Complex emotions and mood improvement in anxiety-prone adults during art reception

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Abstract

Among the most prevalent mental health disorders today is anxiety disorders. Interestingly, various literature shed light on the potential contribution of art experiences in alleviating anxiety and improving mood, as well as the relevant role of complex emotions in such art experiences. In this paper, we investigate the main research question,"Does the experience of complex emotions during art reception contribute to mood improvement in anxiety-prone adults?", and the following hypothesis that complex emotions do indeed play a critical role. To explore this, an experiment was conducted in Groningen, the Netherlands, in which 38 adults participated (in pairs or dyads) in an artistic experience by having a conversation with their peers about artworks they perceived as meaningful to themselves. Participants were also asked to fill out questionnaires about their emotions (among other things) before and after this conversation. Using data from the questionnaires and audio recordings of the conversations, a mixed methods approach was employed for data analysis, in which chi-squared tests, a Pearson's correlation, and a qualitative coding analysis were performed. Although the majority of these analyses yielded non-significant results, common patterns observed from the study offers an important implication that the variables complex emotions, mood improvement, and anxiety levels during art experiences are interrelated. Nevertheless, future research is recommended to establish more conclusive results.

Keywords: complex emotions, mood improvement, anxiety levels, art experiences

Introduction

Anxiety

With an increase in information and access to mental health issues and support over the recent years, mental health awareness is at its highest (Sorel, 2013). With this, there seems to be a subsequent increase in mental health problems as well. Foulkes and Andrews (2023) indeed corroborate that along with increased efforts for mental health awareness over the past decade, there is simultaneously evidence of increased rates of reported mental health problems, such as anxiety, depression, eating disorders, and more. One of the most common mental health disorders today is anxiety disorders, which are even more prevalent than other common problems such as affective or substance abuse disorders (Shearer, 2007; Sorel, 2013). In fact, the prevalence of any criterion-based anxiety disorders for a one-year time frame is 16%, while the lifetime prevalence is even higher at 28.8% (Shearer, 2007). A more recent study on the treatment of anxiety disorders by Bandelow et al. (2017) yet continues to consolidate that indeed, anxiety disorders are still the most pervasive psychiatric disorders.

However, despite such recognition of the prevalence of anxiety disorders, some research claim that a majority of anxiety disorders are not properly identified, detected, or effectively treated; one study, for instance, demonstrated how only about 25% of those struggling with anxiety received medical treatments, and that fewer than 10% received any sort of counseling for it (Shearer, 2007). Buller and Legrand (2001) also further claims that anxiety is underdiagnosed and undertreated. Moreover, not only do the disorders under-receive treatments, it appears that the quality of the treatments are relatively low even in those who do receive them (Sorel, 2013). For example, the most common treatment methods for anxiety are cognitive-behavioral therapies and pharmacotherapies, and patients are still challenged with non-adherence and non-responsiveness to the treatments (Abbing et

al., 2019; Taylor et al., 2012). Therefore, based on these studies, more research and exploration into different anxiety treatment methods could be worthwhile.

Mood Improvement

An alternative approach towards anxiety that could potentially serve as an effective treatment method is art experiences as part of a therapeutic process. Various research studies have discovered that art experiences, including art-making and art-viewing, contributes to mood improvement - that is, the shift from a somewhat negative to a more positive mood (increase of pleasant moods) (Igdalova & Chamberlain, 2023). Firstly, according to Clift (2020), engaging in art improves coping and adaptation strategies, and sparks a sense of hope and optimism in life in general by strengthening one's self-esteem, self-acceptance, and self-worth - all of which are elements that could aid mood improvement. Transcendent experiences, defined as "feelings of sudden change, epiphany, or catharsis", may also play a role in such positive effects of art (Pelowski et al., 2016, p.2). For instance, Karnik et al.'s (2014) study with hospital patients reported that viewing artworks displayed in the hospital's hallways enabled the patients to "transcend their anxieties and smile", feeling peace and joy instead - demonstrating a shift from the negative experiences and expectations of the hospital visit into a more positive one (p.73).

Aligning with Pelowski et al.'s (2016) definition of transcendence, other mechanisms that seem to be at play in mood improvement during art engagement include catharsis and redirection; in De Petrillo and Winner's (2011) study, art-making processes, or specifically drawing, was found to lead to mood improvement by either fully expressing and releasing negative emotions when drawing an image of tragedy (catharsis) or escaping from and denying negative feelings by drawing a more pleasant or neutral image (redirection). Out of these methods, additional studies seem to point to the latter mechanism of redirection, or creating positive images, as more beneficial than negative images (venting). It was speculated

that such positive images allow one to cognitively reinterpret and reappraise situations in a more positive light and shift emotions and attention that way, whereas negative expression and venting is associated with more rumination and extended durations of negative affective states (Dalebroux et al., 2008; Drake et al., 2011; Karnik et al., 2015).

One of the major key mechanisms behind such mood improvement that could be particularly important for reducing anxiety, however, are the emotions - specifically, emotion regulation. Based on the premises that mood improvement involves a shift in mood (demonstrating a regulation of mood), and that mood could be considered as part of emotions, it is plausible that emotion regulation would play a key part in mood improvement (Desmet et al., 2016). Desmet et al. (2016) specifically clarifies that the terms emotion and mood both often express the same phenomenon and are indiscriminate from each other, such as in how they are both essentially "valenced affective responses" (with valence defined as a dimension that represents a blend of both emotion and mood) (p.4). As to specifically how emotion regulation contributes to mood improvement, Dalebroux et al. (2008) and Drake et al. (2011) found that redirection, one of the other leading mechanisms for mood improvement addressed previously, reflects and demonstrates better emotion and attention regulation.

Such literature presented above regarding emotion regulation is especially significant considering that better emotion regulation was associated with reduced anxiety (Abbing et al., 2019). Emotion regulation then potentially indicates a form of mood improvement (e.g., better control of self and emotions) and a crucial factor in reducing anxiety by facilitating individuals to avoid negative biases or tendencies and attend or focus on positive stimuli instead (Young et al., 2019). In fact, many studies already seem to imply this. In a paper by Funch (2021), engagement in both receptive and creative art was found to contribute to emotional integrity and was associated with decreased anxiety and depression levels. Furthermore, cultural and leisure activities in general, not only regarding the more passive

art-viewing but also various active art engagements (including but not limited to painting, drawing, writing, sculpting, music making, etc.), were associated with lower depression and anxiety symptoms as well as better mood regulation - hence, often used as effective art therapy techniques (Abbing et al., 2019; Drake et al., 2011; Trupp, 2022).

According to Moors et al. (2013), for emotion regulation, complex emotional events are an important aspect. Therefore, investigating the role of complex emotions in mood improvement is a logical train of association worth further exploration.

