[Article in press at *Psychology of Aesthetics, Creativity, and the Arts*]

Draft version 1.2, 7/9/24.

A View Worth Talking About:

The Influence of Social Interaction on Aesthetic Experience and Well-Being Outcomes in the Gallery

Aleksandra Igdalova[1], Safiyyah Nawaz[1], Rebecca Chamberlain[1]

[1]Department of Psychology, Goldsmiths, University of London

Author Note:

Aleksandra Igdalova, Safiyyah Nawaz, and Rebecca Chamberlain, Department of Psychology, Goldsmiths, University of London, UK

The authors would like to thank Manchester Art Gallery for the usage of collection artworks as stimuli in this study.

Address Correspondence to:

Aleksandra Igdalova, Department of Psychology, Goldsmiths, University of London, New Cross, London, UK. Email: a.igdalova@gold.ac.uk, https://orcid.org/0000-0002-9693-0565.

Abstract

Art museums are inherently social spaces, and social interaction is a key element of arts-based health interventions. Despite this, the effects of viewing art in social contexts remain largely unexplored in empirical aesthetics. This research presents the first experimental, large-scale study to systematically investigate how social interactions, especially through meaningful conversation, influence aesthetic experience and well-being. Conducted within a special exhibition space at Manchester Art Gallery, this experiment employed a between-participant design in which visitors (N = 240) were randomly assigned to either an Individual viewing condition, a Synchronized silent group viewing condition, or a Discussion-based group viewing condition. Participants viewed two paintings for 10 minutes each while listening to a series of slow-looking prompts. While we observed overall increases in well-being markers such as valence, positive affect, and social connectedness, there were notable group differences as well. Namely, the Discussion group reported higher scores in various aesthetic experience outcomes as compared to the Synchronized group, although the Individual group also reported higher emotional engagement and gallery experience ratings as compared to Synchronized participants. However, only participants in the Discussion group exhibited significant well-being impacts, reporting increased positive affect, social connectedness, and group closeness relative to the Synchronized group. This study highlights the potential for integrating discussion-based art viewing into gallery programming to deepen art engagement and promote visitor well-being, offering valuable insights for museum curators and educators.

Keywords*:* Social Interaction in Museums, Aesthetic Experience, Arts and Wellbeing, Gallery Discussions, Slow Looking

Introduction

Art museums have long been revered as sanctuaries for solitary contemplation. However, the assumption that art appreciation occurs in isolation overlooks the social nature of these spaces. Groups account for the majority of museum visits (Hein, 2002), with early studies finding only 5-20% single visitors at art exhibitions (Hughes et al., 1995). Recent investigations confirm that these trends persist, with 89% of 141 participants reporting they tend to visit art museums with others (Igdalova & Chamberlain, 2023).

Nevertheless, most research in art museums focuses on the relationship between the individual and the exhibit, investigating how exhibit attributes impact the visitor's cognitive or emotional state (Falk & Dierking, 2000). Consequently, current models of aesthetic processing often underrepresent the influence of social factors on art viewing (see Pelowski et al., 2016 for a review). To reconcile this research gap, our study presents the first large-scale experiment to systematically investigate the impact of social interaction on various elements of the art museum experience. In the following introduction, we situate social experiences as a means of promoting well-being and deepened aesthetic engagement within museum contexts, especially with regards to the role they may play in arts-based social prescribing for health. We then describe how shared experiences, particularly when paired with guided discussion, could contribute to greater meaningfulness and engagement during art viewing.

Social museums for well-being

Since the start of the century, museums have adopted a more visitor-centred approach to meaning-making in the gallery (Hooper-Greenhill, 2006; Mayer, 2007), leading to a rise in participatory programming (see Robinson, 2020, for a review). At the same time, there has been an increase in social prescribing (see Chatterjee et al., 2018, for a review), driven by a

growing body of evidence that links the arts to human flourishing (e.g., Fancourt & Finn, 2019). From enhanced subjective well-being (Węziak-Białowolska & Białowolski, 2016) to reduced implicit stress levels, even following a brief gallery visit (Mastandrea, Maricchiolo, et al., 2019), engaging with the arts can have positive outcomes on health and well-being.

Social connection, associated with reduced mortality and morbidity risks (Holt-Lunstad et al., 2017), has been identified by art museum professionals as a key impact factor for their visitors (Cotter & Pawelski, 2022). It is also a primary focus of participatory museum programming, particularly for individuals with dementia (MacPherson et al., 2009), depression (Irwin et al., 2022), or older adults (Roe et al., 2016). Group viewing and discussions are often part of such initiatives (e.g., Thomson et al., 2018), supplementing the other types of conversations that visitors have with staff, facilitators (Villeneuve & Love, 2007), and other visitors (Kim, 2011). Understanding the dynamics of gallery-based social interactions, and the discussions that often accompany them, thus becomes imperative.

Sharing the experience

Museum visitors may choose to share viewing experiences as a means of enhancing emotional responses and visual appreciation, as seen when participants report higher valence ratings and increased liking of images when they believe a friend is also viewing them (Wagner et al., 2015; Boothby et al., 2017). However, even when shared experiences do not amplify enjoyment, people still may choose to share them, driven by a desire for social connection rather than hedonic benefits (Jolly et al., 2019). Indeed, art viewing interventions in the museum have helped participants feel more able to connect with others (Roberts et al., 2011), even lowering social disconnect after a one-hour tour (Koebner et al., 2019).

Social interaction may also help transform unfamiliar museum contexts for some visitors. For example, social experiences around artworks have been shown to soften clinical settings, helping patients feel more positively distracted or bigger than their diagnosis (George et al., 2018; Karnik et al., 2014). This process may introduce a similar softness to the art gallery. Debenedetti (2003) describes in her interview-based investigation of companionship in museum visits that the presence of others can validate individual perceptions through comparison, fostering familiarity in an uncertain setting (Hood, 1993). This shared reassurance can then be particularly helpful for infrequent museum visitors who come with different motives and expectations than more regular museum visitors (Sheng & Chen, 2012).

Lastly, viewing alongside others can influence museum behaviour, such as increasing viewing time. Packer and Ballantyne (2005) compared solitary vs shared museum experiences by asking 40 individual adults and 20 pairs of adults to explore a natural history exhibition, finding that pairs spent more time on displays, while individuals spent more time on labels. This was echoed in the art gallery by Smith and Smith (2001) in their seminal study on viewing times in the gallery, in which they found that pairs and trios spent more time viewing artworks than individuals, a finding they later replicated (L. F. Smith et al., 2017). Carbon (2017) found that group size and quality also impact viewing duration, with family groups viewing works the fastest and all-adult groups viewing works the slowest.

Talking with intention

Visual artworks, through the act of perspective-taking, invite viewers to understand diverse human experiences, often prompting new and impactful conversations (Bailey & Desai, 2005). Social interaction, then, contributes more than just shared experiences; it also fosters the co-creation of meaning-making (Debenedetti, 2003). Conversations play a key role in this

mutual enrichment, strengthening social bonds and exposing visitors to multiple perspectives (Leinhardt & Knutson, 2004; Mayer, 2005). This exchange can then alter individual interpretation, allowing people to perceive new stimuli in ways more aligned with those they've conversed with (Sievers et al., 2024).

In their *eMotion* museum mapping study, Tröndle et al. (2012) observed the behaviours of 500 exhibition visitors, using physiological responses, surveys, and position tracking to investigate social aspects of art viewing. With regards to heart rate, heart rate variability, and skin conductance, the researchers found that visitors who were alone or not conversing experienced higher emotional reactions, likely due to more attentive interactions with the artworks. These solitary visitors also reported more enjoyment of the quiet museum space, a greater experience of beauty, and a deeper connection to the works. However, for those who were conversing, conversations were not always about the artworks (Tröndle et al., 2012), and as the study was observational, these discussions were not guided or controlled.

Likely, then, the quality of the conversation matters in impactful meaning-making. In their investigation of the impact of providing extra information about the creative process to museum viewers, Agata and Okada (2006) examined dyadic conversations that were focused on the artworks themselves, finding that this additional information led to more elaboration and engagement with the exhibited objects. Another study by Kim (2011) explored the content and interaction metrics of paired conversation between adult visitors in an art gallery in order to investigate how visitors construct meaning together through discussion. Kim found that participants, regardless of art knowledge, provided assistance and feedback to one another, while simultaneously reflecting on their own understanding in comparison, leading to scaffolding conversations and greater efforts to construct meaning. Meaningful, reflective

conversations about the artworks, by combining and sharing knowledge, may therefore enhance engagement and sense-making in museum visitors.

This exchange of knowledge can also generate more ideas, deepening art appreciation. A similar hypothesis has been proposed in creative thinking research, as group interaction can be an important source of creative innovation in team members. For example, Paulus & Yang (2000) found that participants who engaged in a shared idea exchange exhibited enhanced creativity, measured by number of responses, in both group-based and individual tasks relative to non-sharing group participants. Similarly, talking together when viewing artworks, which can lead to more unique ideas being produced, may bolster new perspectives and deepen understanding. Scoring higher on a divergent thinking task, such as the Unusual Uses Task, in which participants are asked to list as many creative uses for an object as they can, has been linked to higher beauty ratings in laboratory settings, indicating a possible connection between flexible ideation and aesthetic experience (Stojilović, 2017).

The present study

There is evidence to suggest that viewing art together can enhance enjoyment, social connection, reassurance in unfamiliar settings, and even increase viewing times. Meaningful discussions about art can also foster co-created meaning-making and a deeper, more creative aesthetic experience. But no study has of yet comprehensively examined these impacts within a single experimental design that compares individual and group conditions. There thus remains a gap in the literature when it comes to understanding the impacts of social experiences in the art museum (Packer, 2004; Vom Lehn & Heath, 2014). Here we present the first large-scale, pre-registered experimental study to systematically investigate how varying levels of social interaction influence the aesthetic experience and well-being of individuals.

This between-subjects study featured three randomized groups, which varied in their degree of social interaction during a slow-looking task (Igdalova and Chamberlain, 2023). Participants in the Individual group viewed the artworks on their own, while listening to a series of guided prompts in headphones. Participants in the Synchronized group viewed the artworks in groups of three, while listening to the same guided prompts played aloud from a speaker. Lastly, participants in the Discussion group viewed the artworks in groups of three, while discussing their responses aloud to the guided prompts they heard. The main dependent variables in this study were classified into four main groupings: aesthetic experience outcomes, well-being outcomes, creative association, and exploratory outcomes. Individual differences including aesthetic fluency and the personality measures of openness to experience and extraversion were also accounted for as covariates, due to their association with dependent variables of interest.

