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New insights in the health benefits of art

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New insights in the health benefits of art

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Editorial: New insights in the health benefits of art

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art, health, benefits, prevention, promotion

Editorial on the Research Topic
New insights in the health benefits of art

Asking the right questions

The past decade has been characterized by an increase in research on the health benefits of art, as well as a growing incorporation of arts-based activities into the health systems of several high-income countries (1). A scoping review by the World Health Organization (WHO) showed that engaging with art may enhance mental, physical and social health, across a wide range of art forms (e.g., music, dance, visual art) and target populations (e.g., from patients to individuals free of disease and from pediatrics to geriatrics) (2). Empirical evidence now clearly supports the hypothesis that arts-based activities have promising health benefits, from health promotion to disease prevention, but there are still many areas to explore and actions to take.

One area that requires more attention and effort according to the WHO scoping review is robust experimental data on the health benefits of art, especially those generated through randomized controlled trials (1). Other important domains of knowledge that call for more investigations include those concerning engagement variability in arts-based activities, the social benefit of art and digital art therapy, as well as those related to targeted populations such as older community dwellers. In addition, more information is needed on the mechanisms underlying the health benefits of art, and how to implement an arts-based activity for health purposes in practice and across cultural contexts.

With this in mind, we decided to propose a Research Topic on "*New insights into the health benefits of art*". The aim was to better understand the mechanisms of art's health benefits, their fields of application from health promotion to prevention, and the criteria

for successful implementation of arts-based activities in daily practice. We suggested that addressing these enduring questions may help to support the development of health policies that integrate the arts into ongoing efforts to improve global health.

What effects do arts-based activities have on us?

Within this Research Topic, we reported on five randomized controlled trials (RCT), performed in Asian (i.e., Japan and Singapore), European (i.e., France), and North American (i.e., Canada and United States) countries. These studies confirm the health benefits of arts-based activities. Most of these RCTs (i.e., 60%) examined arts-based activities carried out in museums. The results show an enhancement of wellbeing and quality of life, as well as improvement of physical health. One key finding was a reduction in frailty, which is a state characterized by vulnerability to stressors due to decreased physiological reserves, among older community dwellers. Another RCT demonstrated an increase in resilience, which is a key component of quality of life for individuals living with chronic diseases (3).

Digital art therapy is a new model of care that offers a contemporary and dynamic approach to therapeutic intervention, leveraging digital technologies to enhance accessibility, engagement, creativity, and effectiveness in addressing mental health and wellbeing in today's digital age (4). This Research Topic includes the first study to provide a comprehensive process evaluation of an evidence-based digital integrative arts therapy program. Furthermore, a second study found that arts-based activities practiced in a hybrid format (i.e., in-person and online) significantly improved the mental health of older community dwellers compared to their controls. The results of these two studies are promising and helped establish the feasibility and validity of digital models for arts-based health activities.

How do arts-based activities improve health?

