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RESEARCH ARTICLE

REVISED "I" in research integrity: Introducing art session into research integrity course

[version 2; peer review: 2 approved, 1 approved with reservations]

Ana Marušić[1], Anna Catharina Vieira Armond[2], Benjamin Benzon[3], Maja Gligora Marković[4], Danijel Gudelj[5], Sandra Kostić[6], Anita Lunić[7], Eli Marušić[8], Stjepan Ljudevit Marušić[9], Vanja Pupovac[10], Tamara Radojčić[11], Rea Roje[12], Rafaelly Stavale[13], Dina Šimunović[14], Ružica Tokalić[15], Vicko Tomić[5], Marin Viđak[16], Marija Franka Žuljević[17], Ivan Buljan[7]

[1]Department of Research in Biomedicine and Health, Center for Evidence-based Medicine, University of Split School of Medicine, Split, Split-Dalmatia County, 21000, Croatia
[2]Centre for Journalology, Clinical Epidemiology Program, Ottawa Hospital Research Institute, Ottawa, Ontario, Canada
[3]Department of Anatomy, University of Split School of Medicine, Split, Croatia
[4]Department of Biomedical Informatics, University of Rijeka, Faculty of Medicine, Rijeka, Croatia
[5]ST-OPEN, University of Split, Split, Split-Dalmatia County, Croatia
[6]Department of Histology and Embryology, University of Split School of Medicine, Split, Split-Dalmatia County, Croatia
[7]Department of Philosophy, University of Split Faculty of Humanities and Social Sciences, Split, Croatia
[8]University of Split Faculty of Maritime Studies, Split, Croatia
[9]Rogor, Zagreb, Grad Zagreb, Croatia
[10]Department of Social Sciences and Medical Humanities, University of Rijeka Faculty of Medicine, Rijeka, Croatia
[11]Institute for Culture and Society, University of Navarre Faculty of Education and Psychology, Navarre, Spain
[12]Integritas, Split, Croatia
[13]Department of Nursing, College of Health Sciences, University of Brasília, Brasilia, Brazil
[14]BVAEB Dental Practice, Feldkirch, Austria
[15]Department of Hematology, Holy Spirit University Hospital, Zagreb, City of Zagreb, Croatia
[16]Department of Cardiology, University Hospital Dubrava, Zagreb, City of Zagreb, Croatia
[17]Department of Medical Humanities, Center for Evidence-based Medicine, University of Split School of Medicine, Split, Croatia

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Abstract

Background

Traditional instruction in rules and system of research conduct cannot capture the unique and complex situations involved in ethics choices and actions, but engagement with art may facilitate deeper understanding and discussion of these issues. In this case study, we explored the value of an art exercise incorporated into research integrity (RI) training based on the European Code of Conduct for Research Integrity, including research misconduct.

Open Peer Review

Approval Status ? ✓ ✓

	1	2	3
version 2 (revision) 06 Nov 2025		✓ view	✓ view
version 1 02 Sep 2025	? view	✓ view	? view

1. **Henry Gonnet**, Leeds Arts University, Leeds, UK

Methods

At the end of a summer school on responsible research, we held an art session where the participants, all of whom are also authors of this article, painted a picture to illustrate their perspective on research integrity. They also completed a demographic data survey and provided a short description for their painting. We qualitatively analysed the motives of the drawings and quantitatively analysed the sentiment of the essays corresponding to the paintings

Results

Most authors came from biomedical sciences and were academic researchers, predominantly women (13 out of 19 participants). The titles of paintings ranged from ambiguous (e.g., “Circles” or “Equilibrium”) to more specific (e.g., “The temptation of image manipulation”). Some paintings were abstract, while others fit the representational art framework. Several paintings depicted research graphs and images, while others depicted themes from nature – flowers, beaches, and trees. Motives of conflict and balance were frequent. In the descriptions of the paintings, authors associated their paintings with classical research integrity themes such as morality, transparency, and data manipulation, as well as with personal experiences with research integrity dilemmas. The sentiment of the text was predominantly positive and trusting.

Conclusion

Using art in teaching research integrity may be a good way to stimulate introspection and discussion about research integrity, as well as to improve understanding of how researchers perceive the concept of research integrity.

Keywords
research integrity; art; training; art and text analysis

Samantha Broadhead, Leeds Arts University, Leeds, UK

2. **Lisa DeTora**, Hofstra University, Hempstead, USA

3. **Gengyan Tang**, University of Calgary, Calgary, Canada

Any reports and responses or comments on the article can be found at the end of the article.

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Corresponding author: Ana Marušić (ana.marusic@mefst.hr)

Author roles: Marušić A: Conceptualization, Formal Analysis, Funding Acquisition, Investigation, Methodology, Project Administration, Resources, Supervision, Validation, Visualization, Writing – Original Draft Preparation; **Vieira Armond AC**: Investigation, Writing – Review & Editing; **Benzon B**: Investigation, Writing – Review & Editing; **Gligora Marković M**: Investigation, Writing – Review & Editing; **Gudelj D**: Investigation, Writing – Review & Editing; **Kostić S**: Investigation, Writing – Review & Editing; **Lunić A**: Investigation, Writing – Review & Editing; **Marušić E**: Investigation, Writing – Review & Editing; **Marušić SL**: Investigation, Writing – Review & Editing; **Pupovac V**: Investigation, Writing – Review & Editing; **Radojčić T**: Investigation, Writing – Review & Editing; **Roje R**: Investigation, Writing – Review & Editing; **Stavale R**: Investigation, Writing – Review & Editing; **Šimunović D**: Investigation, Writing – Review & Editing; **Tokalić R**: Formal Analysis, Investigation, Validation, Visualization, Writing – Review & Editing; **Tomić V**: Investigation, Writing – Review & Editing; **Viđak M**: Investigation, Writing – Review & Editing; **Žuljević MF**: Investigation, Writing – Review & Editing; **Buljan I**: Data Curation, Formal Analysis, Validation, Visualization, Writing – Original Draft Preparation

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REVISED **Amendments from Version 1**

The following changes were made in the new version:

1. The abstract was updated with the reference to the European Code of Conduct for Research and shortened to fit the word limit.