The study hypotheses were as follows:

1. In keeping with previous slow looking studies by Igdalova and Chamberlain (2023; 2024), all participants will report increased valence and decreased arousal after completing the exercise.
2. Varying the level of social interaction will impact individual aesthetic experience. Specifically, the Discussion group will report heightened scores in the aesthetic experience measures as compared to the Individual and Synchronized groups.
3. Varying the level of social interaction will impact individual well-being. Specifically, the Discussion group will report heightened scores in the well-being measures as compared to the Individual and Synchronized groups.

4. Varying the level of social interaction will impact creative association. Specifically, the Discussion group will report heightened creative association scores as compared to the Individual and Synchronized groups.

In addition to the above primary hypotheses, we wanted to explore the effect of the intervention on aspects of emotional response, perspective shift, time perception, and group closeness. While the primary outcomes were pre-registered, the exploratory outcomes were investigated using the same analytic approach but were not prespecified in the pre-registered plan. See the *Measures* subsection below for a more detailed breakdown of the main questionnaires that make up these variables.

Methods

The study design, hypotheses, and analysis plan were pre-registered with the Open Science Framework (OSF): https://osf.io/skr5n/?view_only=18cfeba31a104978afc198fa1d2c261f.

Sample Size

An a priori power analysis using G*Power3 (Faul et al., 2007) indicated that 158 participants were needed to achieve 80% power for detecting a medium to large effect size for an ANCOVA, as previously reported in a comparable between-subjects study on the social value of shared experiences (Jolly et al., 2019). A total of 240 participants were recruited, with 191 included in the final sample, indicating that the study was appropriately powered to test the study hypotheses.

Participants

Participants were recruited via Eventbrite, social media advertising through the gallery website, and in-person sampling to ensure a realistic sample of likely gallery visitors. Data collection took place in April and May of 2023. Participants, who had to be over 18, were compensated with a drink voucher for the gallery café.

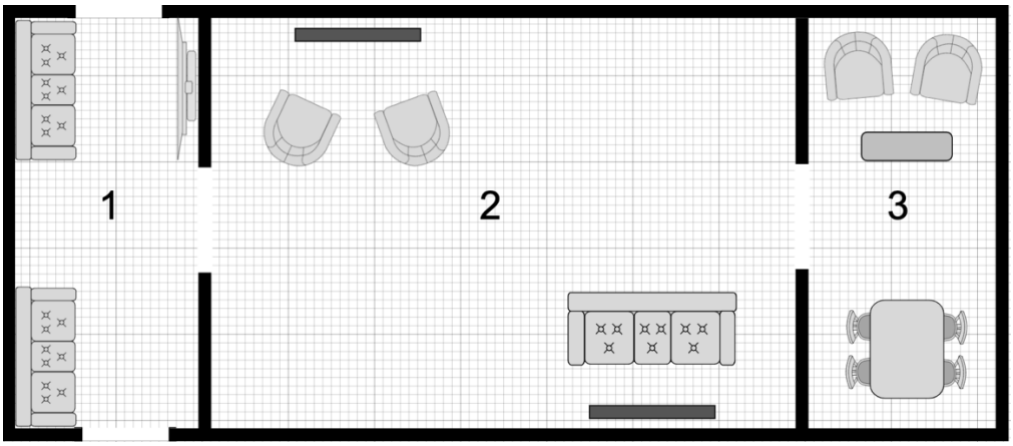
The 240 participants ranged in age from 18 to 84 years (M = 39.94, SD = 17.36), with a slight skew towards younger ages. The sample included 122 females, 112 males, and 6 who identified as other. Participants resided in 28 different countries, with most living in the United Kingdom (73.8%) followed by Australia (5.4%) and the United States (5.4%). Approximately half the sample held a college or university degree (51.2%), and a third held postgraduate degrees (33.8%). The groups did not significantly differ in any of the covariates.

Experimental Space

The study was conducted in collaboration with Manchester Art Gallery, a free museum in the United Kingdom that draws over 500,000 annual visitors. The experiment took place in a dedicated mindful viewing area called *Room to Breathe*. This space features comfortable seating and only two artworks with no accompanying labels or descriptions, spotlit against dark walls and hung at a lower height for seated viewing. Split into three chambers, the layout of *Room to Breathe* is shown in Figure 1. Participants gave consent and answered pre-viewing questions in the first area, viewed the artworks in the second, and answered post-viewing questions in the third. During data collection, the space was closed off to other visitors.

Figure 1

Room to Breathe Layout, Manchester Art Gallery



Materials and Stimuli

Guided prompts

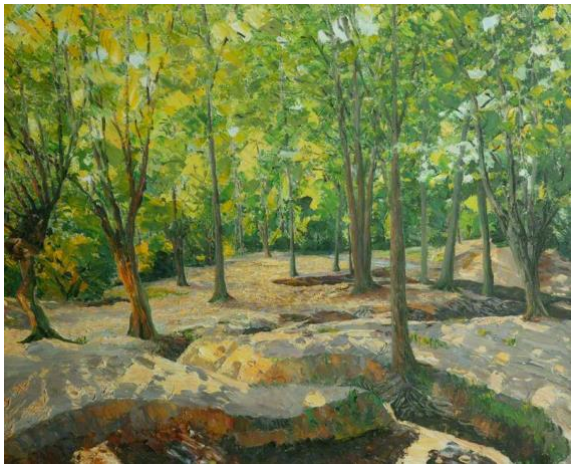
To guide the participants in their 10-minute viewing experience for each painting, a series of guided prompts was written in collaboration with a well-being and mindfulness specialist at the gallery, instructing participants to focus on various aspects of the artwork, such as forms, lines, colours, and composition, and to reflect on their personal reactions. To align with Manchester Art Gallery's existing practices, the audio guide was narrated by the mindfulness specialist as well. The audio files were then edited using Audacity, a free, open-source editing software (GNU General Public License). The same prompts were played either in headphones to the Individual group or aloud to participants in the Synchronized and Discussion groups. In the Discussion group, a shorter version with pauses between key questions was played aloud to encourage conversation. For transcripts of the guided prompts used in each condition, visit: https://osf.io/r7bc5/?view_only=4c003c13a6e446ec92c393863562fe39.

Artworks

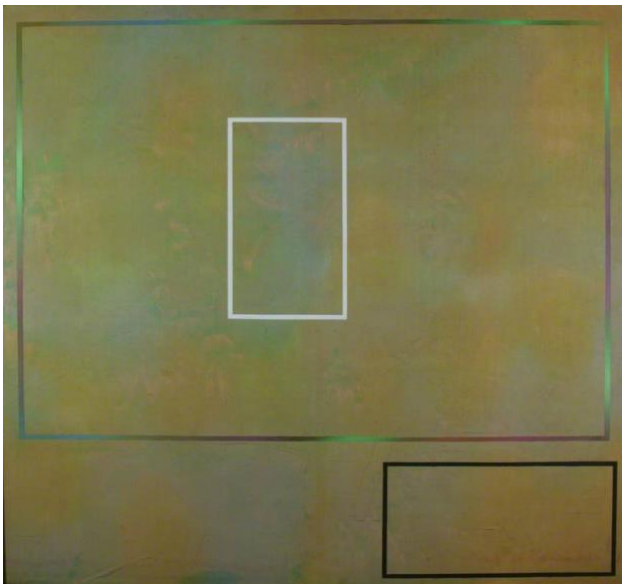
The artwork stimuli were two landscape paintings from the gallery's collection. The landscape genre was selected via a visitor-voting process in 2022 for *Room to Breathe*, and our curatorial collaborator then selected the actual paintings: a representational landscape, *Track of Forest Brook* by Herbert H. Newton, and an abstract landscape, *Her Day at Sneaker's Creek* by Michael Ginsborg. See Figure 2 for the stimuli.

Figure 2

Artwork Stimuli in Room to Breathe



Herbert H. Newton
Track of Forest Brook
Oil on canvas, 63.5 x 79 cm
1938. © Herbert H. Newton
(Courtesy of Manchester Art Gallery.)



Michael Ginsborg
Her Day at Sneaker's Creek
Acrylic on canvas, 183.2 x 198.2 cm
1967. © Michael Ginsborg
(Courtesy of Manchester Art Gallery.)

Measures

A Qualtrics survey was used to record responses to the following sets of measures and questions (arranged by aesthetic experience, well-being, and exploratory outcomes). Full survey available at https://osf.io/r7bc5/?view_only=4c003c13a6e446ec92c393863562fe39.

Demographics. Participants reported their age, gender, country of residence, highest level of completed education, and English confidence before viewing the artworks.

Covariate – Aesthetic Fluency. The Revised Aesthetic Fluency Scale – Short Form (Cotter, Rodriguez-Boerwinkle, et al., 2023) is a 10-item version of the Aesthetic Fluency Scale (Smith & Smith, 2006). The short form scale similarly measures self-reported art knowledge but has reduced response options and is designed for use with a general audience. The items present artist names and art terms and are rated on a 3-point Likert scale from 1 (*I don't really know anything about this artist or term*) to 3 (*I know a lot about this artist or term*). Participants answered the items after art viewing, and their aesthetic fluency, ranging from 1 to 3, was calculated by averaging the 10 items.

Covariate – Personality. The Big Five Inventory – Short Version (BFI-S: Lang et al., 2011) is a 15-item version of the Big Five Inventory (John et al., 1991) that assesses five personality dimensions: extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. Each item is rated on a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Participants answered the items after viewing the artworks, and the subscale scores, ranging from 1 to 5, were calculated as per the scoring instructions for each scale, i.e.., with some items being reversed. For this study, we only examined openness to experience, due to its association with aesthetic experiences (P. Silvia et al., 2015), and extraversion, due to its association with sociability and enhanced positive affect (Watson & Clark, 1997).

Aesthetic Experience – Aesthetic Experience Questionnaire. The Aesthetic Experience Questionnaire (AEQ: Wanzer et al., 2020) is a 22-item measure of aesthetic experience that consists of six diverse dimensions related to art appreciation. The emotional, cultural,

understanding, and perceptual subscales assess the manner in which participants engage with the artwork, while the proximal condition of flow and flow experience subscales assess the content of 'flow' experienced while viewing (Csikszentmihalyi & Robinson, 1990). Each item is rated on a 5-point Likert scale from 1 (*Disagree*) to 5 (*Agree*). Participants answered the items after viewing the artworks, and the subscale scores, ranging from 1 to 5, were calculated by averaging the items within each subscale. A total AEQ score, ranging from 1 to 5, was also calculated across all items.