Basic and Complex Emotions

First of all, there are two major kinds of emotions: basic or primary and complex or secondary (Ekman, 2005; Plutchik, 2001). Basic or primary emotions (i.e., happiness, sadness, anger, disgust, fear, surprise) are considered as discrete emotions that are universal (e.g., in facial expression and social learning), distinct in intensity and pleasantness, and are evolutionary and ancestral as they have adaptive purposes (Ekman, 2005). Based on the speculation that contemporary art provides abstract (complex) emotions (e.g., that are indistinct, confusing, ambiguous) stemming from new existential challenges in modern society, it could also be suggested that such complex emotions evoked by art, too, serves an adaptive function of helping us face and overcome ultimate, existential concerns of life (Funch, 2021).

Complex emotions, alternatively termed as secondary or mixed emotions, are defined as some kind of a combination of different basic or primary emotions (Plutchik, 2001). It is further described that such secondary emotions are acquired during our development, affected by cultural and individual differences (unlike primary emotions which are evolutionary), and are more sensitive to complex and abstract stimuli in the environment (Griffiths, 2003). Examples of such complex emotions include, but are not limited to, pride, despair, guilt, alarm, awe, curiosity, optimism, hopefulness, hate, delight, fatalism, etc. (Plutchik, 1964);

more modern terms also include cynicism, loneliness, shock, outrage, ambivalence, bittersweetness, confusion, etc. (TenHouten, 2021). For more examples of such complex emotions, see Appendix A.

In fact, there is research evidence to support complex emotions' relevant role in art experiences and their mood-facilitating processes. Menninghaus et al.'s (2017) distance-embracing model, for instance, proposes that when we feel negative emotions during art reception, there is an interplay of positive and negative emotions; namely, they argue that pleasurable emotions rely on negative emotions, implying the pivotal role of negative emotions in experiencing positive emotions. For example, a piece of music can be perceived as both sad and beautiful simultaneously (Menninghaus et al., 2017). In this way, mixed emotions appear to be displayed in the form of negative emotions giving rise to an overall positive emotional experience - demonstrating a form of mood improvement. In addition, the statement that "complex, mixed emotions play a stronger role in art reception than pure and simple negative emotions", seems to establish the significance of the role of complex emotions (Menninghaus et al., 2017, p.13).

Despite the promising implications, the literature presented above may still contain a few gaps. Firstly, it seems that there may be a general undertreatment of anxiety disorders and a potential need to explore novel treatment approaches. Secondly, although there is some research on complex emotions, it is still a relatively new concept not yet studied as extensively in terms of their processes or mechanisms - let alone its relation to anxiety. Lastly, elaborating upon the second point, the current research body largely focuses only on the negative processes of anxiety and not the positive processes that may also be involved, such as in complex emotions, where a mix of both positive and negative emotions and processes coexist simultaneously (Menninghaus et al., 2017; Young et al., 2019). Therefore, a research

question and following study addressing these lacking or understudied areas would be insightful and worthwhile investigating.

To sum up, the literature review conducted above demonstrates that art experiences have beneficial effects on anxiety reduction via mood improvement and therefore, could represent an effective way to treat anxiety. That is, it appears that art experiences contribute to mood improvement by shifting one's mood from a more negative or neutral mood state to a positive state, potentially due to enhanced emotional regulation strategies (Abbing et al., 2019; Trupp, 2022). In addition, complex emotions, wherein positive and negative emotions co-occur, seem to play a role in both these art experiences and emotional regulations (Moors et al., 2013).

Connecting all such interlinked variables, it could be speculated that complex emotions potentially contribute to mood improvement and anxiety reduction during art engagement. Thus, the research question the present study aims to explore is: "Does the experience of complex emotions during art reception contribute to mood improvement in anxiety-prone adults?", with the hypothesis that complex emotions would indeed play a role in facilitating mood and that varying anxiety levels could also influence the experiencing of these emotions. The study's main goal is to assess the various emotions evoked from artworks that are personally meaningful to oneself by actively engaging with and talking about them, including but not limited to visual art (ranging from paintings, drawings, sculptures, music, etc.). Although many of the literature mentioned above in this paper in particular are mostly based on visual art (i.e., drawing, painting, etc.), there is extensive literature on other types and forms of art in general as well; hence, for now, it is assumed that the predicted effects of the presented research question would apply more generally.

Methods

This study was approved by the Ethics Committee of the Faculty of Behavioural and Social Sciences at the University of Groningen (research code: PSY-2223-S-0252) and was conducted according to the Dutch ethical standards for scientific research. The study took place for three weeks, from May 1st to May 19th, 2023.

Participants

The study consisted of 38 young adults (19 dyads or pairs) of 18 years or older, who voluntarily participated in the study. Other than being of legal age to provide consent as part of the adult population and the instruction to participate in pairs with a peer, there were no prerequisites for participation.

Potential participants were reached out to and gathered in Groningen, the Netherlands, via convenience and snowballing sampling techniques. Recruitment took place through: 1) targeted advertisement via a research panel website (SONA) aimed at first-year psychology students of the University of Groningen, 2) public advertisement on social media platforms (e.g., Instagram, Whatsapp group chats, etc.), and 3) flyer distribution at leisure, culture and education centers (e.g., Groninger Museum, Forum, University buildings, library, bookstores, USVA, etc.). For those interested, a digital informed consent form, a Qualtrics (http://qualtrics.com) survey link, was shared. On this link, on top of consenting to participate, participants were able to choose a type of compensation: SONA credits, a Pimm Solutions Gift voucher worth €10 or a donation of €10 to schools for cultural activities. Participants that have read the SONA advertisement were also informed about the other types of compensation so that they were able to choose according to their preferences.

Procedure of Data Collection

Preparation Phase

Before the experiment, participants were asked to think of an artwork they perceive to be meaningful and bring this item to the experiment location. These items could include paintings, sculptures, photographs, songs, poetry, videos or pictures, movie scenes, personal mementos, etc. To help the participants through this choice, a referral guide with instructions as seen in Figure 1 was shared:

Figure 1

Screenshot of the Referral Guide within the Information Form

Attachment A. Referral guide

This guide is to help you choose an artwork important to you. It can be anything.
- *Think of paintings, sculptures, photographs, a song, poetry, videos or pictures you encountered online, a scene from a movie, a memento from your life, a music track you composed, a drawing you sketched, a picture you took, a video of your performance, etc.*
- *Think of the reasons behind your choice. Is it your liking? If so, what do you like about it? Is it something you feel connected to? Why? If you do use this guide, bring it to the lab and hand it to the researchers.*
- *Please, do not discuss your choice with the project buddy and try to bring something the buddy does not know about. Please, do not bring anything that you think your buddy could find upsetting.*

Please look at the artwork that you chose. What do you think or feel about it? Why is it important to you? You use the box below to write, draw or paint anything that helps you express your thoughts, ideas or feelings.

