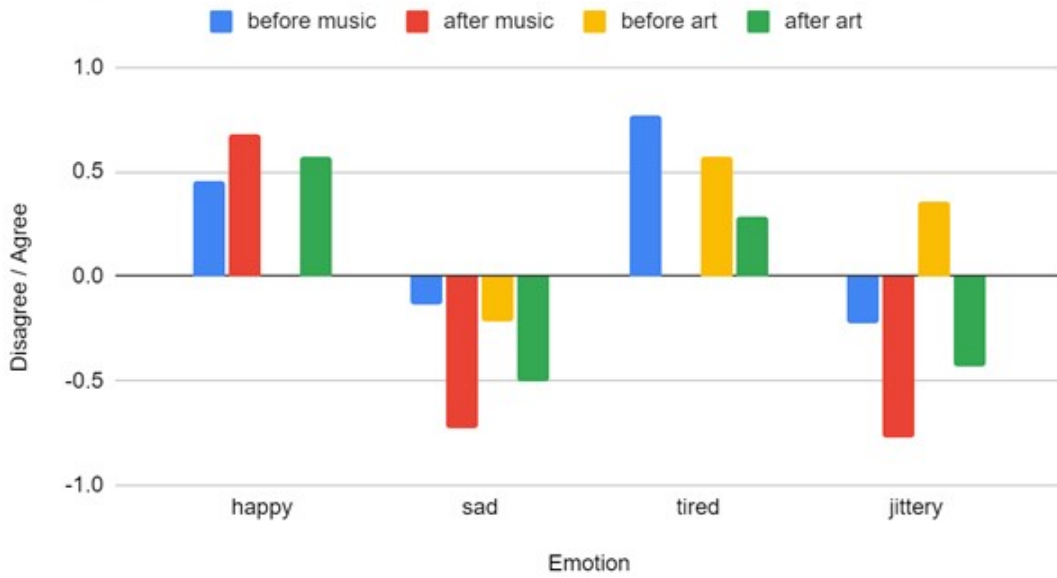


Figure 16.3: Music vs.Art Comparison

### Comparison of Overall Mood Changes

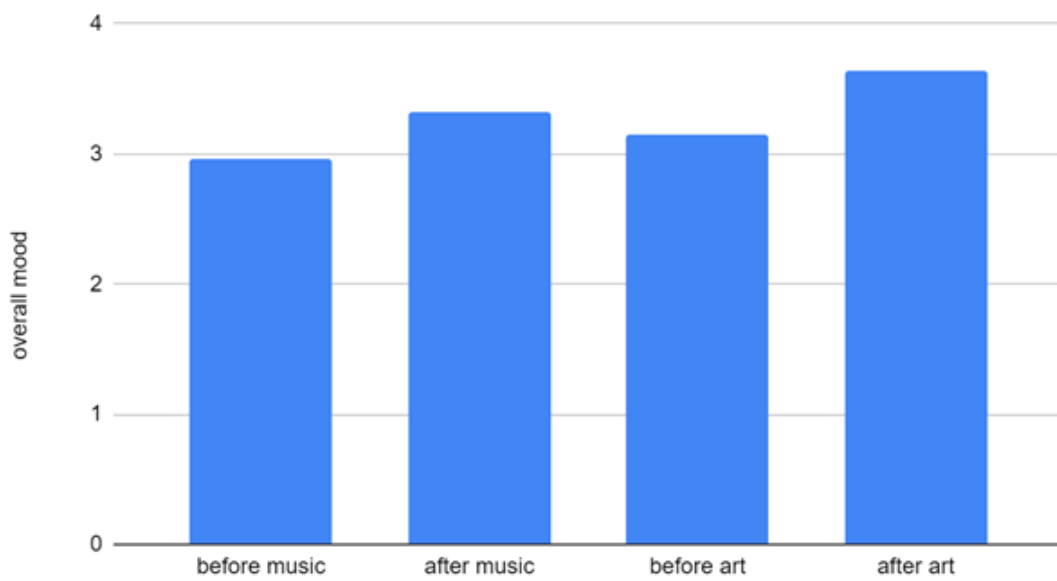


Figure 16.4: Music vs.Art Overall Mood Comparison



## **Chapter 17**

# **Future Work**

For future work, we can always add more co-creative systems. There are many different outlets of creativity like a VR system that dances along, 3D art sculptures, literature, or music lyrics and melodies. Our platform could be applicable for telemedicine and could act as a buffer during appointment waiting times. It could also be used for daily journaling and tracking moods. There are apps that are great for for such features like Daylio but with an integration of our platform, it can provide art therapy outlets in response to the journal and mood entries.

## **Chapter 18**

### **Conclusion**

Within a short time frame, our platform showed promising results. Creativity and self-expression can improve mood, even just slightly within less than 10 minutes through art therapies and co-creative systems. Resources do not have to be a huge time commitment or monetary investment to be effective. Bringing more computers into our lives may sound intimidating but it can very soon become a part of and improve our health.

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