Aesthetic Experience – Gallery Experience. Participants answered 12 questions about their overall art viewing experience, the guide or conversation they had (depending on their group), and the main viewing space. Specifically, the questions asked participants how much they liked, found meaningful, found beautiful, and would recommend each aspect. Each question was rated on a 5-point Likert scale from 1 (*Strongly disagree*) to 5 (*Strongly agree),* and participants answered them after viewing the artworks.

Aesthetic Experience – Mental Image Vividness. Artwork memorability, through mental image vividness, was assessed as a measure of the impact of the viewing experience. Once participants left the viewing area, they were asked to imagine the two paintings they viewed and to rate the vividness of each mental image using a question from the Vividness of Visual Imagery Questionnaire (VVIQ; Marks, 1973): 'Think of the first/second painting you looked at and try to form a mental picture of what you saw. Please rate how vivid the image is on the following scale.' Both items were rated on a 5-point scale from 1 (*No image at all)* to *5 (Perfectly realistic),* and one aggregate score was calculated by averaging the two ratings.

Well-being – Valence and Arousal. The Affect Grid (Russell et al., 1989) is a reliable, single-item tool for measuring mood. This 9x9 grid divides mood into valence (from unpleasant to pleasant) and arousal (sleepy to highly aroused). Valence is indicated by the column (1 to 9 from left) and arousal by the row (1 to 9 from bottom). Participants answered the items before and after art viewing, and these pre- and post-assessment scores were subtracted to determine change in valence and change in arousal.

Well-being – Positive and Negative Affect. The International Positive and Negative Affect Schedule - Short Form (I-PANAS-SF; (Thompson, 2007) is a 10-item scale for estimating positive and negative affect. Each mood scale includes five items (positive: active, attentive, alert, determined, inspired; negative: hostile, ashamed, upset, afraid, nervous) rated on a 5-point Likert scale from 1 (*Very slightly or not at all*) to 5 (*Extremely).* Participants answered the items before and after art viewing, and total scores for each variable, ranging from 5 to 25, were calculated by summing the items in each scale. These pre- and post-assessment scores were subtracted to determine change in positive and negative affect.

Well-being – Social Connectedness. The Social Connectedness Scale – Revised (SCS-Revised; (Lee et al., 2001) is a 20-item self-report questionnaire that measures social belonging using both positively and negatively worded items. Each item is rated on a 6-point Likert scale from 1 (*Strongly disagree*) to 6 (*Strongly agree*). Participants answered the items before and after art viewing, and the social connectedness score, ranging from 20 to 120, was calculated by reversing negative items and summing the scores. These pre- and post-assessment scores were subtracted to determine change in social connectedness.

Creative Association. As per the associative theory of creativity, creative association was assessed by semantic distance (Kenett, 2019). After viewing the actual works, participants viewed them again on a tablet, writing free associations to each. Semantic distance scores were calculated using the "forward flow" approach originally developed by Gray et al. (2019) and later extended by Beaty et al. (Beaty et al., 2021), which uses computational semantic modelling to measure the distance travelled in semantic space from the prompt. The multi-model approach was used to calculate the forward flow score per participant per painting, and these scores were then averaged across the artworks to represent overall creativity.

Exploratory – Aesthetic and Knowledge Emotions. Participants' emotional experiences were assessed with six additional questions added to the pre- and post- I-PANAS-SF questionnaires (Thompson, 2007). Three questions evaluated aesthetic emotions — being moved, feeling wonder, or feeling awe (e.g., Cotter, Harrouche et al., 2023) — while the other three assessed knowledge emotions — surprise, interest, and confusion (P. J. Silvia, 2012). Each item was scored on a 5-point Likert scale from 1 (*Very slightly or not at all*) to 5 (*Extremely)*. Participants answered the items before and after art viewing, and total scores for each variable, ranging from 3 to 15, were calculated by summing the appropriate items. The pre- and post-assessment scores were subtracted to determine change in aesthetic and knowledge emotions.

Exploratory – Cognitive-affective Impacts of Art. To evaluate art's impact, Christensen and colleagues (2023) developed a taxonomy of cognitive and affective impacts, categorized into 11 fine-grained dimensions and four coarse-grained dimensions, the latter of which was used to measure change in impact of each artwork. These four dimensions correspond to what can be considered difficult aspects of art engagement (*challenged/upset*), attentional engagement

and immersion (*interested/enraptured*), positive affective responses that are either low or high in arousal (*calm/pleased*), and deeper cognitive engagement (*enlightened/inspired*). Each dimension was rated on a 5-point Likert scale from 1 (*Not at all*) to 5 (*Extremely*). Participants answered the items before and after viewing each work, and these pre- and post-assessment scores were subtracted to determine changes in these dimensions per artwork.

Exploratory – Perspective Shift. After viewing the artworks, participants were asked, "Did you find that your perspective of the artworks changed as a result of the viewing experience?" This question was rated on a 4-point Likert scale from 1 (*Not at all)* to 4 (*Very much so)*.

Exploratory – Time Perception. After viewing the artworks, participants were asked, "How well-timed do you think the art viewing experience was?" This question was rated on a 3-point Likert scale from 1 (*Too short)* to 3 (*Too long)*.

Exploratory – Group Closeness. As another measure of social connection between the two group conditions, participants in the two group conditions were asked, "How close do you feel to the members of your group?" before and after viewing the artworks. This question was rated on a 5-point Likert scale from 1 (*Not close at all*) to 5 (*Very close*).

Evaluative Questions. The survey also asked additional questions not covered in this paper, as they are either gallery-specific or will be addressed in future studies. These include questions for Discussion group participants about conversation quality and other across-group questions, including a 1-week and 1-month follow-up survey. See the full survey here: https://osf.io/r7bc5/?view_only=4c003c13a6e446ec92c393863562fe39.

Attention Checks. The survey included three attention checks: one within the Aesthetic Fluency section, instructing participants to select *I know a lot about this artist or term,* and two at the end of the questionnaire, asking if participants took the survey seriously and whether they would use their own responses if conducting the research themselves.

Procedure

Upon agreeing to participate, participants were shown into the first chamber of *Room to Breathe*, where they read a study information form detailing the experimental procedure and their data protection rights. After consenting, participants were randomly assigned to a group and completed the first part of the Qualtrics survey on individual iPads, which asked about demographics, personality, and the pre-viewing assessments of valence, arousal, positive and negative affect, social connectedness, and aesthetic and knowledge emotions.

Participants then entered the main viewing space either alone or with two others, based on their group assignment. They were directed to sit in front of the first artwork, with the presentation order counterbalanced, and to answer the pre-assessment cognitive-affective impact questions about the artwork in front of them. They then viewed the work for 10 minutes, with guided prompts delivered through headphones for individuals and from a speaker for groups, viewing either in silence or in discussion with their group members. Discussion-group conversations were tape-recorded for future qualitative analysis. Following the viewing, participants then completed the post-assessment cognitive-affective impact questions about the first artwork. They then repeated this process with the second artwork.

After viewing both works, participants proceeded to the final chamber to complete the remaining questionnaire, which included the post-viewing assessments of valence, arousal,

positive and negative affect, social connectedness, and aesthetic and knowledge emotions, as well as tasks and questions on creative association, mental image vividness, aesthetic fluency, the AEQ and gallery experience questions, and other subjective experience questions, including perspective shift, time perception, and group closeness. After completing the study, participants were compensated, debriefed, and given the opportunity to opt into follow-up surveys by providing their emails in an encrypted document. Follow-up surveys were sent 1 week and 1 month after study completion. The gallery session lasted approximately 45 minutes to 1 hour, while the follow-up surveys took less than 5 minutes each.

Ethics

The protocol of the current study received approval from both the Research Ethics and Integrity Sub-Committee at Goldsmiths, University of London, and the ethical committee of Manchester Art Gallery.

Data Preparation

IBM SPSS Statistics was used for data analysis and preparation. The alpha threshold was set at .05, except where specified. Analyses under the subsections labelled “Hypothesis 1,2,3,4” were pre-registered, except where specific post hoc analyses are specified, while the “Exploratory” analysis subsections were not originally pre-registered.

Data Screening

Thirty participants were excluded for failing attention checks. The dataset was then screened for missing values, outliers, and normality and checked for relevant statistical test assumptions. A further 19 participants were excluded due to missing values and outliers. This led to a total $N = 191$ (Individual = 59; Synchronized = 64; Discussion = 68). When checking

for multi-collinearity, we found that the 12 questions comprising the gallery experience ratings had high correlations between all of the questions and across the collapsed, averaged scores, $r > .5$, $p < .001$. For this reason, we deviated from the pre-registered analysis plan and averaged these items together to comprise one total gallery experience score.