2. Reference to the European Code of Conduct for Research Integrity was also added to the Introductions section.

3. Reference to the qualitative methodology for text analysis was added to the Methods section.

4. The Discussion section was revised to include a more detailed integrated analysis of quantitative and qualitative findings. Participatory research was defined in more detail. The sections on psychological aspects of art and the potential use of AI in art session were deleted, per suggestion of the reviewer. Finally, we interpreted our findings in view of a research study of using art as a method to gain insight into research integrity sat a personal level but also as a way of understanding organizational culture.

5. A reference was added and the list of references was reordered.

Any further responses from the reviewers can be found at the end of the article

Background

Creating and reporting honest, trustworthy, and objective science in any field depends on doing research in line with research integrity (RI) standards. Endorsing RI standards within the research community can be achieved by clear guidelines, data sharing, and RI education[1]. Many different RI training programs have been developed in recent decades, but with varying success in terms of improving RI-related awareness within the research community[2]. A qualitative study on RI training practices highlighted the importance of providing general RI-related knowledge, but also expressed the need for diverse and combined approaches to be considered for development of more comprehensive training[2].

Art may represent a training tool suitable for this purpose. Whether in the form of music, poetry, illustrations, or sculptures, art can serve as a cognitive instrument and promote the synthesis of different types of knowledge. It may also have a significant role in the process of scientific research, due to its ability to induce creativity and critical thinking[3]. Although art and science have been perceived to be in an opposing relationship, they often share images, symbols and archetypes[4], and are becoming increasingly interlinked, from the artistic scientific masterpieces of Leonardo da Vinci to artworks created by artificial intelligence[5].

Art has been a part of education and training in many professions, particularly for those related to health. Recent systematic reviews on the use of art in health care education showed that art can be successfully used in a variety of ways and with diverse student groups to promote learning a profession[6–8]. Engagement with the arts stimulates reflection, interpretation, imagination, and aesthetic and emotional engagement, which helps in constructing new meanings, such as self-awareness, opening to alternate perspectives, coping with ambiguity and deeper understandings, all of which translated to health practice, leading to increased empathy and communication and observation skill as well as increased ethical reasoning[6]. Formats and content of art programs in health care education vary, and long-term outcomes are not clear, but the evidence indicates a strong influence on different clinical competences, such as mindfulness, identification of patient stories, and emotional awareness[7,8]. An example of the interface of the arts and medicine is the collection of more than five hundred creative works by medical students, patients, and doctors – the Out of Our Heads collection, created by the teachers from the Bristol Medical School in the UK[9,10]. A hermeneutic phenomenological analysis of written statements from students of occupational therapy about ethics training using visual arts[10] showed that the students reported the following important learning outcomes: becoming aware of values, discovering creativity, valuing reflection in personal life, deepening self-awareness, and capacity to imagine future practices. Examples of art-based training include teaching undergraduate students of chemistry[11], business ethics courses[12], and mathematics[13]. Positive experiences of collaboration between artists and scientists have also been reported, which may result in improved communication skills, creative problem solving and better problem articulation[14,15].

Because art-based training uses the artistic language to create concepts and new ideas, and not recreated physical objects[3], it may be particularly relevant for teaching research ethics and research integrity. We are not aware of previous studies exploring the use of art in this context, although there is a clear rationale for its use in teaching ethics and integrity. As Rethorst[16] argues in his recent book on "Why Teaching Art is Teaching Ethics," standard approaches to training ethics cannot provide "moral illumination" which is important in internalizing good behaviours. Traditional instruction in rules and system of conduct cannot capture the unique and complex situations involved in ethics choices and actions, but engagement with art may facilitate understanding and discussion of these issues.

In this case study, we explored the value of introducing an art session in virtue-based RI training withing the European Code of Conduct for Research Integrity. We present the analysis of paintings and literary reflections of doctoral and postdoctoral students and teachers participating in a summer school of research integrity, where an art session was introduced at the end of the school as a formal and mandatory part of the training.

Methods

Study design and aim

This was a case study performed during a summer school on RI that took place at the University of Split School of Medicine, Split, Croatia. An art session exercise took place at the end of the summer school, with the aim of having the participants integrate, evaluate, and synthesize the knowledge they had gained into an artistic creation and elaborate on its meaning.

The specific aim of the present study was to gain understanding about the relationship between the RI concepts and researchers' perspective of their role in RI processes. We used a qualitative approach to analyse the painting and the accompanying essays, with the overall goal to lay ground for the development of a new innovative practical exercise for RI training. Within the art session, our aim was not to assess the effect of the whole RI training, but rather to explore the value of an art session embedded in a RI course and the multifaceted information that can come out of such an activity.

Setting

The first four days of a five-day summer school were focused on information collection and understanding the principles of and good practices in RI, as outlined in the European Code of Conduct for Research Integrity[17]. The practical exercises were based on the application of normative principles as well as virtue-based approach, developed by the Horizon 2020 project VIRT^{2}UE[18]. The topic of research misconduct and responses to allegation of misconduct were also addressed. The school's program was organized in 5 full days that could be briefly described as follows[19]:

> Day 1: RI concepts; virtue-based training (Debate and Dialogue, Values and Norms); sharing experiences about own research;
>
> Day 2: Safeguards; Information sources; virtue-based training (Goodness/Self-declaration);
>
> Day 3: Research procedures, research reproducibility; virtue-based training (Middle position); Walkshop;
>
> Day 4: Data management and sharing; Misinterpretation of research findings; virtue-based training (Rotterdam Dilemma Game);
>
> Day 5: Responsible publishing and peer review; Art session.

The art session at the end of the summer school was designed as an exercise to help the participants synthesize their knowledge of RI concepts and envision how they affect their research practice by combining these concepts in a visual, art-based format. The art session format, where each participant received a task to make a painting about their perspective on research integrity, allowed the participants to focus on the most important aspects of RI relevant to them as individuals.