Experimental Phase

Upon arrival, the participants took a seat in the same room. Each pair was firstly instructed to experience the artworks that either they or their peers brought for a minimum of 20 seconds to a maximum of 2.5 minutes. Then, the participants were asked to fill out a questionnaire (Q1) based on the first artwork they experienced. After this, the artworks were swapped and the same process was repeated. A second questionnaire (Q2) followed for the second artwork.

Next, participants were instructed to stand up and start a conversation about both artworks they just experienced, using prompts as guidance; one of the researchers also stayed in the room with the participants for further assistance. At this time, audiovisual recording was started to measure qualitative speech data and body language. The conversation ended

when all the questions of the prompt had been answered (for a minimum of 10 minutes) or the

maximum time limit (20 minutes) had been reached. The recordings were stopped as soon as

the conversation was over, and participants were asked to take a seat again. They then filled

out Q1 and Q2 once again about the artworks brought in, but this time also based on their

conversations. The entire experiment lasted approximately 45 to 60 minutes in total. For an

overview of the overall experimental procedure, see Figure 2.

Figure 2

Flowchart of the Experimental Procedure
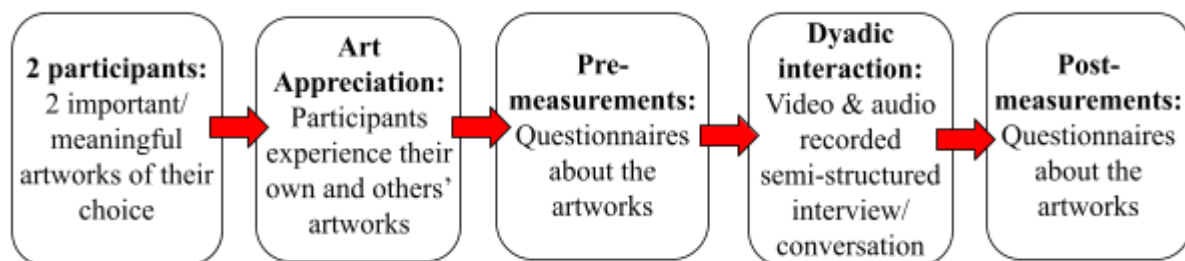
Instruments

General Materials

Firstly, each participant brought a personally selected art-related item to the

experiment. For any auditory or visual items, headphones and laptops were provided.

For the video and audio recordings, a Logitech BRIO camera was used. The videos and

audios were linked and connected through a Lab Streaming Layer from the room where the

experiment was conducted to a control room where other researchers were monitoring the

experiment. For the conversation part, a powerpoint with guiding prompts was displayed.

Lastly, participants filled out questionnaires on iPads that were provided. These

questionnaires contained multiple sections: media preference (regarding artworks or items of

choice), semiotic strategies used in art engagement, Bodily Sensation Maps (BSM) to assess

bodily activations and deactivations, the Geneva Emotion Wheel (GEW) to assess emotions,

and finally mental health questionnaires regarding anxiety (Generalized Anxiety Disorder-7

or GAD-7) and depression (Patient Health Questionnaire-9 or PHQ-9) to assess anxiety and depression levels. For this paper's research question in particular, only the speech transcripts of the conversations, GEW, and GAD-7 were considered relevant and therefore used as data.

Conversation Prompts

During the conversation, eight prompts were presented to qualitatively measure how participants judged, related to, felt about and made sense of the items. The prompts were based on emotions, semiotic strategies (i.e., perception, imagination, conceptualization and analysis), and self-referential patterns, to facilitate reflection. Examples of the prompts included, "What purpose do these artworks fulfill by being made in this particular way?", "What do you think about what your friend brought?", etc.

Geneva Emotion Wheel (GEW)

The GEW, developed by Sacharin et al. (2012), was used to measure emotions in response to art engagement, consisting of: interest, amusement, pride, joy, pleasure, feeling love, feeling awe, relief, surprise, nostalgia, compassion, sadness, fear, shame, guilt, disappointment, envy, disgust, contempt, and anger. It also offered the options of 'None' and 'Other' for respondents to indicate if they had felt nothing special or something different, respectively. These emotions were systematically aligned in a circle, each based and measured on three dimensions: valence (positive and negative), control (high and low), and intensity (high and low).

Generalized Anxiety Disorder-7 (GAD-7)

GAD-7, developed by Spitzer et al. (2006), was used to assess proneness to anxiety. Any extreme scores or severe deviations observed were reported back to the participants of concern immediately. There were seven items in total, which were statements such as "feeling nervous, anxious, or on edge", "feeling afraid, as if something awful might happen", etc.

Responses to the items were measured on a scale of 1 to 4 (1 = not at all, 2 = several days, 3 = more than half the days, 4 = nearly every day).

Data Analysis

The final sample for the data analysis consisted of 13 dyads of participants, or 26 participants (N = 26, n = 10 males, n = 16 females), between 18 and 35 years of age (M_{age} = 22.923, SD = 4.698). Data of 12 participants were excluded because the experiment was conducted 12 times in Dutch; for this paper, only the experiments that were conducted in English, which was 26 times, were used. A power analysis for each analysis of the study, tested using Faul et al.'s (2007) G*Power software, yielded power (1-β err prob) values ranging from 0.080 to 0.969 (see Table D1).

For the data analysis, a mixed methods approach, combining both qualitative and quantitative analysis methods, was used to encapsulate the experience of art in a more comprehensive manner - especially considering that art experience is a dyadic, inherently complex, intuitive, and diverse process involving various meanings and interpretations (Starr, 2020). Different analysis methods as presented below were selected to answer this paper's research question of whether or not complex emotions play a role in mood improvement in anxiety-prone individuals, along with its following hypothesis that complex emotions will play a significant role in that those that are more prone to anxiety would engage in more complex emotions and hence, more likely to experience mood improvement.

Quantitative Data

The hypothesis above could be dissected into two portions: that 1) complex emotions play a role in mood improvement, and 2) higher anxiety levels contribute to experiencing more complex emotions, also potentially contributing to greater mood improvement. Complex emotions and anxiety levels were considered as continuous independent variables (i.e., counts, frequencies and percentages or proportions), while mood improvement was considered as a

binary or categorical dependent variable of whether there has been a mood improvement (alternatively interpreted and referred to as an upward or positive mood shift according to the GEW data) or not. The three variables involved - complex emotions, positive mood shift, and anxiety levels - were measured via the conversational data based on a manually developed qualitative coding scheme, GEW data, and GAD-7 data, respectively.