Results

Hypothesis 1: Change in Valence and Arousal Across Groups

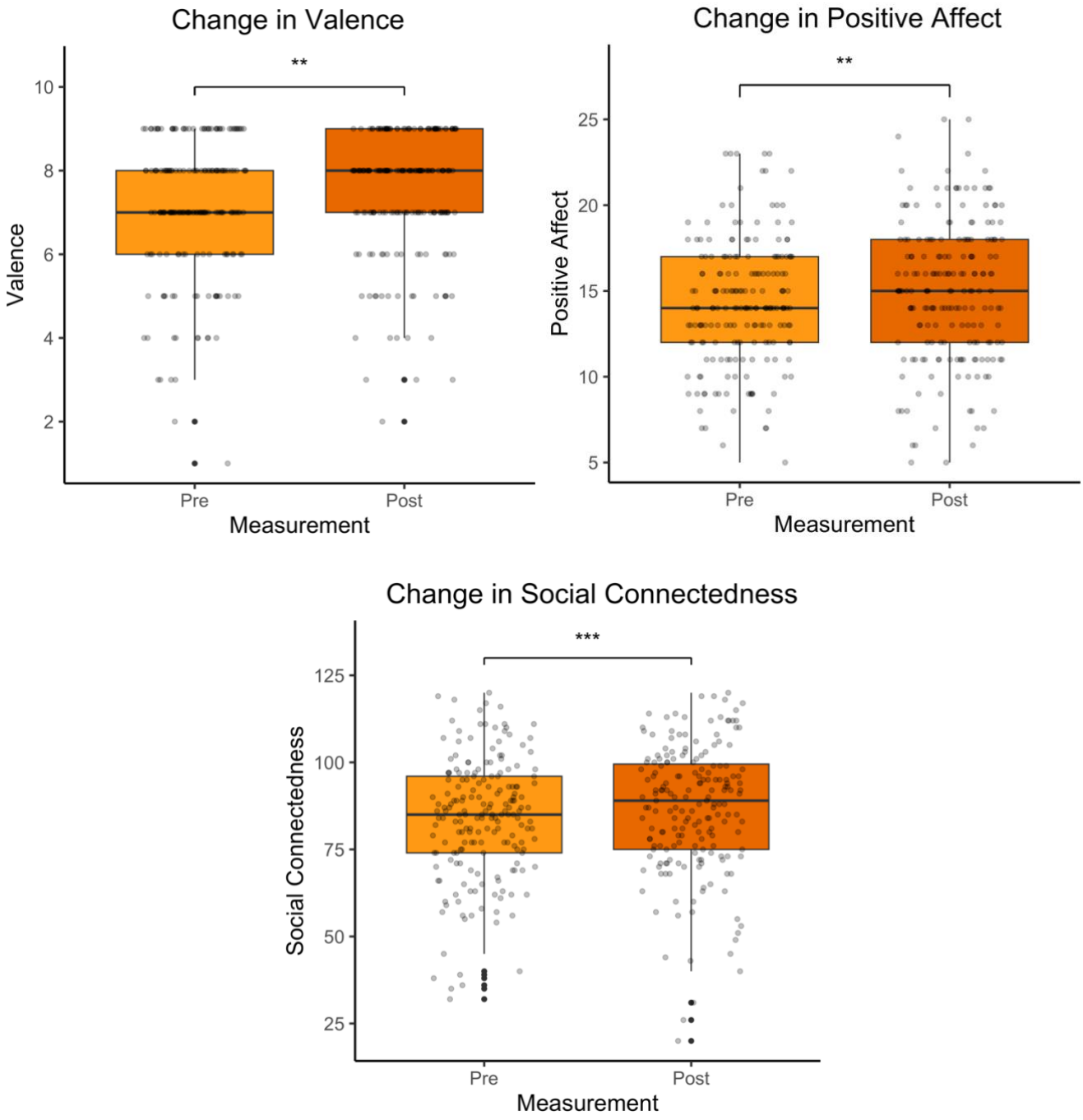
Two one-sample t-tests were performed to detect changes in valence or arousal across all groups following the art-viewing experience. Participants reported a statistically significant valence increase ($M = 0.35$, $d = 0.21$), $t(190) = 2.84$, $p = .005$, reporting a more positive, more 'pleasant' valence score as compared to before ($M = 7.11$, $SD = 1.63$) and after ($M = 7.46$, $SD = 1.48$) the intervention. There was no significant change in arousal ($M = -0.16$, $d = -0.07$), $t(190) = -0.92$, $p = .357$, from before ($M = 4.83$, $SD = 1.84$) to after ($M = 4.67$, $SD = 2.07$) the intervention. Figure 3 displays the change in pre- and post-assessments for each variable.

A non-pre-registered series of post hoc, one-sample t-tests were carried out to detect sample-wide changes in other pre- and post-assessments. With regards to well-being outcomes, participants reported a significant increase in positive affect ($M = 0.72$, $d = 0.20$), $t(190) = 2.72$, $p = .007$, from before ($M = 14.26$, $SD = 3.63$) to after ($M = 14.98$, $SD = 4.07$) the intervention. They also reported a significant increase in social connectedness ($M = 2.61$, $d = 0.38$), $t(190) = 5.28$, $p < .001$, from before ($M = 83.98$, $SD = 17.37$) to after ($M = 86.60$, $SD = 18.45$) the intervention. However, there was no significant change in negative affect ($M = -0.13$, $d = -0.06$), $t(190) = -0.83$, $p = .404$, from before ($M = 6.17$, $SD = 1.85$) to after ($M = 6.04$, $SD = 1.73$) the intervention. Figure 3 displays the significant variable changes.

Of the exploratory outcomes, participants reported a significant increase in aesthetic emotions, knowledge emotions, each of the eight cognitive-affective impact categories, and group closeness. See Results S1 and Table S1 for full statistics and Figure S1 for plots. All significant differences remained significant after applying the Benjamini-Hochberg (BH) adjustment for multiple comparisons with a false discovery rate of 10%.

Figure 3

Significant changes in pre-post measures across groups (*N = 191*)



Note. *$p < .05$, **$p < .01$, ***$p < .001$.

Hypothesis 2: Aesthetic Experience Differences Between Groups

To examine the impact of social interaction on aesthetic experience, a series of ANCOVAs were carried out, accounting for aesthetic fluency, openness to experience, and extraversion. The variables met the relevant ANCOVA assumptions, except for the AEQ flow proximal score, which violated the homogeneity of regression assumption. Accordingly, a Kruskal-Wallis test was conducted for this measure. All post hoc tests were Bonferroni-corrected.

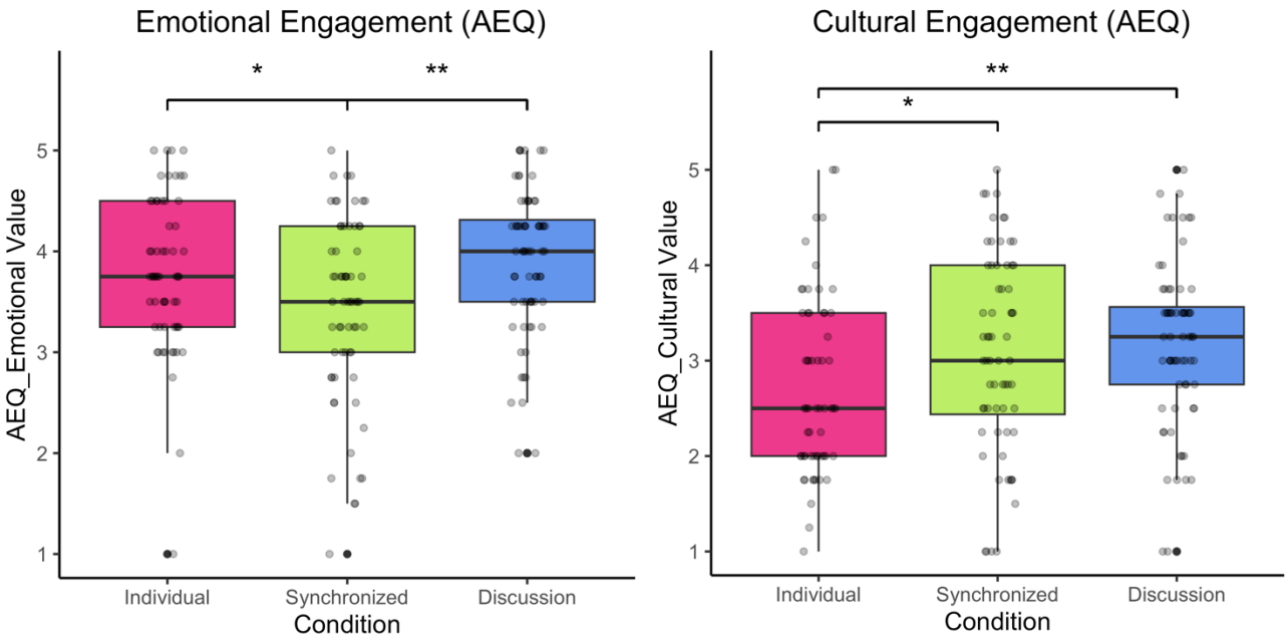
Level of social interaction was found to significantly impact AEQ emotional scores, with post hoc comparisons indicating that participants in the Individual group (M_{adj} = 3.785, SE = 0.11) and in the Discussion group (M_{adj} = 3.902, SE = 0.10) reported a significantly higher increase in emotional engagement than participants in the Synchronized group (M_{adj} = 3.423, SE = 0.10), p = .043 and p = .002, respectively. Social interaction also impacted AEQ cultural scores, with participants in the Discussion group (M_{adj} = 3.210, SE = 0.11) and Synchronized group (M_{adj} = 3.083, SE = 0.12) reporting a significantly higher increase in cultural engagement than participants in the Individual group (M_{adj} = 2.673, SE = 0.12), p = .005 and p = .050, respectively. The experience of flow was also impacted by social interaction, with participants in the Discussion group (M_{adj} = 4.136, SE = 0.09) reporting significantly higher scores than participants in the Synchronized group (M_{adj} = 3.696, SE = 0.10), p = .003. Lastly, social interaction impacted overall aesthetic experience scores on the AEQ, with significantly higher scores reported in the Discussion group (M_{adj} = 3.790, SE = 0.06) as compared to the Synchronized group (M_{adj} = 3.590, SE = 0.06), p = .049. See Table 1 for full statistics and Figure 4 for boxplot distributions of significant group comparisons. No other AEQ variables showed an effect (see Table 1).

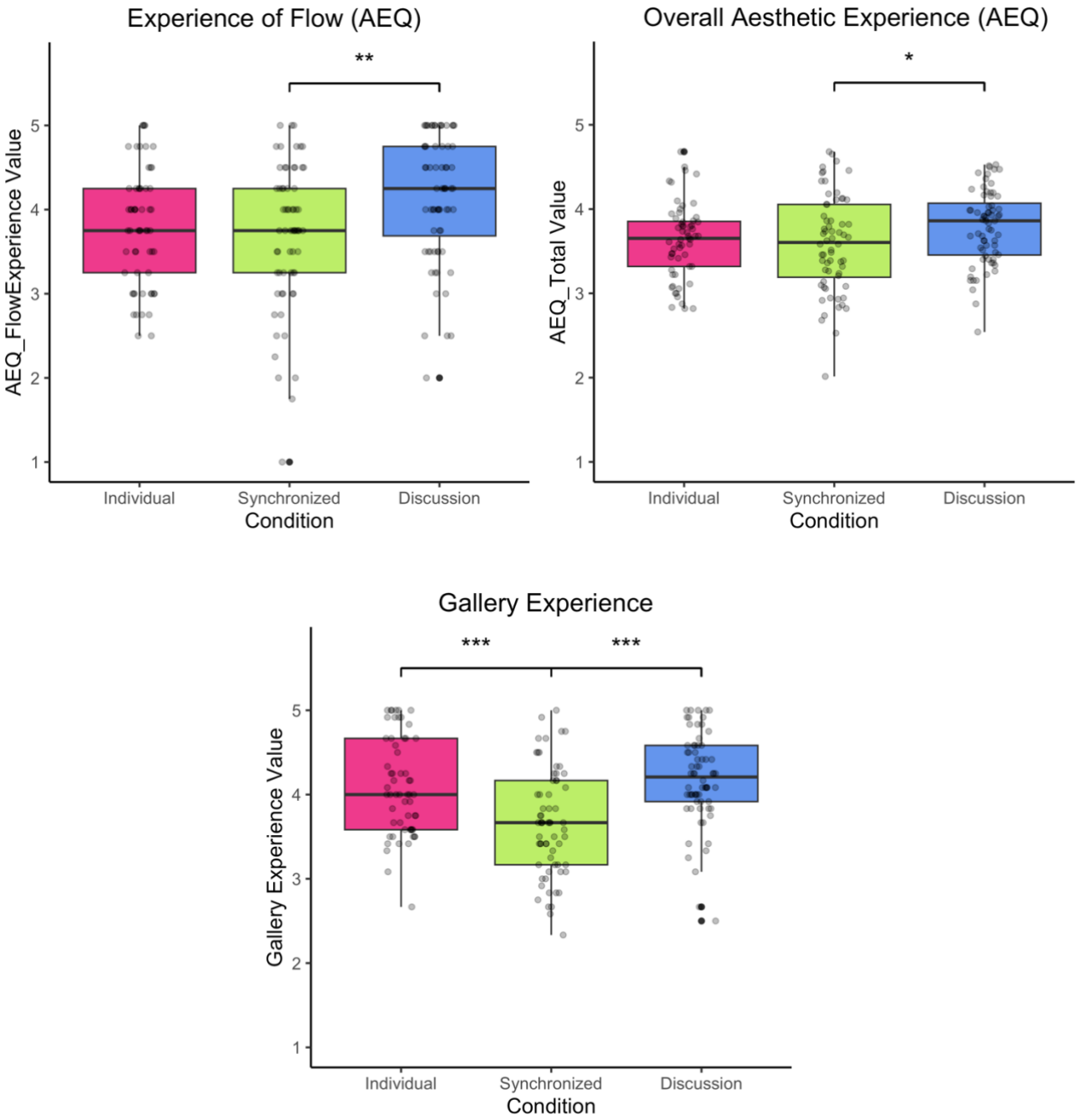
Next, total gallery experience was impacted by social interaction, with post hoc tests indicating that participants in the Individual group (M_{adj} = 4.121, *SE* = 0.08) and in the Discussion group (M_{adj} = 4.167, *SE* = 0.07) rated their gallery experience significantly higher than participants in the Synchronized group (M_{adj} = 3.651, *SE* = 0.07), $p < .001$ and $p < .001$, respectively. Mental image vividness was not impacted. See Figure 4 for significant group comparisons and Table 1 for full statistics.