Procedure and data collection

Both the teachers and the students participated in the art session, which was titled: The "I" in Research Integrity. They received the following instruction: "In this session, your task is to visually present how you see yourself (the "I" from the title) in research integrity. You have in front of you a small canvas (20×20 cm), a set of tempera colours, a brush, and some water in a cup. You have the full freedom to use the colours and any additional material, such as flour, paper, plastic, or wood".

After the end of the summer school, the participants in the art session were asked to submit a brief essay (up to 300 words) about their painting. They were asked to give it a title, and describe what the "I" in Integrity meant to them based on what they drew.

Participants' characteristics and reflexivity

The summer school was a voluntary extracurricular activity for doctoral students and other early career researchers. We targeted both national and international participants. The participants came from our institution, other institutions in Croatia, as well as from other countries. They were doctoral or postdoctoral students. Some participants knew each other well, but the majority met for the first time at the beginning of the summer school and interacted a lot during the summer school's activities. Considering that the exercise was performed on the fifth day of the school, it is possible that by participants knew each other well enough, which helped them approach the exercise without any pressure to make a good initial impression, thus facilitating their creative expression in the task.

All teachers in the summer school were researchers from the field of RI and certified trainers in virtue-based research integrity training[18]. The coders (IB, RT) of the qualitative analysis had substantial experience in qualitative research since they both participated and published within the field of qualitative research. They were also participants in the school, but the decision that they would be the first coders was made after the summer school (several of the participants/teachers had experience in qualitative research). The coders performed the qualitative analysis using a consensus-based approach after working through the essays written about the art session paintings.

Analysis

We analysed the results both quantitatively and qualitatively in order to provide a multi-perspective overview of the outcomes of the art session. For the qualitative analysis, we analysed the motives of the drawings, descriptions of the motives, and colours used, using a descriptive approach to form conclusions about the authors' experiences and attitudes. We followed an interpretivist research paradigm, since participants themselves gave meaning and descriptions to their drawings, and we only analysed the content of the corresponding descriptions[20]. Since all of the study participants were also authors of the study, a full description of the analysis, performed initially by the two coders, was sent to all participants in order for them to confirm that they agree with the way it was presented, thus minimizing a possible bias.

The quantitative analysis included a descriptive presentation of the demographic characteristics and sentiment analysis of the essays corresponding to the paintings. For sentiment analysis, we used the "SentimentAnalysis" package, version 1.3–4[21]. Categorical variables were presented as frequencies and percentages, while numerical variables were presented as median and interquartile range (IQR). A graphical presentation of the most frequent words within the participants' essays was constructed to serve as a supplement to the qualitative analysis of the paintings, where we created a word-cloud where word size depended on the word frequency in the texts, using the "wordcloud" package, v2.6[22] and "wordcloud2" package v0.2.1[23].

Ethical considerations

Ethics approval was obtained from the institutional ethics committee for this study. The participation in the art session was voluntary. All authors gave written informed consent to participate in the study and for their paintings from the summer school to be presented and analysed within this study. They did not give consent to publicly share the full text of their essays. The access to anonymized full texts may be requested from the corresponding author.

Results

Eight out of 19 participants of the art session had a university master or doctoral degree, and ranged in age from 24 to 57 years (Table 1). They were academic researchers (16 out of 19), were engaged in research in biomedical sciences (15 out of 19), were women (13 out of 19), and had a medium level of experience in RI issues (Table 1). They also served multiple roles in the research process, from students to journal editors (Table 1).

Table 1. Characteristics of study participants.

Characteristics	No. participants
Female gender	13/19
Country of residence:	
Croatia	16
Hungary	1
Brazil	1
Montenegro	1
Age (median, interquartile range)	31 (28-37)
Highest level of education:	
Bachelors'	1
Masters'	3
PhD student	5
PhD/MD	8
Other	2
In which type of the research process are you currently active?*	
Academic researcher	16
Journal editor	7
Peer reviewer	9
Member of research ethics or research integrity committee	1
Student	7
Research assistant	1
In which discipline(s) do you work?*	
Biomedical sciences	15
Social sciences	7
Humanities	3
Multidisciplinary	1
How experienced are you in research integrity? (Scale range 1 (no experience) to 5 (expert); median, interquartile range)	3 (3–4)

*More than one choice was possible.

Qualitative content analysis of the drawings

The graphical content was very diverse (Figure 1). Some of the images created were monochromatic, while others used a wide range of colours. Two authors decided to add newspaper pieces or flour to create texture in their paintings. In some cases, images of nature, such as sunflowers, beaches, and trees, were associated with RI. Conflict and balance motives were also present in the paintings, such as the contrast between black and white and the image of a scale.

Qualitative content analysis of the painting titles and descriptions

The titles of the painting ranged from ambiguous and abstract (e.g., "Circles" or "Equilibrium") to more specific (e.g., "The