Specifically, the coding scheme was developed based on various literature regarding complex emotions. Mood improvement was measured via whether or not there has been an increase in valence (x-axis coordinates) between the pre and post GEW data, indicating an upwards or positive mood shift. As lower valence or the left of the GEW consisted of more negative emotions, and higher valence or the right of the GEW consisted of more positive emotions, an increase in valence then demonstrated a shift from the more negative to more positive emotions (and hence, mood improvement). These valences were calculated based on Coyne et al.'s (2020) protocol and formula. Lastly, anxiety levels were measured via the total scores of the GAD-7, wherein proneness to anxiety was classified into three categories: minimal (scores of 0-4), mild (scores of 5-9), and moderate (scores of 10-14).

Contingency tables and their corresponding chi-squared tests were used to answer the hypotheses regarding the association between complex emotions and mood improvement, anxiety levels and complex emotions, and anxiety levels and mood improvement. Chi-squared tests were selected because our study's main aim was to investigate relationships and associations between the variables presented, which could uncover and direct towards newer areas or paths to further research regarding our novel research question - not to replicate or confirm previous findings or literature. In addition, since one of our variables was categorical, using a chi-squared test that allowed for this was more fitting. However, for assessing the association between anxiety levels and complex emotions in particular, a Pearson's correlation

was also able to be conducted as an additional, confirmatory analysis since both variables were continuous. All quantitative analyses were performed using the statistical software JASP.

Qualitative Data

To explain how the qualitative coding scheme was developed further in detail, we firstly referred to the coded analysis of guided interviews by Starr (2022) and Cognitive Discourse Analysis (CODA), a verbal protocol used to analyze speech data transcript, by Tenbrink (2015). A more specific coding scheme for complex emotions in particular was then further developed primarily based on Plutchik's (1991) wheel of emotions, but also other literature regarding complex emotions (see Appendix A). Using these literatures, our coding scheme divided complex emotions into five different categories: primary dyad (C1), secondary dyad (C2), tertiary dyad (C3), opposite emotions (C4), and aesthetic or artistic emotions (C5) (see Appendix A). Each of these categories was coded for present (1) or absent (0), and later used as counts, frequencies, or percentages and proportions for data analysis. On top of this coding scheme, AI coding from the program Atlas.ti Mac (Version 23.1.1 [4239]) - a computer-assisted qualitative data analysis software - was utilized as an additional complementary tool to aid the manual coding process.

Results

All assumptions for the analyses were met.

Quantitative Analysis

The majority of participants who experienced positive mood shifts (implying mood improvements) as indicated by increased GEW valence also experienced complex emotions. This pattern was observed across all categories, but most prominently in the complex emotions category 5 (C5) at 84.615% (see Table B9). However, only C3 yielded a significant result, wherein 65.385% of those who experienced positive mood shifts also reported complex emotions of the category, at $X^2 = 4.093$ and $p = 0.043$ (see Table B6). This aligns with our hypothesis that complex emotions play a role in mood improvement, but only for category 3 (tertiary dyads of complex emotions). Figure 3 visualizes the overarching pattern that compared to those who did not experience the mood shift, those who did reported much greater frequencies of all the complex emotions categories - especially for C5.

Similarly, for the varying anxiety levels, there was a general pattern that the lower the anxiety scores were (e.g., participants with lowest [minimal] anxiety level), the more likely participants were to experience more complex emotions (e.g., greatest frequencies in C1, C2, and C5) (see Figure 3) - aligning with the paper's hypothesis that individuals low in anxiety are more likely to engage with complex emotions than those high in anxiety. However, this trend was only seen for C1, C2, C4, and C5 - and the result was only significant for C1 with $X^2 = 7.344$ and $p = 0.025$ (see Appendix C). Aside from C1, only C3 showed a significant result ($X^2 = 11.798$, $p = 0.003$), but a reverse ascending pattern wherein the higher the anxiety level, the more use of tertiary dyads of complex emotions was observed (see Table C6).

Figure 3

Bar Graphs of Complex Emotions with Positive Mood Shifts and Anxiety Levels
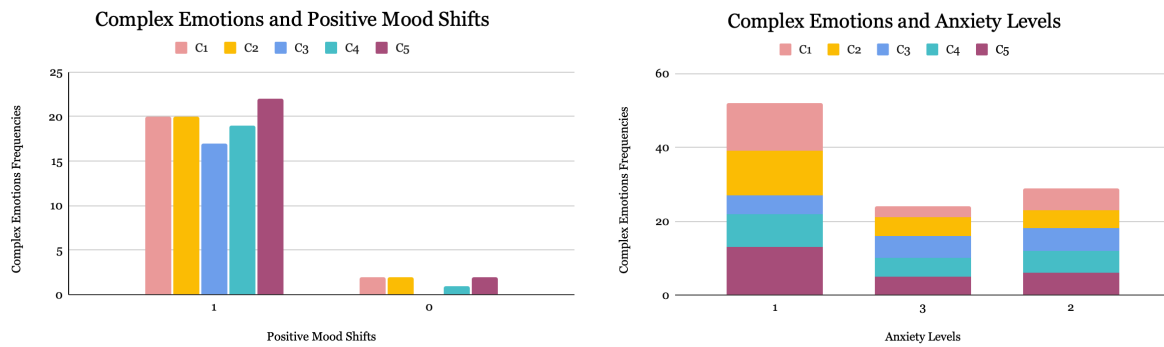
Note. For the x-axis of the left figure, 1 refers to the presence and 0 refers to the absence of positive mood shifts. On the x-axis of the right figure, 1, 2, and 3 refer to minimal, mild, and moderate levels of anxiety, respectively, based on GAD-7 scores.

Corresponding with the previous findings regarding complex emotions and anxiety levels, a Pearson's correlation between the total anxiety scale (GAD-7) scores and complex emotions categories revealed negative relationships for C1, C4, and C5, in which an increasing anxiety score indicated decreased occurrences of primary dyads, opposite and aesthetic complex emotions - again aligning with our hypothesis (see Table 1). Another corresponding result was the positive relationship between GAD-7 scores and C3 (but in contrast, also for C2), where higher anxiety scores yielded greater frequencies of the tertiary (and secondary) dyads of complex emotions. However, among these correlations, only C5 showed borderline significance at $p = 0.055$ (see Table 1). Interestingly, the complex emotions categories themselves were positively and significantly correlated with each other (C3 and C4, and C1 and C5) (see Table 1).