All significant differences observed in the ANCOVAs remained significant even after applying the Benjamini-Hochberg (BH) adjustment for multiple comparisons with a false discovery rate of 10% (see Table 1).

Figure 4

Significant difference in aesthetic experience outcomes between groups (N = 191)





Note. *$p < .05$, **$p < .01$, ***$p < .001$.

Table 1

Main Effects Testing on Aesthetic Experience Outcomes – ANCOVAs (N = 191)

Measures	*F / χ2*	*p*	η_p^2 / η^2	*BH-adjusted p*
AEQ emotional				
Group	6.27	.002**	.064	.022
Aesthetic fluency	0.06	.811	.000	
Openness to experience	0.76	.385	.004	
Extraversion	1.87	.173	.010	
AEQ cultural				
Group	5.42	.005**	.055	.044
Aesthetic fluency	10.64	.001**	.054	
Openness to experience	0.06	.802	.000	
Extraversion	0.11	.737	.001	
AEQ perceptual				
Group	0.30	.745	.003	.100
Aesthetic fluency	14.24	.000***	.071	
Openness to experience	6.42	.012*	.034	
Extraversion	3.64	.058	.019	
AEQ understanding				
Group	1.27	.282	.014	.067
Aesthetic fluency	0.03	.865	.000	
Openness to experience	3.45	.065	.018	
Extraversion	2.16	.143	.012	
AEQ flow proximal				
Group	0.89	.642	.006	.089
AEQ flow experience				
Group	5.86	.003**	.060	.033
Aesthetic fluency	0.88	.350	.005	

Openness to experience	4.02	.047*	.021	
Extraversion	0.30	.587	.002	
AEQ total				
Group	3.45	.034*	.036	.055
Aesthetic fluency	5.14	.024*	.027	
Openness to experience	4.90	.028*	.026	
Extraversion	0.65	.420	.004	
Gallery experience				
Group	15.92	.000***	.147	.011
Aesthetic fluency	1.95	.165	.010	
Openness to experience	9.02	.003**	.046	
Extraversion	0.21	.651	.001	
Mental image vividness				
Group	1.21	.301	.013	.078
Aesthetic fluency	4.27	.040*	.023	
Openness to experience	1.18	.279	.006	
Extraversion	0.65	.420	.004	

Note. Non-parametric effect sizes were calculated based on Cohen's (2008) formula: $\eta^2 = (\chi^2 - k + 1)/(N - k)$. *$p < .05$, **$p < .01$, ***$p < .001$.

Hypothesis 3: Well-Being Differences Between Groups

To examine the impact of social interaction on well-being, a series of ANCOVAs were carried out, accounting for aesthetic fluency, openness to experience, and extraversion. The variables met the relevant ANCOVA assumptions, except for change in valence, change in positive affect, and change in social connectedness, which violated the homogeneity of variance or regression assumptions. Kruskal-Wallis tests were performed in place of ANCOVAs for these variables. All post hoc tests were Bonferroni-corrected.

Level of social interaction was found to significantly impact change in positive affect, with pairwise post hoc comparisons using Dunn's test indicating that the participants in the Discussion group (mean rank = 102.18, *M* = 1.309, *SE* = 0.44) reported a significantly higher increase in positive affect as compared to the Synchronized group (mean rank= 81.16, *M* = -0.125, *SE* = 0.46), *p* = .044. There was also a significant group difference in change in social connectedness, with participants in the Discussion group (mean rank = 110.63, *M* = 4.324, *SE* = 0.82) reporting a significantly higher increase in social connectedness as compared to the Synchronized group (mean rank= 85.27, *M* = 1.156, *SE* = 0.84), *p* =.025. Figure 5 displays the boxplot distributions of significant group comparisons. The groups did not significantly differ in change in valence, arousal, and negative affect (see Table 2 for relevant statistics).

However, after applying the BH adjustment, the previously observed difference in change in positive affect and social connectedness between groups did not meet the BH adjusted *p*-values of adjusted *p* = .02 and adjusted *p* = .04, respectively.

Figure 5

Significant difference in well-being outcomes between groups (N = 191)

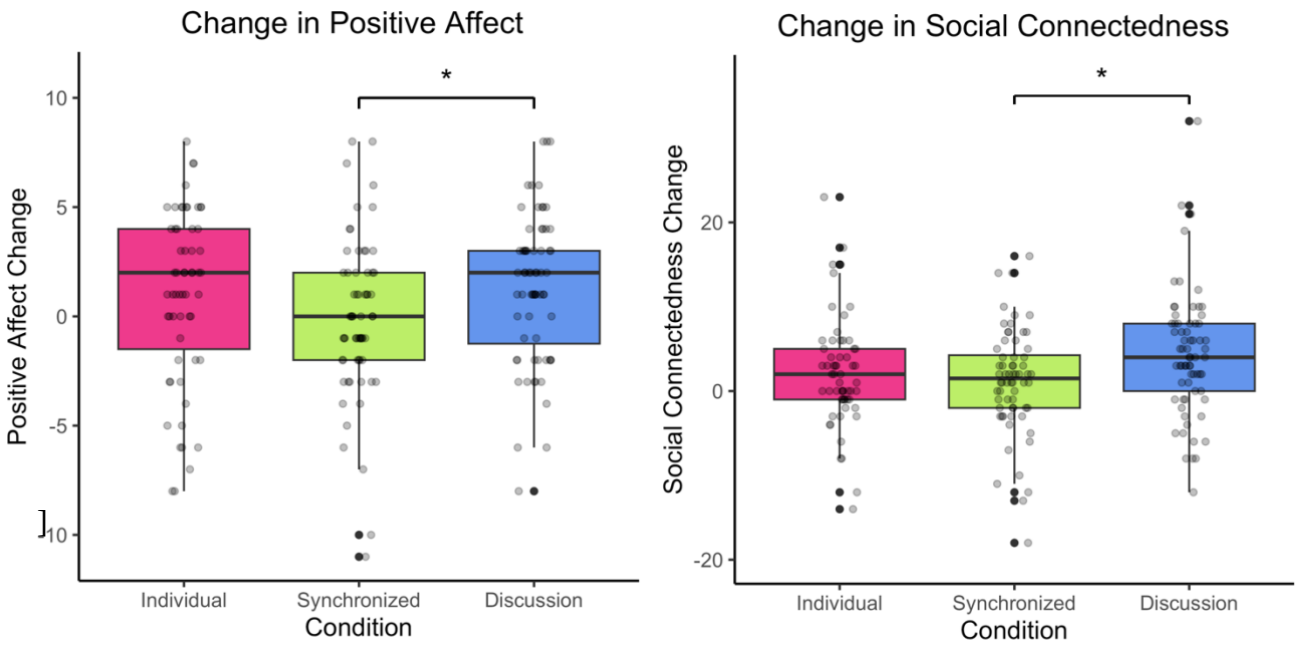


Table 2

Main Effects Testing on Well-Being Outcomes – ANCOVAs and Kruskal-Wallis (N = 191)

Measures	*F* / $\chi 2$	*p*	η_p^2 / η^2	*BH-adjusted p*
Change in Valence				
Group	2.69	.260	.004	.080
Change in Arousal				
Group	1.48	.231	.016	.060
Aesthetic fluency	0.55	.459	.003	
Openness to experience	5.25	.023*	.028	
Extraversion	0.00	.991	.000	
Change in Positive Affect				
Group	7.05	.029*	.027	.040
Change in Negative Affect				
Group	0.05	.954	.001	.100
Aesthetic fluency	0.56	.456	.003	
Openness to experience	0.59	.442	.003	
Extraversion	5.84	.017*	.031	
Change in Social Connectedness				
Group	7.73	.021*	.030	.020

Note. Non-parametric effect sizes were calculated based on Cohen's (2008) formula: $\eta^2 = (\chi^2 - k + 1)/(N - k)$. *$p < .05$, **$p < .01$, ***$p < .001$

Hypothesis 4: Creative Association Difference Between Groups

To examine the impact of social interaction on creative association, one ANCOVA was carried out, accounting for aesthetic fluency, openness to experience, and extraversion. There was no difference in overall creative association between the groups, $F(2,164) = 0.70$, $p = .497$, $\eta_p^2 = .008$.

Exploratory: Other Differences Between Groups

To examine the impact of social interaction on our exploratory outcomes, a series of non-pre-registered ANCOVAs and chi-square tests were carried out on the data, accounting for aesthetic fluency, openness to experience, and extraversion (see S2 in Supplementary Materials).