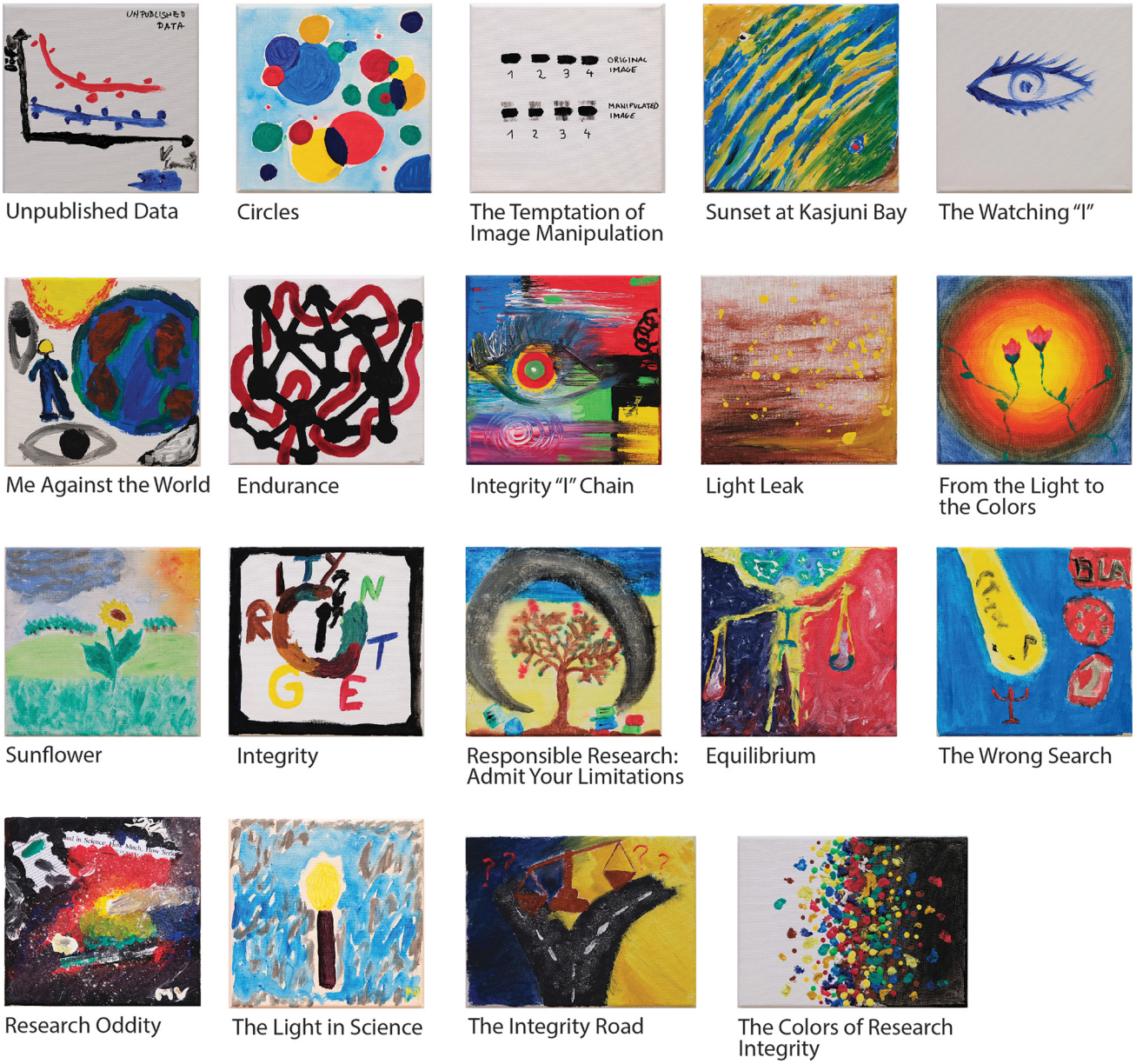


Figure 1. Paintings we created at the art session of the Summer School of Responsible Research. The titles are original titles given by the participants in their essays.

temptation of image manipulation"). In describing their paintings, some authors associated them with classical RI themes such as morality, transparency, or data manipulation. The titles of the paintings and excerpts from essays describing the paintings are available as extended data in Zenodo (https://doi.org/10.5281/zenodo.16874806).

Quantitative analysis of painting descriptions

Word cloud analysis of the text corpus put RI in the centre as the most common word, followed by words expressing positive concepts, such as "good", "right", "light" (Figure 2). "Science", "picture", and "painting" were also common.

The sentiment analysis, which looked at the overall frequency of words with different sentiments (Figure 3), showed that the most predominant sentiment in the total text corpus was positive, with trust, anticipation, and joy as important positive sentiments.

Negative sentiment was very low. At the level of the individual textual descriptions of how we see ourselves in RI, the text content was predominantly positive, with a median count of 7 (IQR 3-13) words expressing positive emotions (Table 2). The specific positive emotion expressed in the texts was trust, with a median of 5 words reflecting this sentiment (IQR 3-9).

Discussion

Our study demonstrated that an art session can be incorporated into formal training in RI. While there are a number of studies on how art can be included in general professional education[6–8] or ethics training[16], this is, to the best of our knowledge, the first study to explore using art to teach RI. The art session was well-accepted as a part of the summer school and the participants were keen to express their understanding of RI using art techniques. They also actively participated in the essay assignment, indicating that they were very engaged with the art session. Significant differences in presenting the "I in Integrity" and in describing paintings suggest the complexity of RI and its

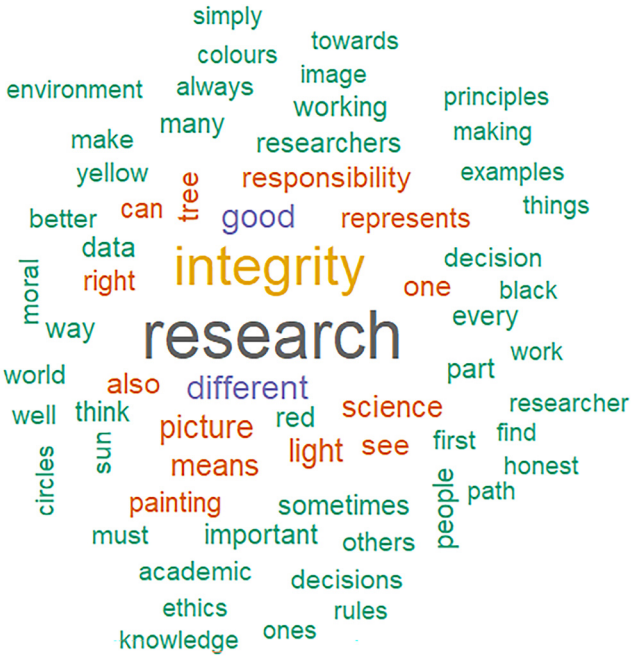


Figure 2. Word cloud of words used in the picture descriptions, arranged by frequency from the centre outward.