Table 1

Pearson's Correlations of Anxiety Levels (GAD-7) and Complex Emotions Categories

Pearson's Correlations							
Variable		GAD-7	C1	C2	C3	C4	C5
GAD-7	Pearson's r	—					
	p-value	—					
C1	Pearson's r	-0.182	—				
	p-value	0.374	—				
C2	Pearson's r	0.182	-0.274	—			

	p-value	0.373	0.176	—			
C3	Pearson's r	0.332	0.154	-0.358	—		
	p-value	0.098	0.453	0.073	—		
C4	Pearson's r	-0.056	0.122	0.021	0.466	—	
	p-value	0.787	0.554	0.919	0.016	—	
C5	Pearson's r	-0.381	0.408	-0.231	-0.182	-0.096	—
	p-value	0.055	0.039	0.257	0.374	0.642	—

In general, we also found that the occurrences of positive mood shifts were mostly found in those with the lowest level of anxiety (minimal), at 46.154%, compared to the higher levels of anxiety (mild and moderate) (see Table 2). This supports the hypothesis that lower proneness to anxiety is more likely to predict mood improvement. However, this was not significant ($X^2 = 1.857$ and $p = 0.395$) (see Table 3).

Table 2

Anxiety levels and Positive Mood Shifts

Contingency Table

Anxiety Level		Positive Mood Shift 0	Positive Mood Shift 1	Total
1	Count	2.000	12.000	14.000
	% of total	7.692 %	46.154 %	53.846 %
2	Count	0.000	6.000	6.000
	% of total	0.000 %	23.077 %	23.077 %
3	Count	0.000	6.000	6.000
	% of total	0.000 %	23.077 %	23.077 %
Total	Count	2.000	24.000	26.000
	% of total	7.692 %	92.308 %	100.000 %

Note. 1, 2, and 3 under the 'Anxiety Level' column refers to minimal, mild, and moderate levels of anxiety, respectively, based on GAD-7 scores. 0 and 1 under the 'Positive Mood Shift' column refers to the presence and absence of positive mood shift, respectively.

Table 3

Chi-Squared Test for Anxiety Levels and Positive Mood Shifts

Chi-Squared Tests

	Value	df	p
X^2	1.857	2	0.395
N	26		

Cramer's V	0.267

Qualitative Analysis

In total, category five of complex emotions (C5), aesthetic emotions, were mentioned most often by participants. The most prevalent themes were feelings of awe, amazement, beauty appreciation, feeling moved or touched, and even transcendence. For instance, a few participants reported a sense of spirituality, religion, and existence within the vast universe via their artworks, demonstrating transcendence (see Table 4 for more specific examples). Primary (C1) and secondary dyads (C2) of complex emotions were the next most prevalent - including but not limited to curiosity and interest, compassion, love, pride, hope, and optimism. In fact, curiosity, interest, and love were among the most frequently experienced complex emotions. Category 4 of a mix of opposite emotions were also common, such as feelings of nostalgia, bittersweetness or ambivalence (e.g., reminiscing both good and bad memories in the past); although category 4 was not the most frequently occurring category, nostalgia was the second most frequently mentioned emotional term by all participants. Category 3 or tertiary dyad was least mentioned (e.g., embarrassment, anxiety, sentimentality, melancholy, etc.).

Table 4

Coding Extracts and Examples of Each Complex Emotions Categories from the Conversation

Category	Extracts/quotes from conversations	Emotions
Primary dyads (C1)	"And your artwork I found really beautiful because it is one of the most basic human things. Like, to be loved, feel loved, to have family." "I am starting to feel a little more compassionate towards it because you brought it and you relate to it. I relate to it and I was like wow that's something that connects." "Observing your artwork made me feel in awe of the craftsmanship...and also its meaning to you, the symbolism." "Very powerful; I think awe is the main feeling I feel."	Love Compassion Awe
Secondary dyads (C2)	"It made me feel curious. And I'm interested." "I am really curious about the meaning behind it." "For my artwork, I chose pride and love. I love my home country and feel pride for what they have done despite being such a poor country." "It makes you think that you can achieve anything, that nothing's impossible."	Curiosity Interest Pride Optimism

Tertiary dyads (C3)	"Talking about my artwork I think emotion was anxiety; a mix of anxiety for not performing and fear of having forgotten what was the meaning to me." "I feel a bit, I don't know, like nervous, talking about it..." "Like tension, I have a lot." "I'm so sorry...this is so embarrassing." "Yeah I'm melancholy; I am feeling melancholic." "Things that I hold close to me and are sentimental to me; it was given to me at a very difficult time, so I hold it close." "...being alone - being a lonely emotion."	Anxiety Nervous Tension Fun Enjoyment Embarrassment Melancholy Sentimentality Loneliness
Opposite (C4)	"It does make me feel nostalgic, because I miss her, but also that I have something of her here." "Brings me nostalgia and memories." "Just immediately kind of getting drawn into this whole feeling of nostalgia." "A bittersweet kind of feeling; more like melancholy and like how you can like balance both worlds you're living in" "It does make me very excited to talk about it, but I also realize that it's a little weird).." "A little bit ambivalent, because I love it so much but at the same time I do realize that it's a nerdy thing to do" "I felt a bit of sadness but also kind of amusement"	Nostalgia Bittersweetness Ambivalence
Aesthetic/ artistic (C5)	"When I saw the artwork it sort of made me feel quite uhm, like in awe and quite uh, amus - I was quite like, wow. We're so small in this huge world and I mean at least I found it very beautiful." "And my artwork moves me in the sense that it makes me want to find out, like to explore the world. So, in that sense I find it beautiful." "I definitely find it beautiful; I was tearing up; I got really touched by it. " "Music itself can be a very spiritual experience; say you are not of this world; help you transcend." "There is a greater force that you can lean on that can bring comfort and healing."	Transcendence Awe Amazement Beauty Feeling moved Feeling touched Spirituality

Overall, as illustrated in Figure 4, the frequencies of each category were still very evenly (almost equally) distributed. In general, beauty appreciation, nostalgia, curiosity, interest, love, and awe were the most recurring complex emotions - also overlapping with the GEW data, wherein nostalgia, love, and awe were selected most often (see Figure 5).
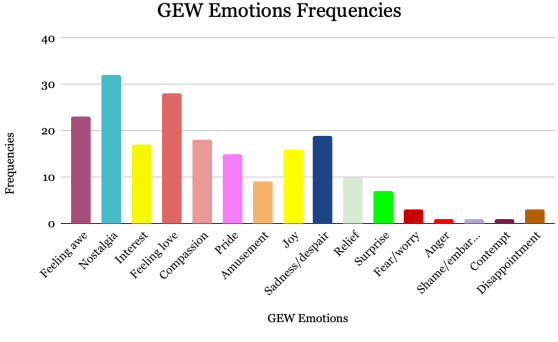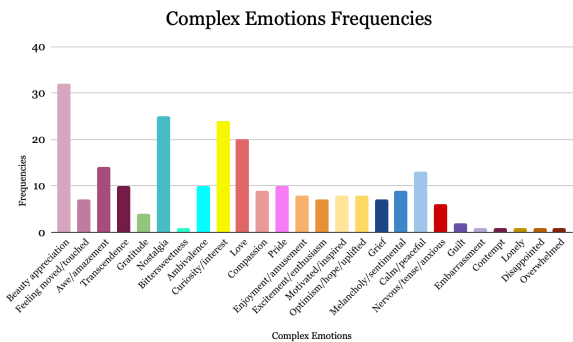
Figure 4