Main effects testing revealed that the level of social interaction significantly impacted several exploratory variables. Specifically, there was a group difference in change in knowledge emotions, with the Individual group reporting higher change scores as compared to the Synchronized group. There was also a group difference in shift in perspective, with participants in the Discussion group reporting a significantly higher shift in perspective as compared to the Synchronized group. Next, the two group conditions differed in change in group closeness, with participants in the Discussion group feeling significantly closer to their groupmates after the exercise than the participants in the Synchronized group. Lastly, there was a significant difference in the participant's perception of how well-timed the exercise was, with the Discussion group reporting that the exercise felt 'too short' as compared to both the Individual and Synchronized groups. See Tables S2 and S3 for full statistics and Figure S2 for boxplot distributions of significant group comparisons. None of the other variables indicated significant group differences (see Table S2 for full statistics).

However, after applying the BH adjustment, the group difference in change in knowledge emotions, perspective shift, and group closeness did not meet the corrected significance thresholds (see Table S2).

Discussion

This study systematically investigated how social interaction influences aesthetic experiences and well-being in a museum context. Using a between-subjects design, we compared individual viewing, synchronized group viewing without discussion, and discussion-based group viewing during a slow-looking exercise. Overall, we observed increases in most well-being and emotional activation measures across all participants. And as hypothesized, significant differences emerged between the groups, though not exclusively in favour of the Discussion group alone as expected. While the Discussion group showed higher emotional engagement, flow, and overall aesthetic and gallery experience than the Synchronized group, the Individual group also reported higher emotional engagement and gallery experience as compared to the Synchronized group. However, within the well-being domain, the Discussion group alone scored higher than the Synchronized group in positive affect and social connectedness, while also reporting a greater shift in perspective and increased group closeness relative to this group, though these results did not survive multiple comparison correction. The Discussion group also perceived the viewing time as 'too short' compared to the other two groups. No group differences were found in creative association.

The positive impacts of art viewing

Across all groups, we observed significant increases in valence, positive affect, social connectedness, group closeness, and emotional activation. These findings align with previous research suggesting that art engagement in museums fosters positive affective experiences (e.g., Thomson et al., 2018), decreased social disconnect (Koebner et al., 2019) and increased social inclusion (Herron & Jamieson, 2020), and a diversity of emotional content to create a holistic museum experience (Rodriguez-Boerwinkle et al., 2021). Within the context of slow-looking studies in particular, engaging in art viewing for longer periods of time has been

shown to lead to increased valence after a 3- minute online viewing exercise (Igdalova & Chamberlain, 2023) and increased thriving and life satisfaction after a 15-minute virtual gallery exercise (Cotter, Harrouche, et al., 2023). That the present study could elicit such positive increases across our measures despite its 10-minute viewing period per artwork – a much longer time compared to the average viewing time observed in most museum studies (27.2 – 32.9 s: J. K. Smith & Smith, 2001; L. F. Smith et al., 2017) and even that associated with most slow looking and visual thinking approaches (5 - 10 min: Housen, 2002) – provides more support for the power of the visual arts as a unique stimuli for longer reflection and appreciation. The use of a mindful, visual-thinking oriented audio guide likely contributed to these outcomes, as similar guides have been shown to increase viewing times in both in-person (Ishiguro et al., 2021) and online studies (Igdalova & Chamberlain, 2023).

The individual vs. synchronized experience

In our pre-registration, we hypothesized that the Discussion group would outperform the other groups in aesthetic experience, well-being, and exploratory outcomes. However, the Individual group also scored significantly higher than the Synchronized group in emotional engagement, gallery experience, and change in knowledge emotions. This finding was unexpected, given that shared experiences are known to increase enjoyment (Boothby et al., 2017) and amplify emotions (Shteynberg et al., 2014).

Perhaps, then, sharing silent space during art viewing detracts from the individual experience more than it complements it. Tröndle et al.'s (2012) *eMotion* museum mapping study supports this, showing that solitary visitors reported greater beauty, deeper connection, and more enjoyment than those viewing alongside others, reinforcing the solitary viewing model of art contemplation (Høffding et al., 2020; Spock, 2000). A recent study at the Austrian Gallery

Belvedere also found that visitors often experienced and remembered exhibitions as solitary activities, even when attending in pairs (Reitstätter & Christidou, 2024). However, pairs with more interaction also explored more individually, suggesting an ideal museum visit combines both solitary and social experiences. Additionally, Reitstätter and Christidou (2024) found that pairs with a higher social intimacy looked at more artworks together at the same time, which could also help explain why our study, which paired three participants together with varying levels of familiarity, showed less combinatory mutual enrichment. We also note that the uninterrupted, solitary nature of the Individual condition — unusual for most museum experiences — likely enhanced participants' aesthetic and emotional responses.

Interestingly, though, Synchronized group participants, along with the Discussion group, reported higher cultural engagement than the Individual group. In other words, viewing alongside other people, even when not speaking, prompted participants to consider historical and cultural contexts while viewing. This contrasts with Tröndle et al. (2012), who found that group viewing led to less understanding of art. However, in our study, the prolonged, shared viewing of two artworks may have encouraged participants to consider historical and cultural contexts through social learning by acts of comparison (Debenedetti, 2003).

The discussion experience

While the presence of silent visitors detracted from solitary viewers' gallery experiences and emotional engagement, our findings suggest that discussion-based viewing enhances both aesthetic and well-being experiences more effectively than silent group viewing. More specifically, the Discussion group reported similar scores to the Individual group in overall gallery experience (of the artwork viewing, guide/ conversation, and exhibition space) and emotional engagement, while also showing heightened ratings in other measures. This

indicates that the dynamics of group versus solitary viewing are more nuanced, as Reitstätter and Christidou (2024) suggest. Engaging in meaningful conversations about artworks, unlike the more general discussions noted by Tröndle et al. (2012), not only enhances emotional responses but also elevates other aspects of the viewing experience, such as the flow state, comprehensive engagement across the different AEQ categories, and cultural considerations.

Collective meaning-making, then, seems to be more impactful than simple shared presence. This could be due to the scaffolding conversations that lead to more effort and enhanced sense-making, as suggested by Kim (2011), or through the exposure to multiple perspectives (Leinhardt & Knutson, 2004; Mayer, 2005). Accordingly, the Discussion group reported a greater shift in perspective than the Synchronized group. And as perspective-taking has been positively associated with emotionality and empathy in museum contexts (Sherman et al., 2020), this consideration of others combined with heightened cultural engagement that the two group conditions reported likely contributed to the higher emotional engagement and comprehensive AEQ scores observed in the Discussion group. Individual creative association, though, as measured by semantic distance, was not impacted by the presence of other voices, as previous divergent-thinking research (e,g., Paulus & Yang, 2000) may have suggested.

Moreover, discussion-based viewing, without compromising the solitary experience, also seems to offer additional benefits, such as enhanced positive affect, social connectedness, and group closeness. While museum art engagement on its own fosters social connection (Roberts et al., 2011), interactive group activities can amplify these effects. Perspective-taking during museum visits can enhance reflection on societal issues and community well-being (Waszkielewicz, 2006), and these changes in mindset that occur can subsequently promote social connection and community (Smith, 2014). The heightened group closeness reported by

the Discussion group likely reflects this idea and could also help explain their greater increase in positive emotions, previously found to be linked to enhanced social connection (e.g., Whelan & Zelenski, 2012). Indeed, within art museums contexts, visitors who experience positive and aesthetic emotions tend to feel more socially connected (Cotter et al., 2024).

Where we see the impact of social interaction

Our results show that the intervention primarily influenced aesthetic experience and emotional engagement, with some impact on well-being. The presence of others without interaction (Synchronized group) added little to the individual viewing experience beyond considerations of historical and cultural context. In contrast, interaction within the Discussion group preserved the benefits of individual viewing while enhancing other aesthetic outcomes and increasing group closeness, social connectedness, and positive affect.

But while the Individual and Discussion groups showed moderate to large effects in emotional engagement and aesthetic experience, the well-being outcomes for the Discussion group were less pronounced. Moreover, the differences in social connectedness change, positive affect change, and group closeness change between the two group conditions were not significant after correcting for multiple comparisons. This suggests that well-being outcomes may be harder to achieve with short-term interventions, highlighting the need for museum researchers to consider this when designing programmes.

Another variable that showed large, significant group differences was timing perception. Discussion group participants found the 20-minute viewing period "too short," while Synchronized group participants felt it was "too long," and Individual group participants thought it was "just right." This indicates that discussion-based interventions can alter time perception, encouraging longer engagement without it being noticed. While previous studies

have shown that groups typically spend more time with artworks than individuals (L. F. Smith et al., 2017), only one recent study examined the impact of talking on viewing time. Reitstätter and Christidou (2024) found that more talkative pairs stayed longer in the room, and, subsequently, those pairs with longer dwelling time also continued conversing longer in the post-visit space.

Relevance to museum programming

In the past decade, social connection has become a target of interest for both art museum professionals (Cotter & Pawelski, 2022) and social prescribers (for a review, see Tomlinson et al., 2023). Understanding social contexts, then, is crucial for designing interventions that will not only deepen aesthetic appreciation, and any subsequent mood improvements that may follow (Mastandrea, Fagioli, et al., 2019), but also strengthen other well-being impacts. This study aims to offer practical recommendations for galleries in this regard.

First, our findings suggest that discussion-based art viewing during slow looking, a growing trend in museum programming (Slow Art Day, 2021), promotes longer viewing times, with participants even perceiving the time as "too short." Conversation, especially that about the artworks within a guided format, can act as a medium by which museum visitors can engage with works longer, a finding echoed by Reitstätter and Christidou (2024). Second, such discussions not only extend viewing time but also foster closeness among group members and slightly boost individual positive emotions and social connectedness — key outcomes for museum health practitioners.

Third, group discussions lead to greater perspective shifts, which may contribute not only to greater meaning-making and aesthetic engagement but also to other transformative or

reflective experiences within the gallery, such as increased empathy (Sherman et al., 2020), a goal of many art education programmes (e.g., Montero, 2023). Lastly, as Discussion group participants rated their experience as more beautiful, meaningful, and recommendable than the Synchronized group, incorporating conversations into group viewing could improve visit satisfaction, especially for socially motivated visitors. Likewise, the increased positive affect and social connectedness could then prompt further visits to the museum and more opportunities for engagement. However, we emphasize that our study also highlights the strengths of individual viewing within museum spaces, so ultimately it is up to museum educators to tailor programming to the specific needs of their visitors.