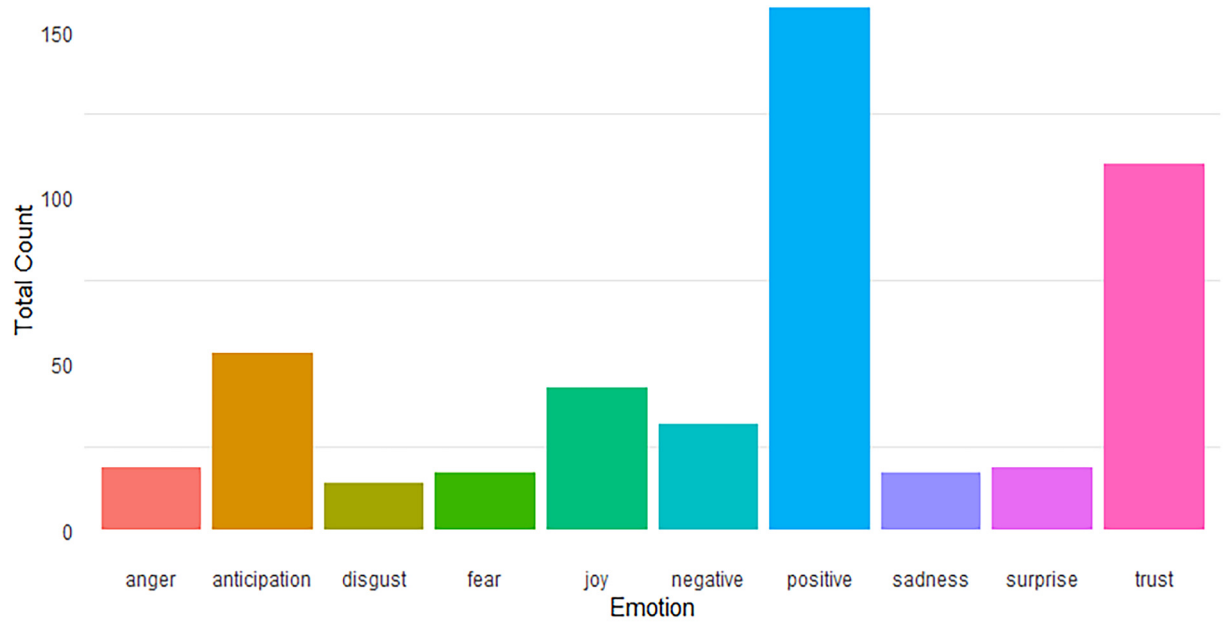


Figure 3. Sentiment analysis of the descriptions about what research integrity means to participants. Bar size represents the number of words for each word category for all painting descriptions. SentimentAnalysis in R, version 1.3-4 was used for data analysis.

Table 2. Median number of words (interquartile range) related to specific emotions in painting descriptions*.

Emotion	Number of words
Anger	1 (0–2)
Anticipation	2 (1–4)
Disgust	1 (0–1)
Fear	1 (0–1)
Joy	2 (0–4)
Sadness	0 (0–2)
Surprise	0 (0–2)
Trust	5 (3–9)
Positive emotions in general	7 (3–13)
Negative emotions in general	1 (0–3)

*SentimentAnalysis in R, version 1.3–4 was used for data analysis.

understanding. Alternatively, this may be due to the variety in human capacity of expression on the same topic brought out by the creation of art. Most likely both processes were in play – artistic expression leads to a large variety of modes of expression, and the subject matter itself was complex.

From a qualitive point of view, our study showed a variety of artistic expressions, and the quantitative linguistic characteristics of the essays about participants' painting showed mostly positive tone and words related to trust. This indicates that artistic and literary analysis of works related to RI may help understand individual perceptions of research processes, which can then help understand wider, organizational culture for research. The frequent appearance of motifs of balance and light in the artwork followed the linguistic expressions of optimism and moral clarity found in participants' descriptions of their art. Similarly, the absence of negative sentiments such as anger or fear was consistent with an absence of visual or narrative conflict within the paintings. This suggests that participants' artistic and written expressions pointed towards their view of research integrity as a source of meaning and trust instead of a source of tension or moral struggle.

Several limitations of our study have to be kept in mind. Firstly, this was a pilot study and we did not formally study the short- or long-term effectiveness of the art session as a training tool for RI. We see the art session as an important creative and introspective tool that can be added to the conventional RI training. Secondly, our case study involved participatory research, – collaborative research approach that emphasizes shared decision-making, mutual learning, and co-creation of knowledge between researchers and participants. In our case, both the teachers and students jointly took part in the art session, performed the qualitative and quantitative analysis of paintings and written essays, respectively, and wrote the present article. This introduced different and significant biases related to participant recruitment, delivery of the intervention, and analysis. On the other hand, it is important to keep in mind that our study was explorative pilot study. The rationale for including the teachers in the art session was to reflect the actual research environment: research is mostly done in a group comprised of researchers at different career levels; thus, their collaboration and interactions in research were recreated in the art session, where the discussion by written or oral arguments in a research group was replicated in their artistic expressions. Our sample was small and purposive, as it is often the case with qualitative studies, which enables obtaining a richness of data, but does not allow the generalization of the findings to other populations. We are not art experts and did not attempt to use analysis methods from art studies, particularly with regard to transferability, reproducibility and authenticity of the art works created in this study. Further studies should look deeper into art as a research method to understand both the critical reflections of individual researchers and the wider RI culture. For this, larger samples may be needed, also with diverse populations in terms of cultural, ethnic, and professional background.

Despite these limitations, our art exercise provided the opportunity for us to have an important introspection on how we see RI from our individual standpoints and lived experiences. As Redhorst posited in his book on the similarities of teaching art and ethics[16], our perception of aesthetics and ethics has an organic connection, which helps us clarify moral perception. Art takes ethics education to a higher level, transcending direct formal educational instruction into a state of moral illumination[16]. We can say, as the participants and researchers studying our own behaviour in an educational exercise, that the visual art allowed us to express ourselves more freely on the challenging topic of RI. Such an introspective experience helped us become more aware of our position in a particular research environment and to also learn how other colleagues from a similar or very different research, educational, or social/geographical background express their innermost views and interpretations on the common topic of RI.