Pie Chart of the Five Complex Emotions Categories
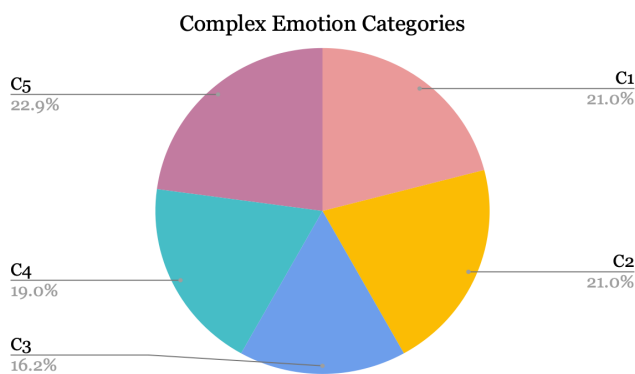
Note. C1 = primary dyads, C2 = secondary dyads, C3 = tertiary dyads, C4 = opposite, and C5 = aesthetic.

Figure 5

Bar Graphs of the Frequencies of the Complex Emotions Categories and GEW Emotions

Discussion

In this study, we hypothesized that firstly, complex emotions would play a critical role in mood improvement, and that secondly, those who show lower levels and vulnerability to anxiety would be more likely to engage in such complex emotions and to experience mood improvement - based on the premise that art experiences and complex emotions help reduce anxiety levels (Abbing et al., 2019; Moors et al., 2013; Trupp, 2022). We indeed found that for each complex emotion category, the majority of participants who experienced the complex emotions also experienced an upward mood shift indicating mood improvement, aligning with the first hypothesis. However, only the result for tertiary dyads was significant, perhaps because some of the complex emotions here include enjoyment, fun, and uplifting - which are more directly positively associated with mood improvement (Raedeke, 2007).

Secondly, we also found that the majority of those who experienced positive mood shifts were the group with the lowest level of anxiety, but only significantly so with primary dyads and (borderline) with aesthetic emotions. This, too, could be explained by how the complex emotions involved in the primary dyads, such as love or optimism, are more directly associated and predictive of mood improvement (Conversano et al., 2010; Laranjeira & Querido, 2022). Moreover, aesthetic emotions like transcendence could allow people to look beyond their struggles - (i.e., "transcend their anxieties") and move towards mood improvement (Karnik et al., 2014, p.70). In fact, one participant in our study who experienced a positive mood shift also frequently mentioned the term catharsis - which ties in perfectly with Pelowski's (2017) definition of transcendence as a cathartic process and De Petrillo and Winner's (2011) suggestion that catharsis contributes to mood improvement.

However, a significant reverse (negative) correlation was found for tertiary dyads of complex emotions in which higher anxiety levels showed more engagement with the emotions. This could partially be explained by how most of the complex emotions

participants reported for this dyad consisted of emotional responses common in anxiety, such as nervousness or tension (see Table 4) (American Psychiatric Association, 2013). Similarly, participants reported melancholy, which is synonymous to depression, gloom, or sorrow - and depression is highly comorbid with anxiety, once again, justifying a positive correlation in this sense (Hirschfeld, 2001). To refer back to some concepts from the introduction, perhaps the anxiety-related emotions of this category allows people to get stuck in the negative emotional state as in venting, experiencing more anxiety, rather than redirecting their attention towards more positive emotions and mood improvement instead (De Petrillo & Winner, 2011).

The non-significant results in our study could be explained by design and methodological limitations. Firstly, our data was based on 26 participants, which was less than the desired sample size according to the power analyses (see Table D2). Additionally, the sample was of a non-clinical population; using a clinical sample of those who are diagnosed with anxiety would be a more representative and accurate population and hence, may prove as a stronger predictor producing more reliable, significant associations (Abbing et al., 2019; Kim et al., 2014). Moreover, in terms of the qualitative analysis, the coding scheme for complex emotions may have been impacted by the coder's subjective judgments, interpretations and biases - especially since some themes and keywords, for instance, were difficult to fit into the predetermined coding scheme categories. Another potential limitation with the coding scheme was that it did not discern a difference between complex and basic emotions within the GEW or the conversational data, yielding less evident results.

Nevertheless, our study holds various strengths as well, such as how it utilized a mixed methods design, taking into account insights from both the detailed, contextualized qualitative data and the more generalizable, accurate quantitative data. Our study was also interdisciplinary, drawing in and combining forces and expertise knowledge from various fields (e.g., psychology and the arts). Both these aspects allowed our research to hold high

ecological validity, yielding better understanding of a comprehensive, complex study. It is also worth noting that we found positive and significant correlations between some of the different complex emotions categories (see Table 2), which already establishes a baseline reliability of our coding scheme as potential predictors of complex emotions.

Following such positive notions, there are also still various impactful takeaways from our study. Looking at our data qualitatively, for instance, we could observe that all of the participants (except two) always reported two emotions rather than one out of the GEW already overlapping with and containing some complex emotions, proving the integral role of complex emotions in art engagement. In addition, the overlaps between the specific complex emotions that were brought up in our own and other studies regarding art experiences and emotions - such as opposite emotions (e.g., nostalgia), aesthetic emotions (e.g., awe or being moved), self-conscious emotions (e.g., embarrassment), or even hostile emotions (e.g., anger or contempt) - all point to the conclusion that in general, art experiences evoke a wide range of both positive and negative emotions, which are again also characteristic of complex emotions (Cooper & Silvia, 2009; Karnik et al., 2014; Menninghaus, 2017; Prinz, 2011; Schubert, 2022).

Furthermore, the association of lower anxiety levels and mood improvement in art engagement that we observed aligns with the argument that emotional responses to art are adaptive in that they enable us to make meaningful connections to the art, which can further contribute to growth and well-being towards less anxiety and depression (Cupchik, 2011; Funch, 2021). In line with this, participants from Karnik et al.'s (2014) study explicitly described viewing artworks as, alongside many other complex emotional terms, "therapeutic" (p.70). In fact, tying all links together, the modern field of neuroaesthetics and creativity supports the growing notion that art therapy can help one process and express complex emotions, which has a positive impact on psychological well being (Neuroaesthetics and

Creativity, 2023). Following these findings, there is reason to believe in an association between art, well-being (i.e., mood improvement and anxiety alleviation), and complex emotions.