Limitations and future directions

There are several components of the present work that prompt further investigation. Firstly, the intimate gallery setting of *Room to Breathe* may have influenced some group outcomes, particularly for individual viewers who received a solitary and, thus, unusual museum experience. Moreover, *Room to Breathe* was designed to enhance mood and aesthetic engagement and has been shown to do so in comparison with other exhibition halls in the gallery (Igdalova & Chamberlain, 2024), so participant experiences in this space may not generalize to other exhibition contexts. To address this, we recommend further exploration of individual, synchronized, and discussion-based viewing in diverse museum environments.

Another factor to consider is the effectiveness of the intervention itself. Beyond individual differences in aesthetic fluency and personality, the quality of social interactions likely influenced participant experiences, particularly for the Discussion group. Furthermore, the quality of these interactions was likely impacted by the social connection and closeness that participants felt, especially considering the variability in familiarity among group participants.

For example, a recent study found that higher social connection during group music sessions was associated with greater individual pleasure (Curzel et al., 2023), so participants who experienced greater group closeness and social connectedness may have benefited more from the intervention used in our study. A controlled design limiting familiarity levels may thus better isolate the effects of discussion-based viewing.

Next, the limited selection of artworks, aligned with the 'mindful' ideology of Room to Breathe, may have constrained participants' responses. The opposing genres of the two works could have also played a role, suggesting the need for testing similar interventions across a broader range of art styles. Finally, since all participants used a slow-looking audio guide, investigating social impacts on free-viewed works is advisable. This is especially relevant for the Discussion group, who were asked to speak about their reaction to different aspects of the artwork, which kept them focused on the task of viewing. Open conversation may prompt different responses. For this reason, we plan to qualitatively analyse the content of these art-directed conversations to understand their homogeneity or diversity.

Conclusion

This study addresses the largely unexplored role of social interaction in art museum settings, experimentally examining how social presence and conversation influence the viewing experience. Based on our findings, we provide recommendations for museum educators in designing social programming. As opposed to simply sharing space, discussion-based viewing preserves the individual viewing experience while exposing visitors to diverse perspectives that may ultimately usher in other benefits like deeper engagement and well-being impacts. In other words, social interaction can enhance the museum experience, but the nature of that interaction plays a crucial role in determining its benefits.

Acknowledgements

We thank Dr. Elizabeth Johnson (Wharton Neuroscience Initiative, University of Pennsylvania) for providing expertise on discussion-based slow-looking practices and guide construction; we thank Louise Thompson (Health and Wellbeing Manager, Manchester Art Gallery) and Fiona Corridan (Curator of Art and Design, Manchester Art Gallery) for collaborating with us in the design and experimental site set-up of this project; lastly, we thank the amazing team of volunteer research assistants for their hard work in crafting our smooth data collection pipeline.

Bibliography

Agata, T., & Okada, T. (2006). How does Information about Creative Process Affect Audience Appreciation of Artwork?. In *Proceedings of the Annual Meeting of the Cognitive Science Society* (Vol. 28, No. 28).

Bailey, C., & Desai, D. (2005). Visual art and education: Engaged visions of history and community. *Multicultural Perspectives*, 7(1), 39-43.

Beaty, R. E., Zeitlen, D. C., Baker, B. S., & Kenett, Y. N. (2021). Forward flow and creative thought: Assessing associative cognition and its role in divergent thinking. *Thinking Skills and Creativity*, *41*, 100859. https://doi.org/10.1016/j.tsc.2021.100859

Boothby, E. J., Smith, L. K., Clark, M. S., & Bargh, J. A. (2017). The world looks better together: How close others enhance our visual experiences. *Personal Relationships*, *24*(3), 694–714. https://doi.org/10.1111/pere.12201

Carbon, C.-C. (2017). Art perception in the museum: How we spend time and space in art exhibitions. *I-Perception*, *8*(1), 2041669517694184. https://doi.org/10.1177/2041669517694184

Chatterjee, H. J., Camic, P. M., Lockyer, B., & Thomson, L. J. M. (2018). Non-clinical community interventions: A systematised review of social prescribing schemes. *Arts & Health*, *10*(2), 97–123. https://doi.org/10.1080/17533015.2017.1334002

Christensen, A. P., Cardillo, E. R., & Chatterjee, A. (2023). What kind of impacts can artwork have on viewers? Establishing a taxonomy for aesthetic impacts. *British journal of psychology*, *114*(2), 335-351

Cohen, B. H. (2008). *Explaining psychological statistics*. John Wiley & Sons.

Cotter, K. N., Harrouche, M., Rodriguez-Boerwinkle, R. M., Boerwinkle, M., Silvia, P. J., & Pawelski, J. O. (2023). Virtual art visits: Examining the effects of slow looking on well-being in an online environment. *Psychology of Aesthetics, Creativity, and the Arts*, No Pagination Specified-No Pagination Specified. https://doi.org/10.1037/aca0000548

Cotter, K. N. & Pawelski, J. O. (2022). Art museums as institutions for human flourishing. Journal of Positive Psychology, 17(2), 288-302.

Cotter, K. N., Rodriguez-Boerwinkle, R. M., Christensen, A. P., Fekete, A., Smith, J. K., Smith, L. F., Tinio, P. P. L., & Silvia, P. J. (2023). Updating the Aesthetic Fluency Scale: Revised long and short forms for research in the psychology of the arts. *PLOS ONE*, *18*(2), e0281547. https://doi.org/10.1371/journal.pone.0281547

Cotter, K. N., Rodriguez-Boerwinkle, R. M., Silver, S., Hardy, M., Putney, H., & Pawelski, J. O. (2024). Emotional Experiences, Well-Being, and Ill-Being During Art Museum Visits: A Latent Class Analysis. *Journal of Happiness Studies*, *25*(1), 24. https://doi.org/10.1007/s10902-024-00736-9

Csikszentmihalyi, M., & Robinson, R. E. (1990). *The Art of Seeing: An Interpretation of the Aesthetic Encounter*. Getty Publications.

Curzel, F., Carraturo, G., Ripollés, P., & Ferreri, L. (2023). Better Off Alone? When Sharing

Music Reduces Pleasure Responses. *Advances in Cognitive Psychology*, *19*(4).

Debenedetti, S. (2003). Investigating the Role of Companions in the Art Museum Experience. *International Journal of Arts Management*, *5*(3), 52–63.

Falk, J. H., & Dierking, L. D. (2000). *Learning from museums: Visitor experiences and the making of meaning*. AltaMira Press.

Fancourt, D., & Finn, S. (2019). *What is the evidence on the role of the arts in improving health and well-being? A scoping review*. WHO Regional Office for Europe. http://www.ncbi.nlm.nih.gov/books/NBK553773/

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175–191. https://doi.org/10.3758/BF03193146

Gray, K., Anderson, S., Chen, E. E., Kelly, J. M., Christian, M. S., Patrick, J., ... & Lewis, K. (2019). “Forward flow”: A new measure to quantify free thought and predict creativity. *American Psychologist*, *74*(5), 539

George, D. R., de Boer, C., Hammer, J., Hopkins, M., King, T., & Green, M. J. (2018). Evaluating the benefits of hospital room artwork for patients receiving cancer treatment: A randomized controlled trial. Journal of Hospital Medicine, 13(8), 558–561. https://doi.org/10.12788/jhm.2915

GNU General Public License. [Online]. Available: http://www.gnu.org/licenses/ licenses.html#GPL

Hein, G. E. (2002). *Learning in the Museum*. Routledge.

Herron, A., & Jamieson, A. (2020). Grandfathers at Melbourne Museum: Shining a Spotlight on Overlooked Museum Visitors. *Visitor Studies*, *23*(2), 101–119. https://doi.org/10.1080/10645578.2020.1772616

Høffding, S., Rung, M., & Roald, T. (2020). Participation and Receptivity in the Art Museum – A Phenomenological Exposition. *Curator: The Museum Journal*, *63*(1), 69–81. https://doi.org/10.1111/cura.12344

Holt-Lunstad, J., Robles, T., & Sbarra, D. A. (2017). Advancing Social Connection as a Public Health Priority in the United States. *The American Psychologist*, *72*(6), 517–530. https://doi.org/10.1037/amp0000103

Hood, M. G. (1993). Comfort and caring: Two essential environmental factors. *Environment and behavior*, *25*(6), 710-724.

Hooper-Greenhill, E. (2006). Studying Visitors. In *A Companion to Museum Studies* (pp. 362–376). John Wiley & Sons, Ltd. https://doi.org/10.1002/9780470996836.ch22

Housen, A. C. (2002). Æsthetic thought, critical thinking and transfer. *Arts and Learning Research*, *18*(1), 34.

Hughes, C., Mello, R., and Hein G.E. (1995) Final Evaluation Report, Heritage Of The Land Exhibit, Worcester Art Museum, Cambridge, Mass.: Program Evaluation and Research Group, Lesley College.

Igdalova, A., & Chamberlain, R. (2024). Room to Breathe: Testing the efficacy of breathing exercises vs. environmental design in enhancing museum experiences. *Psyarxiv*, https://osf.io/preprints/osf/s9u37

Igdalova, A., & Chamberlain, R. (2023). Slow looking at still art: The effect of manipulating audio context and image category on mood and engagement during an online slow looking exercise. *Psychology of Aesthetics, Creativity, and the Arts*.

Irwin, L., Rhodes, P., & Boydell, K.M. (2022). Evaluation of a gallery-based Arts Engagement program for depression. Australian Psychologist, 57, 186 - 196.

Ishiguro, C., Takagishi, H., Sato, Y., Seow, A. W., Takahashi, A., Abe, Y., Hayashi, T., Kakizaki, H., Uno, K., Okada, H., & Kato, E. (2021). Effect of dialogical appreciation

based on visual thinking strategies on art-viewing strategies. *Psychology of Aesthetics, Creativity, and the Arts*, *15*(1), 51–59. https://doi.org/10.1037/aca0000258

John, O. P., Donahue, E. M., & Kentle, R. L. (1991). *The Big Five Inventory—Versions 4a and 54*. University of California, Berkeley. https://doi.org/10.1037/t07550-000

Jolly, E., Tamir, D. I., Burum, B., & Mitchell, J. P. (2019). Wanting without enjoying: The social value of sharing experiences. *PLOS ONE*, *14*(4), e0215318. https://doi.org/10.1371/journal.pone.0215318

Karnik, M., Printz, B., & Finkel, J. (2014). A hospital's contemporary art collection: effects on patient mood, stress, comfort, and expectations. *HERD: Health Environments Research & Design Journal*, *7*(3), 60-77.