In our experience, attending an art session started with some anxiety, as most of us were not familiar with visual expression of our thoughts and opinions, since our professional and research education and experience focused almost solely on writing research articles. The only opportunity for visual expression for most of us was when we had to create graphs to present research results. However, although some of us felt insecure and perhaps unqualified to make art, we all enjoyed the course session very much. Some of us had to spend more time on preparing for the painting process, but some dove right into painting. We also had different levels of painting skills, from very basic to very accomplished. However, all of us found the best way to express themselves regardless of our art skill. Some used more complex motives from nature, while some resorted to conceptual motives, letters, or symbols, whose meaning was only made clear in the written assays, thus making the visual and literary expressions complementary parts of their artistic expression. Our experience thus demonstrates that no art skills are needed for successful implementation

of art in RI training – everyone can find the mode of artistic expression that is best for them, especially when there is a combination of different art forms. Most of the concepts presented and addressed in our art session were very optimistic. This may mean that we have not experienced hardships in research and morally grey choices and situations in the real-world. This may have been true for most of us, as we were mostly researchers in their early careers. However, those of us with more experience, who had sometimes witnessed the negative sides of science, still presented an optimistic view of RI. Our approach is similar to the photovoice methodological approach in qualitative research, where participatory research empowers individuals to reflect and document their thinking and opinions, invite critical discussion, and create knowledge about important issues through the creation of photographs[24].

A recent study from UK used collage art to explore how researchers reflect on their work and the conditions shaping it, thus framing research culture as something negotiated by individuals within the practice of research[25]. Similar to that study, our study may indicate that arts-based, reflexive, and deliberative approach may foster a more responsible research environment. Future research should examine whether the artistic expression changes over time, with accumulated research experience. It would also be interesting to explore whether other stakeholders in RI, such as research policy makers, funders, managers, journal editors, have different artistic expression of their role in and view of RI.

Conclusions

Training in RI and research ethics has moved from conventional training to learning by doing and learner-cantered teaching, emphasizing the development of virtues relevant for RI[18,26,27]. Art as a training tool may contribute to the success of virtue training by focusing on introspection, which may contribute to the development of moral sensitivity and moral character and facilitate taking ethics education beyond utilitarian compliance to the rules, thus better addressing the complexities of individual, specific dilemmas in real-life situations. At a personal level, art may help in accomplishing Aristotle's eudaimonia – a (research) life well lived[28]. At an institutional level, art in RI training may help understand how Ri is practiced, manifested, and debated in everyday life, providing creative and reflexive approaches can play an active role in shaping responsible research culture[25].

Declarations

Ethics approval and consent to participate

This study is the result of participatory research, where all the participants and some of the teachers at the summer school participated in the art session and were also authors in the study, therefore participating in the analysis and interpretation of data and writing of the manuscript. The participation in the art session was voluntary. Ethics approval was obtained from the Ethics Committee of the University of Split School of Medicine (document: Class No. 003-08/23-03/0015, Reg. No 2181-198-03-04-23-0086). All authors gave written informed consent to participate in the study and for their paintings from the summer school to be presented and analysed within this study.

Consent for publication

Not applicable.

Data and software availability

Underlying data

The full text of individual essays from cannot be shared due to the restrictions for sharing personal data, as per informed consent and ethics approval. The access to anonymized full texts may be requested from the corresponding author (ana.marusic@mefst.hr).

Extended data

Zenodo: Table S1. Titles of paintings and excerpts from author descriptions. https://doi.org/10.5281/zenodo.16874806[29].

The table contains the following extended data: Titles of the paintings and excerpts from essays on the paintings about how participant perceive themselves in research integrity.

Data are available under the terms of the Creative Commons Attribution 4.0 International license.

Authors' information

The authors of this article are participants and teachers who worked together in the art session during the Summer School of Responsible Research. This was a truly collaborative work and all authors made significant intellectual contribution to the manuscript.

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Open Peer Review

Current Peer Review Status: ? ✓ ✓

Version 2

Reviewer Report 07 November 2025

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✓ **Gengyan Tang**
University of Calgary, Calgary, Alberta, Canada

I have no further comments on the authors' response.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Research integrity, academic integrity, scholarly publishing, higher education, education leadership

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 07 November 2025

https://doi.org/10.21956/openreseurope.23531.r63547

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✓ **Lisa DeTora**
Hofstra University, Hempstead, New York, USA

Thank you for these additions. I have no further comments.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Biomedical ethics, rhetoric of science, rhetoric of health and medicine, technical communication, health humanities, comics studies, studies of embodiment, medical

humanities, pedagogy

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 29 September 2025

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Gengyan Tang
[1] University of Calgary, Calgary, Alberta, Canada
[2] University of Calgary, Calgary, Alberta, Canada

The authors explore how art can be brought into research integrity education and share some interesting observations from their practice. The article adds something valuable to this area, but I have a few suggestions the authors might want to think about:

1. When reviewing the literature on art and integrity education, if you find there isn't much directly on research integrity education, you could consider widening the scope a bit. The academic integrity field may have more relevant studies. Much of that work is situated in higher education, often written by researchers with backgrounds in education.
2. For the qualitative analysis, the paper only briefly mentions a consensus-based approach, but it's not clear what specific method was actually used. Was it thematic analysis, grounded theory, or narrative analysis? Readers would benefit from a clearer picture of the process.
3. In the results section, the discussion of the qualitative findings feels a little thin. Qualitative analysis usually calls for "thick description." Since you have both student artworks and short written reflections, it would be great to draw more from them—looking at whether students' understanding of research integrity shifted during the course, for example. You might also compare the artworks more closely to highlight the different ways students expressed their ideas, experiences, or learning journeys. That could offer readers richer insights.
4. For the quantitative part, it might help to connect those results with the qualitative findings. This would allow readers not just to see patterns in word frequency or sentiment, but also to better understand the context behind them.

Overall, I appreciate the effort the authors have put into this topic. With some further development, the article could make an even stronger contribution.

Is the work original in terms of material and argument?