Conclusion and Future Directions

In conclusion, while no definitive statements can be made due to some non-significant, mixed results, the common patterns and themes that arose from our research imply a fascinating notion that the variables of complex emotions, anxiety, and mood improvement are interrelated in art experiences. For more conclusive results, we recommend future research in this area to employ a larger sample size, recruit samples from a clinical population, or consider analysis methods with greater predictive validity (e.g., increasing inter-rater reliabilities of coding schemes, measuring causations, etc.). Exploring other relevant variables, such as a specific complex emotion or therapeutic procedure, could also provide new perspectives. Gaining more insight into complex emotions as such, which is still a relatively new topic in research (along with their relation to anxiety and art), holds both scientific and practical value - not only because of its potential for more scientific and accurate discoveries, but also because of its applicability to the real world. For instance, such findings could facilitate clinicians to uncover and identify various emotions when interacting with clients, ultimately contributing to better understanding and utilization of the underlying essence of (art) therapies and mental health (i.e., anxiety).

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Appendix A

Complex Emotions Categories

1.	Primary dyad (1 petal apart)	- Love, friendliness (joy+trust) - Submission, modesty (trust+fear) - Awe, alarm (fear+surprise) - Disapproval, disappointment (surprise+sadness) - Remorse, misery (sadness+disgust) - Contempt, scorn (disgust+anger) - Aggressiveness, vengeance (anger+anticipation) - Optimism, courage (anticipation+joy)
2.	Secondary dyad (2 petals apart)	- Guilt, excitement (joy+fear) - Despair (fear+sadness) - Envy, sullenness (sadness+anger) - Pride, victory (anger+joy) - Curiosity (trust+surprise) - Unbelief, shock (surprise+disgust) - Cynicism (disgust+anticipation) - Hope, fatalism (anticipation+trust)
3.	Tertiary dyad (3 petals apart)	- Delight, doom (joy+surprise) - Outrage, anger (surprise+anger) - Dominance (anger+trust) - Sentimentality, resignation (trust+sadness) - Shame, prudishness (fear+disgust) - Pessimism (sadness+anticipation) - Morbidness, derisiveness (disgust+joy) - Anxiety, dread (anticipation+fear)
4.	Opposite emotions	- Bittersweetness (joy+sadness) - Ambivalence (trust+disgust) - Frozenness (fear+anger) - Confusion (surprise+anticipation) - Or a mix of other seemingly different emotions (don't have to be *directly* the opposite..) - Nostalgia
5.	Aesthetic/artistic emotions	- Transcendence, sublimity, awe, amazement, wonder - Feeling touched/moved - (Beauty) appreciation/ugliness

Note. Adapted from Parrott, 2001; Plutchik, 1991; Plutchik, 2001; TenHouten, 2016;

TenHouten, 2021; Schubert, 2022.

Appendix B

Contingency Tables, Chi-Squared Tests, and Cramer's V for Complex Emotions and Positive Mood Shifts

Table B1

Complex Emotions Category 1 (C1) and Positive Mood Shifts

Contingency Table

C1		Positive Mood Shift		Total
		0	**1**	**Total**
0	Count	0.000	4.000	4.000
	% of total	0.000 %	15.385 %	15.385 %
1	Count	2.000	20.000	22.000
	% of total	7.692 %	76.923 %	84.615 %
Total	Count	2.000	24.000	26.000
	% of total	7.692 %	92.308 %	100.000 %

Note. 0 refers to the absence and 1 refers to the presence (of C1 or positive mood shifts).

Table B2

Chi-Squared Test and Cramer's V for C1 and Positive Mood Shifts

Chi-Squared Test and Cramer's V

	Value	df	p
X^2	0.394	1	0.530
N	26		
Cramer's V	0.123		

Table B3

Complex Emotions Category 2 (C2) and Positive Mood Shifts

Contingency Table

C2		Positive Mood Shift		Total
		0	**1**	**Total**
0	Count	0.000	4.000	4.000
	% of total	0.000 %	15.385 %	15.385 %
1	Count	2.000	20.000	22.000
	% of total	7.692 %	76.923 %	84.615 %
Total	Count	2.000	24.000	26.000
	% of total	7.692 %	92.308 %	100.000 %

Note. 0 refers to the absence and 1 refers to the presence (of C2 or positive mood shifts).

Table B4

Chi-Squared Test and Cramer's V for C2 and Positive Mood Shifts

Chi-Squared Test and Cramer's V

	Value	df	p
X²	0.394	1	0.530
N	26		
Cramer's V	0.123		

Table B5

Complex Emotions Category 3 (C3) and Positive Mood Shifts

Contingency Table

C3		Positive Mood Shift 0	Positive Mood Shift 1	Total
0	Count	2.000	7.000	9.000
	% of total	7.692 %	26.923 %	34.615 %
1	Count	0.000	17.000	17.000
	% of total	0.000 %	65.385 %	65.385 %
Total	Count	4.000	24.000	26.000
	% of total	7.692 %	92.308 %	100.000 %

Note. 0 refers to the absence and 1 refers to the presence (of C3 or positive mood shifts).

Table B6

Chi-Squared Test and Cramer's V for C3 and Positive Mood Shifts

Chi-Squared Test and Cramer's V

	Value	df	p
X²	4.093	1	0.043
N	26		
Cramer's V	0.397		

Table B7

Complex Emotions Category 4 (C4) and Positive Mood Shifts

Contingency Table

C4		Positive Mood Shift 0	Positive Mood Shift 1	Total
0	Count	1.000	5.000	6.000
	% of total	3.846 %	19.231 %	23.077 %
1	Count	1.000	19.000	20.000
	% of total	3.846 %	73.077 %	76.923 %

Total	Count	2.000	24.000	26.000
	% of total	7.692 %	92.308 %	100.000 %

Note. 0 refers to the absence and 1 refers to the presence (of C4 or positive mood shifts).

Table B8

Chi-Squared Test and Cramer's V for C4 and Positive Mood Shifts

Chi-Squared Test and Cramer's V

	Value	df	p
X²	0.885	1	0.347
N	26		
Cramer's V	0.184		

Table B9

Complex Emotions Category 5 (C5) and Positive Mood Shifts

Contingency Table

C5		Positive Mood Shift 0	Positive Mood Shift 1	Total
0	Count	0.000	2.000	2.000
	% of total	0.000 %	7.692 %	7.692 %
1	Count	2.000	22.000	24.000
	% of total	7.692 %	84.615 %	92.308 %
Total	Count	2.000	24.000	26.000
	% of total	7.692 %	92.308 %	100.000 %

Note. 0 refers to the absence and 1 refers to the presence (of C5 or positive mood shifts).