Kenett, Y. N. (2019). What can quantitative measures of semantic distance tell us about creativity? *Current Opinion in Behavioral Sciences*, *27*, 11–16. https://doi.org/10.1016/j.cobeha.2018.08.010

Kim, H. (2011). *Paired Conversations of Adult Museum Visitors in front of Works of Art* [Doctoral thesis, Florida State University]. Florida State University Research Repository. http://purl.flvc.org/fsu/fd/FSU_migr_etd-3098

Koebner, I. J., Fishman, S. M., Paterniti, D., Sommer, D., Witt, C. M., Ward, D., & Joseph, J. G. (2019). The Art of Analgesia: A Pilot Study of Art Museum Tours to Decrease Pain and Social Disconnection Among Individuals with Chronic Pain. *Pain Medicine (Malden, Mass.)*, *20*(4), 681–691. https://doi.org/10.1093/pm/pny148

Lang, F. R., John, D., Ludtke, O., Schupp, J., & Wagner, G. G. (2011). Short assessment of the Big Five: robust across survey methods except telephone interviewing. *Behavior Research Methods, 43,* 548-567.

Lee, R. M., Draper, M., & Lee, S. (2001). Social connectedness, dysfunctional interpersonal behaviors, and psychological distress: Testing a mediator model. *Journal of Counseling Psychology*, *48*(3), 310–318. https://doi.org/10.1037/0022-0167.48.3.310

Leinhardt, G., & Knutson, K. (2004). *Listening in on Museum Conversations*. Rowman Altamira.

MacPherson, S., Bird, M., Anderson, K., Davis, T., & Blair, A. (2009). An art gallery access programme for people with dementia: 'You do it for the moment'. Aging & Mental Health, 13(5), 744-752.

Marks, D. F. (1973). Vividness of Visual Imagery Questionnaire [dataset]. In *Journal of Mental Imagery*. https://doi.org/10.1037/t05959-000

Mastandrea, S., Fagioli, S., & Biasi, V. (2019). Art and psychological well-being: Linking the brain to the aesthetic emotion. *Frontiers in Psychology*, *10*. https://www.frontiersin.org/articles/10.3389/fpsyg.2019.00739

Mastandrea, S., Maricchiolo, F., Carrus, G., Giovannelli, I., Giuliani, V., & Berardi, D. (2019). Visits to figurative art museums may lower blood pressure and stress. *Arts & Health*, *11*(2), 123–132. https://doi.org/10.1080/17533015.2018.1443953

Mayer, M. M. (2005). A postmodern puzzle: Rewriting the place of the visitor in art museum education. *Studies in Art Education*, *46*(4), 356–368. https://doi.org/10.1080/00393541.2005.11651796

Mayer, M. M. (2007). New art museum education(s). In P. Villeneuve (Ed.), From periphery to center: Art museum education in the 21st century. Reston, VA: National Art Education Association.

Montero, J. (2023). Developing empathy through design thinking in elementary art education. *International Journal of Art & Design Education*, *42*(1), 155-171.

Packer, J. (2004). Motivational Factors and the Experience of Learning in Educational Leisure

Settings. Doctoral dissertation. Queensland University of Technology.

Packer, J., & Ballantyne, R. (2005). Solitary vs. shared: Exploring the social dimension of museum learning. *Curator: The Museum Journal*, *48*(2), 177-192.

Paulus, P. B., & Yang, H.-C. (2000). Idea Generation in Groups: A Basis for Creativity in Organizations. *Organizational Behavior and Human Decision Processes*, *82*(1), 76–87. https://doi.org/10.1006/obhd.2000.2888

Pelowski, M., Markey, P. S., Lauring, J. O., & Leder, H. (2016). Visualizing the Impact of Art: An Update and Comparison of Current Psychological Models of Art Experience. *Frontiers in Human Neuroscience*, *10*. https://www.frontiersin.org/articles/10.3389/fnhum.2016.00160

Reitstätter, L., & Christidou, D. (2024). Alone together? Solitary and shared visiting practices of pairs in the art museum. *Museum Management and Curatorship*, 1–21. https://doi.org/10.1080/09647775.2024.2312579

Roberts, S., Camic, P. M., & Springham, N. (2011). New roles for art galleries: Art-viewing as a community intervention for family carers of people with mental health problems. Arts & Health, 3(2), 146-159.

Robinson, H. (2020). Curating good participants? Audiences, democracy and authority in the contemporary museum. *Museum Management and Curatorship*, *35*(5), 470–487. https://doi.org/10.1080/09647775.2020.1803117

Rodriguez-Boerwinkle, R. M., Fekete, A., Silvia, P. J., & Cotter, K. N. (2021). The art of feeling different: Exploring the diversity of emotions experienced during an art museum visit. *Psychology of Aesthetics, Creativity, and the Arts*. https://doi.org/10.1037/aca0000443

Roe, B., McCormick, S., Lucas, T., Gallagher, W., Winn, A., & Elkin, S. (2016). Coffee, Cake & Culture: Evaluation of an art for health programme for older people in the community. *Dementia*, *15*(4), 539–559. https://doi.org/10.1177/1471301214528927

Russell, J. A., Weiss, A., & Mendelsohn, G. A. (1989). Affect grid: a single-item scale of pleasure and arousal. *Journal of personality and social psychology*, *57*(3), 493.

Sheng, C.-W., & Chen, M.-C. (2012). A study of experience expectations of museum visitors. *Tourism Management*, *33*(1), 53–60. https://doi.org/10.1016/j.tourman.2011.01.023

Sherman, A., Cupo, L., & Mithlo, N. M. (2020). Perspective-taking increases emotionality and empathy but does not reduce harmful biases against American Indians: Converging evidence from the museum and lab. *PLOS ONE*, *15*(2), e0228784. https://doi.org/10.1371/journal.pone.0228784

Shteynberg, G., Hirsh, J. B., Apfelbaum, E. P., Larsen, J. T., Galinsky, A. D., & Roese, N. J. (2014). Feeling more together: Group attention intensifies emotion. *Emotion*, *14*(6), 1102–1114. https://doi.org/10.1037/a0037697

Sievers, B., Welker, C., Hasson, U., Kleinbaum, A. M., & Wheatley, T. (2024). Consensus-building conversation leads to neural alignment. *Nature communications*, *15*(1), 3936.

Silvia, P. J, Fayn, K., Nusbaum, E., & Beaty, R. (2015). Openness to Experience and Awe in Response to Nature and Music: Personality and Profound Aesthetic Experiences. *Psychology of Aesthetics Creativity and the Arts*. https://doi.org/10.1037/aca0000028

Silvia, P. J. (2012). Human emotions and aesthetic experience. *Aesthetic science: connecting minds, brain and experience*, 250-275.

Slow Art Day (2021). 2020 Annual Report. https://drive.google.com/file/d/1LueBpd0IPEXLst0QgoPGvO6ybdWLuTN/view

Smith, J. K., & Smith, L. F. (2001). Spending time on art. *Empirical Studies of the Arts*, *19*(2), 229–236. https://doi.org/10.2190/5MQM-59JH-X21R-JN5J

Smith, L. F., Smith, J. K., & Tinio, P. P. L. (2017). Time spent viewing art and reading labels. *Psychology of Aesthetics, Creativity, and the Arts*, *11*(1), 77–85. https://doi.org/10.1037/aca0000049

Smith, L. F., & Smith, Jeffrey K. (2006). The Nature and Growth of Aesthetic Fluency. In *New Directions in Aesthetics, Creativity and the Arts*. Routledge.

Smith, J. K. (2014). The museum effect: How museums, libraries, and cultural institutions educate and civilize society. Rowman & Littlefield.

Spock, M. (2000). Tales of Alonetime and Owntime in Museums. *Journal of Museum Education*. https://www.tandfonline.com/doi/abs/10.1080/10598650.2000.11510418

Stojilović, I. (2017). Effects of creativity on aesthetic experience. *Psihologija*, *50*(3), 319–339.

Thompson, E. R. (2007). Development and Validation of an Internationally Reliable Short-Form of the Positive and Negative Affect Schedule (PANAS). *Journal of Cross-Cultural Psychology*, *38*(2), 227–242. https://doi.org/10.1177/0022022106297301

Thomson, L. J., Lockyer, B., Camic, P. M., & Chatterjee, H. J. (2018). Effects of a museum-based social prescription intervention on quantitative measures of psychological wellbeing in older adults. *Perspectives in Public Health*, *138*(1), 28–38. https://doi.org/10.1177/1757913917737563

Tomlinson, A., Lane, J., Julier, G., Grigsby Duffy, L., Payne, A., Mansfield, L., ... & Victor, C. (2023). A systematic review of the subjective wellbeing outcomes of engaging with visual arts for adults ("working-age", 15-64 years) with diagnosed mental health conditions.

Tröndle, M., Wintzerith, S., Wäspe, R., & Tschacher, W. (2012). A museum for the twenty-first century: The influence of 'sociality' on art reception in museum space. *Museum*

Management and Curatorship, *27*(5), 461–486. https://doi.org/10.1080/09647775.2012.737615

Villeneuve, P., & Love, A. R. (2007). Rethinking the gallery learning experience through inquiry. *From periphery to center: Art museum education in the 21st century*, 194-204.

Vom Lehn, D., & Heath, C. (2014). Social interaction in museums and galleries: A note on video-based field studies. In *Video research in the learning sciences* (pp. 287-301). Routledge.

Wagner, U., Galli, L., Schott, B. H., Wold, A., van der Schalk, J., Manstead, A. S., ... & Walter, H. (2015). Beautiful friendship: Social sharing of emotions improves subjective feelings and activates the neural reward circuitry. *Social cognitive and affective neuroscience*, *10*(6), 801-808.

Wanzer, D. L., Finley, K. P., Zarian, S., & Cortez, N. (2020). Experiencing flow while viewing art: Development of the Aesthetic Experience Questionnaire. *Psychology of Aesthetics, Creativity, and the Arts*, *14*(1), 113–124. https://doi.org/10.1037/aca0000203

Waszkielewicz, I. I. (2006). Encounters with art: The psychological impact of art museum visitation [Unpublished doctoral dissertation]. Rutgers University.

Watson, D., & Clark, L. A. (1997). Chapter 29—Extraversion and Its Positive Emotional Core. In R. Hogan, J. Johnson, & S. Briggs (Eds.), *Handbook of Personality Psychology* (pp. 767–793). Academic Press. https://doi.org/10.1016/B978-012134645-4/50030-5

Węziak-Białowolska, D., & Białowolski, P. (2016). Cultural events–does attendance improve health? Evidence from a Polish longitudinal study. *BMC Public Health*, *16*, 1-9.

Whelan, D. C., & Zelenski, J. M. (2012). Experimental evidence that positive moods cause sociability. *Social Psychological and Personality Science, 3*(4), 430–437.