Yes

Does it sufficiently engage with relevant methodologies and secondary literature on the topic?
Partly

Is the work clearly and cogently presented?
Partly

Is the argument persuasive and supported by evidence?
Yes

If any, are all the source data and materials underlying the results available?
Yes

Does the research article contribute to the cultural, historical, social understanding of the field?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Research integrity, academic integrity, scholarly publishing, higher education, education leadership

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 27 Oct 2025

Ana Marušić

Thank you for your comments. Below are the responses to individual comments.
The authors explore how art can be brought into research integrity education and share some interesting observations from their practice. The article adds something valuable to this area, but I have a few suggestions the authors might want to think about:
1. When reviewing the literature on art and integrity education, if you find there isn't much directly on research integrity education, you could consider widening the scope a bit. The academic integrity field may have more relevant studies. Much of that work is situated in higher education, often written by researchers with backgrounds in education.
Response: *Thank you for your comment. The academic and research integrity field have extensive literature, including systematic or scoping reviews on research integrity training. We did not think that repeating that information in the context of our study would be necessary, as we extend that body of evidence by exploring whether it is worth introducing art in research integrity training.*

2. For the qualitative analysis, the paper only briefly mentions a consensus-based approach, but it's not clear what specific method was actually used. Was it thematic analysis, grounded theory, or narrative analysis? Readers would benefit from a clearer picture of the

process.
Response: *Thank you for your comment. We used content analysis, which did not address latent meanings of the work bur rather concrete descriptions of paintings by their authors. We followed the methodology of Graneheim and Lundman (2004). This is now described in the Method section.*

3. In the results section, the discussion of the qualitative findings feels a little thin. Qualitative analysis usually calls for "thick description." Since you have both student artworks and short written reflections, it would be great to draw more from them—looking at whether students' understanding of research integrity shifted during the course, for example. You might also compare the artworks more closely to highlight the different ways students expressed their ideas, experiences, or learning journeys. That could offer readers richer insights. **Response:** *Thank you for your comment. As we stated in the response to the first reviewer, we do not have experience in qualitative art research, so we would rather refrain from such in-depth analysis, and leave that for a future study. This is now addressed in the limitations of the study, in the Discussion section.*

4. For the quantitative part, it might help to connect those results with the qualitative findings. This would allow readers not just to see patterns in word frequency or sentiment, but also to better understand the context behind them. *ANSWER: Thank you for your comment. We now address this in the Discussion of the revised manuscript. Also, the small sample size would not allow us to determine patterns between qualitative characteristics and quantitative variables. But it remains as the foundation for the future studies.* Overall, I appreciate the effort the authors have put into this topic. With some further development, the article could make an even stronger contribution.
Response: *Thank you for your positive opinion of or study. The scope of our study was to pilot introducing art in research integrity training. We will certainly take your into account for our future studies on this topic.*

Competing Interests: No competing interests were disclosed.

Reviewer Report 25 September 2025

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Lisa DeTora
[1] Hofstra University, Hempstead, New York, USA
[2] Hofstra University, Hempstead, New York, USA

This participatory research study including 19 participants, evaluated the benefits of including an art session into a 5-day research integrity summer school in Split, Croatia.

This was an original and engaging study not only from the standpoint of including a participatory qualitative research component into research integrity training (both the art component and its evaluation were qualitative and deeply immersive), but also in terms of being set in an underrepresented national context.

In general, the research is well presented and engages with secondary sources; however, the paper could benefit from a brief explanation of participatory research in the background and methods (ie, before the well-framed paragraph in the discussion). It would also be helpful for the reader naive to these methods to have a brief comment in the discussion section on how the sentiment analysis and word cloud methods could be applied in related settings.

In sum, this is a clear and cogent article, persuasively written, that engages in a meaningful way with novel and creative methodologies. The methods and results presentation include multiple outcomes to strengthen its evidence base, and in all the research contributes to the cultural, historical, and social understanding of the field.

Is the work original in terms of material and argument?

Yes

Does it sufficiently engage with relevant methodologies and secondary literature on the topic?

Partly

Is the work clearly and cogently presented?

Yes

Is the argument persuasive and supported by evidence?

Yes

If any, are all the source data and materials underlying the results available?

Yes

Does the research article contribute to the cultural, historical, social understanding of the field?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Biomedical ethics, rhetoric of science, rhetoric of health and medicine, technical communication, health humanities, comics studies, studies of embodiment, medical humanities, pedagogy

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 27 Oct 2025

Ana Marušić

Thank you for your comments. Below are the responses to individual comments.

1. This participatory research study including 19 participants, evaluated the benefits of including an art session into a 5-day research integrity summer school in Split, Croatia. This was an original and engaging study not only from the standpoint of including a participatory qualitative research component into research integrity training (both the art component and its evaluation were qualitative and deeply immersive), but also in terms of being set in an underrepresented national context. In general, the research is well presented and engages with secondary sources; however, the paper could benefit from a brief explanation of participatory research in the background and methods (i.e., before the well-framed paragraph in the discussion).
Response: Thank you for the comment – we have included a brief discussion on this issue in the Discussion section

2. It would also be helpful for the reader naive to these methods to have a brief comment in the discussion section on how the sentiment analysis and word cloud methods could be applied in related settings.
Response: Thank you for the comment. We now address the potential role of these quantitative methods in RI training in the Discussion section.

3. In sum, this is a clear and cogent article, persuasively written, that engages in a meaningful way with novel and creative methodologies. The methods and results presentation include multiple outcomes to strengthen its evidence base, and in all the research contributes to the cultural, historical, and social understanding of the field.
Response: Thank you for your positive opinion of our study.

Competing Interests: No competing interests were disclosed.