Table B10

Chi-Squared Test and Cramer's V for C5 and Positive Mood Shifts

Chi-Squared Test and Cramer's V

	Value	df	p
X²	1.857	1	0.395
N	26		
Cramer's V	0.083		

Appendix C

Contingency Tables, Chi-Squared Tests, and Cramer's V for Anxiety Levels and

Complex Emotions

Table C1

Anxiety levels and Complex Emotions Category 1 (C1)

Contingency Table

Anxiety Level		C1		Total
		0	**1**	**Total**
1	Count	1.000	13.000	14.000
	% of total	3.846 %	50.000 %	53.846 %
2	Count	0.000	6.000	6.000
	% of total	0.000 %	23.077 %	23.077 %
3	Count	3.000	3.000	6.000
	% of total	11.538 %	11.538 %	23.077 %
Total	Count	4.000	22.000	26.000
	% of total	15.385 %	84.615 %	100.000 %

Note. 1, 2, and 3 under the 'Anxiety Level' column refers to minimal, mild, and moderate

levels of anxiety, respectively, based on GAD-7 scores. 0 and 1 under the 'C1' column refers

to the presence and absence of complex emotions category 1 (C1), respectively.

Table C2

Chi-Squared Test and Cramer's V for Anxiety Levels and C1

Chi-Squared Tests and Cramer's V

	Value	df	p
X^2	7.344	2	0.025
N	26		
Cramer's V	0.674		

Table C3

Anxiety levels and Complex Emotions Category 2 (C2)

Contingency Table

Anxiety Levels		C2		Total
		0	1	
1	Count	2.000	12.000	14.000
	% of total	7.692 %	46.154 %	53.846 %
2	Count	1.000	5.000	6.000
	% of total	3.846 %	19.231 %	23.077 %
3	Count	1.000	5.000	6.000
	% of total	3.846 %	19.231 %	23.077 %
Total	Count	4.000	22.000	26.000
	% of total	15.385 %	84.615 %	100.000 %

Note. 1, 2, and 3 under the 'Anxiety Level' column refers to minimal, mild, and moderate levels of anxiety, respectively, based on GAD-7 scores. 0 and 1 under the 'C2' column refers to the presence and absence of complex emotions category 2 (C2), respectively.

Table C4

Chi-Squared Test and Cramer's V for Anxiety Levels and C2

Chi-Squared Test and Cramer's V

	Value	df	p
X^2	0.028	2	0.986
N	26		
Cramer's V	0.033		

Table C5

Anxiety levels and Complex Emotions Category 3 (C3)

Contingency Table

Anxiety Levels		C3		Total
		0	1	
1	Count	9.000	5.000	14.000
	% of total	34.615 %	19.231 %	53.846 %
2	Count	0.000	6.000	6.000
	% of total	0.000 %	23.077 %	23.077 %
3	Count	0.000	6.000	6.000
	% of total	0.000 %	23.077 %	23.077 %
Total	Count	9.000	17.000	26.000
	% of total	34.615 %	65.385 %	100.000 %

Note. 1, 2, and 3 under the 'Anxiety Level' column refers to minimal, mild, and moderate levels of anxiety, respectively, based on GAD-7 scores. 0 and 1 under the 'C3' column refers to the presence and absence of complex emotions category 3 (C3), respectively.

Table C6

Chi-Squared Test and Cramer's V for Anxiety Levels and C3

Chi-Squared Test and Cramer's V

	Value	df	p
X^2	11.798	2	0.003
N	26		
Cramer's V	0.674		

Table C7

Anxiety levels and Complex Emotions Category 4 (C4)

Contingency Table

Anxiety Levels		C4 0	C4 1	Total
1	Count	5.000	9.000	14.000
	% of total	19.231 %	34.615 %	53.846 %
2	Count	0.000	6.000	6.000
	% of total	0.000 %	23.077 %	23.077 %
3	Count	1.000	5.000	6.000
	% of total	3.846 %	19.231 %	23.077 %
Total	Count	6.000	20.000	26.000
	% of total	23.077 %	76.923 %	100.000 %

Note. 1, 2, and 3 under the 'Anxiety Level' column refers to minimal, mild, and moderate levels of anxiety, respectively, based on GAD-7 scores. 0 and 1 under the 'C4' column refers to the presence and absence of complex emotions category 4 (C4), respectively.

Table C8

Chi-Squared Test and Cramer's V for Anxiety Levels and C4

Chi-Squared Test and Cramer's V

	Value	df	p

	Value	df	p
X²	3.198	2	0.202
N	26		
Cramer's V	0.351		

Table C9

Anxiety levels (GAD-7) and Complex Emotions Category 5 (C5)

Contingency Table

Anxiety Levels		C5 0	C5 1	Total
1	Count	1.000	13.000	14.000
	% of total	3.846 %	50.000 %	53.846 %
2	Count	0.000	6.000	6.000
	% of total	0.000 %	23.077 %	23.077 %
3	Count	1.000	5.000	6.000
	% of total	3.846 %	19.231 %	23.077 %
Total	Count	2.000	24.000	26.000
	% of total	7.692 %	92.308 %	100.000 %

Note. 1, 2, and 3 under the 'Anxiety Level' column refers to minimal, mild, and moderate levels of anxiety, respectively, based on GAD-7 scores. 0 and 1 under the 'C5' column refers to the presence and absence of complex emotions category 5 (C5), respectively.

Table C10

Chi-Squared Test and Cramer's V for Anxiety Levels and C5

Chi-Squared Test and Cramer's V

	Value	df	p
X²	1.187	2	0.553
N	26		
Cramer's V	0.214		

Appendix D

Power Analyses

Table D1

Power Values for Each Analysis

Analysis	Power Analysis Values
Chi-squared tests (complex emotions categories and positive mood shifts)	Complex emotions category 1 (C1) = 0.118 Complex emotions category 2 (C2) = 0.118 Complex emotions category 3 (C3) = 0.687 Complex emotions category 4 (C4) = 0.205 Complex emotions category 5 (C5) = 0.080
Chi-squared tests (anxiety levels and complex emotions categories)	Complex emotions category 1 (C1) = 0.843 Complex emotions category 2 (C2) = 0.053 Complex emotions category 3 (C3) = 0.969 Complex emotions category 4 (C4) = 0.476 Complex emotions category 5 (C5) = 0.201
Pearson's correlation (anxiety levels and complex emotions categories)	= 0.58

Table D2

Desired Sample Size for Each Power Analysis

Analysis	Desired Sample Size (N)
Chi-squared tests (complex emotions categories and positive mood shifts)	Complex emotions category 1 (C1) = N = 38 Complex emotions category 2 (C2) = N = 38 Complex emotions category 3 (C3) = N = 39 Complex emotions category 4 (C4) = N = 38 Complex emotions category 5 (C5) = N = 38
Chi-squared tests (anxiety levels and complex emotions categories)	Complex emotions category 1 (C1) = N = 39 Complex emotions category 2 (C2) = N = 37 Complex emotions category 3 (C3) = N = 39 Complex emotions category 4 (C4) = N = 38 Complex emotions category 5 (C5) = N = 39
Pearson's correlation (anxiety levels and complex emotions categories)	N = 39