Reviewer Report 23 September 2025

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Henry Gonnet
[1] Research, Leeds Arts University, Leeds, West Yorkshire, UK
[2] Research, Leeds Arts University, Leeds, West Yorkshire, UK

Samantha Broadhead
[1] Leeds Arts University, Leeds, England, UK

[2] Leeds Arts University, Leeds, England, UK

This article is an evaluative account of introducing a painting session at the end of a short course in Research Integrity. The article was co-written by the participants of the art session. Qualitative methods were used to analyze the essays the participants wrote about their paintings. The participants mostly came from science backgrounds so taking part in an art session was a novel experience for them. The use of quantitative methods to look at work from 19 people seemed unnecessary. The positive words associated with RI that were found could be to do with the previous course content and the cohort of individuals' previous experiences. Maybe using analysis methods from art history would have been an alternative?
The article has some strengths, it was good to see it had been co-constructed with the participants. The rationale for undertaking the project were sound. The imagery produced was shared and it was good to see. This project could be undertaken in different contexts.
The article should be read carefully, for example in the abstract it reads as if 'data manipulation' is part of RI. Honest reporting of findings would not encourage data manipulation. So reword this section, perhaps drawing on RI principles.
Refer to the RI framework used in the training, acknowledging there are others which may vary slightly in emphasis, early on in the abstract and introduction (European Code of Conduct for Research Integrity). This would aid international readers.
This work may be of interest as it takes a similar approach. It refers to Research Culture, which RI is a significant part. [Reference 1]
Although the findings are not generalizable, it would be good to explore other quality indicators related to the qualitative and arts-based paradigms such as transferability, reproducibility and authenticity.
In the discussion was some over-claiming based on evidence based on one art session. For example, the authors did mention that some people were a little anxious at trying something new. This is to be expected. However, from this study there can be no significant evidence that there is an impact on stress levels in researchers. This seems to be diverting from the aims of the study, which is about the synthesis of previous learning about RI. It would be better to focus on the learning aspects of the exercise.
It was surprising that recommendations for future research was to use AI to create imagery. The ethics and integrity of this need to be considered. In addition, this activity has RI issues as AI uses the works of other artists to create derivatives without crediting the original author(s).
Also, using AI to create images totally negates the idea of making art - it's a human activity! It's the thinking through making that makes the art session effective. AI is contrary to art as a human activity and confounds the point of the research. Would this activity elicit the same therapeutic introspective experience mentioned in the article ? The computer would be doing the making rather than the participants Future research would better consider a more consistent approach to arts-based learning with more sessions and a diversity of arts practices.

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Is the work original in terms of material and argument?

Yes

Does it sufficiently engage with relevant methodologies and secondary literature on the

topic?
Partly

Is the work clearly and cogently presented?
Yes

Is the argument persuasive and supported by evidence?
Partly

If any, are all the source data and materials underlying the results available?
Yes

Does the research article contribute to the cultural, historical, social understanding of the field?
Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Research Culture, Ethics and Integrity in the arts research; social justice in arts education

We confirm that we have read this submission and believe that we have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however we have significant reservations, as outlined above.

Author Response 27 Oct 2025

Ana Marušić

Thank you for your comments. Below are our answers to individual comments.
1. This article is an evaluative account of introducing a painting session at the end of a short course in Research Integrity. The article was co-written by the participants of the art session. Qualitative methods were used to analyze the essays the participants wrote about their paintings. The participants mostly came from science backgrounds so taking part in an art session was a novel experience for them. The use of quantitative methods to look at work from 19 people seemed unnecessary. The positive words associated with RI that were found could be to do with the previous course content and the cohort of individuals' previous experiences. Maybe using analysis methods from art history would have been an alternative? ***Response:*** Thank you for the positive opinion of our work and the comment on quantitative analysis of the art works. We did describe the content of paintings, but as we are not historian experts, we include this in the limitation in the Discussion section and indicate that such art analysis could be done in future research. We left the quantitative part of the results, as they also represent pilot results that can be used for future in-depth research.

2. The article has some strengths, it was good to see it had been co-constructed with the participants. The rationale for undertaking the project were sound. The imagery produced

was shared and it was good to see. This project could be undertaken in different contexts. The article should be read carefully, for example in the abstract it reads as if 'data manipulation' is part of RI. Honest reporting of findings would not encourage data manipulation. So reword this section, perhaps drawing on RI principles.
Response: Thank you for this comment. Research misconduct is a breach of RI principles and was a part of the training programme. We have now revised the abstract and Methods section describing the course, to emphasize this fact.

3. Refer to the RI framework used in the training, acknowledging there are others which may vary slightly in emphasis, early on in the abstract and introduction (European Code of Conduct for Research Integrity). This would aid international readers.
Response: Thank you – we have now incorporated the reference to the European Code of Conduct for Research Integrity in the abstract and the introduction.

4. This work may be of interest as it takes a similar approach. It refers to Research Culture, which RI is a significant part. [Reference 1] 1. Richmond H: The Creative Researcher. Exchanges: The Interdisciplinary Research Journal. 2025; 12 (3): 1-30 | Publisher Full Text
Response: Thank you for this work, we now address it in the Discussion section, emphasizing the importance of individual experiences for understanding the wide research culture.

5. Although the findings are not generalizable, it would be good to explore other quality indicators related to the qualitative and arts-based paradigms such as transferability, reproducibility and authenticity.
Response: Thank you for this comment. As we are not researchers with experience with qualitative studies in art, we would rather refrain from such analysis at this point and address this as a limitation. We will surely take this as a guidance for future research.

6. In the discussion was some over-claiming based on evidence based on one art session. For example, the authors did mention that some people were a little anxious at trying something new. This is to be expected. However, from this study there can be no significant evidence that there is an impact on stress levels in researchers. This seems to be diverting from the aims of the study, which is about the synthesis of previous learning about RI. It would be better to focus on the learning aspects of the exercise.
Response: Thank you for this comment. We agree that the discussion on the stress related to research may not be relevant in this context, so we deleted this part of the Discussion section.

7. It was surprising that recommendations for future research was to use AI to create imagery. The ethics and integrity of this need to be considered. In addition, this activity has RI issues as AI uses the works of other artists to create derivatives without crediting the original author(s). Also, using AI to create images totally negates the idea of making art - it's a human activity! It's the thinking through making that makes the art session effective. AI is contrary to art as a human activity and confounds the point of the research. Would this activity elicit the same therapeutic introspective experience mentioned in the article? The computer would be doing the making rather than the participants Future research would better consider a more consistent approach to arts-based learning with more sessions and

a diversity of arts practices.
Response: Thank you for this comment. With the current development of generative AI, and the challenges to the research process it created, we agree that it is best to remove this part of the Discussion section.

Competing Interests: No competing interests were disclosed.