Multiple benefits of arts-based activities have been reported over the past decade (2). In contrast, fewer studies have examined the explanatory mechanisms of these health benefits. This Research Topic helps to address this gap in the literature through the publication of several mechanistic studies. First, the role of emotion has been highlighted. One study describes the development of the role of positive emotion processing in art therapy. The relationship between emotion and arts-based activities is complex, as art has the power to evoke, express, and reflect emotions in various ways (5, 6). Through art, individuals can experience and understand the emotions of others, fostering empathy and compassion. Arts-based activities may also be analyzed as an aesthetic experience (6). This experience refers to the subjective encounter with beauty or art that stimulates one's senses, emotions, and cognition in a profound and meaningful way. It involves perceiving and appreciating the qualities, forms, or expressions of objects, ideas, or experiences that evoke a sense of pleasure. Second, the mechanism of art's health benefits may be examined by studying measures of stress in humans including salivary cortisol levels, skin conductance or heart rate (7). On this Research Topic, we reported the effects of a museum-based art activity on heart rate used as a proxy measure of autonomic nervous system functioning that regulates our fight-or-flight and rest-and-digest responses. The study demonstrated that this art-based activity significantly decreased full-day heart rate, suggesting a health benefit in participants. Third, cerebral activity may elucidate the health benefits of art. A study on this subject found that a museum visit increased activation in the left ventrolateral prefrontal region of the brain and that this activation was associated with reduced anxiety and stress. This result suggests that the level of engagement of attention processes while practicing arts-based activities may play a key role their health benefits. Fourth, another study examined the mechanisms by which arts-based activities can create health benefits, as well as the associated lived experiences. It refers to the active involvement or participation of individuals with art, whether it be through creation, appreciation, interpretation, or interaction. This concept encompasses a wide range of activities and experiences that involve engaging with art in various forms, including visual arts, performing arts, literature, music, film, and more (8). Such engagement is not only a means of personal expression and enjoyment but also a way to connect with others, explore different perspectives, and enrich one's understanding of the world. It fosters creativity, critical thinking, empathy, and cultural appreciation, making it an essential aspect of individual and societal wellbeing. This systematic review showed that engagement with the arts reduced cognitive decline and improved mental health in a healthy population.

What should the next step be?

The development of arts-based health interventions is an evolving field with much potential for growth and innovation. Several next steps for advancing its development are needed. First, as the arts and health community of practice grows, it should be mindful of the need to adapt arts-based interventions to be culturally responsive. For instance, using the modification of a singing intervention for post-partum depression (PPD) as a case study, Warran et al.'s brief research report on this topic underscored the importance of cultural sensitivity and local stakeholder involvement in achieving successful implementation of arts-based health interventions as they move across cultural contexts. Second, we need more research to better understand the mechanisms of art on various health conditions. Third, we need to advocate for the integration of arts-based interventions into different healthcare settings from hospitals to residences for older adults. Collaboration with healthcare professionals in the development and implementation of art programs may complement existing treatments and support holistic approaches from patient care to health promotion in the general population. Fourth, expanding access to arts-based interventions in community settings such as schools, community centers, libraries, and cultural institutions is essential for scale. Developing partnerships with these local organizations may be helpful to develop outreach programs that

promote creativity, self-expression, and mental wellness among diverse populations. Fifth, providing training and education for healthcare professionals, therapists, educators, and artists on the principles and modalities of arts-based interventions is essential to ensure accessibility and scalability toward integrating the arts into professional healthcare and social practices. Sixth, we need to explore the use of technology and digital platforms to enhance the delivery and accessibility of arts-based interventions. Developing digital tools, mobile apps, virtual reality experiences and online platforms may facilitate creative expression, engagement, and collaboration in therapeutic and wellness contexts. Seventh, cross-disciplinary collaboration through a living lab approach is required to improve the effectiveness and personalization of arts-based interventions, as well as their implementation in health systems. Indeed, we need to create opportunities for knowledge exchange, cross-pollination of ideas, and co-creation of innovative solutions that leverage the intersection of art, health and technology. Eighth, we should advocate for policies and funding initiatives that support the integration of arts-based interventions into healthcare, education, and social services. There is a need to raise awareness about the health benefits of art and advocate for greater recognition and investment in arts-based approaches to health promotion, prevention, and treatment. By advancing these efforts, we can further harness the transformative power of art to improve health outcomes, enhance quality of life, and foster wellbeing for individuals and communities around the world.

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The role of emotion processing in art therapy (REPAT) intervention protocol

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Psychological and physical health are known to improve with emotion processing, which is becoming aware of bodily sensations, accepting them as information that can be translated into emotion concepts and expressing them symbolically and linguistically as emotions. Art therapy utilizes the visual arts for processing emotions to facilitate self-expression and communication with the goal of improving psychological wellbeing. The mental health of individuals coping with and recovering from cancer is known to benefit from art therapy. The purpose of this paper is to describe the development of the role of emotion processing in art therapy (REPAT) intervention, which is an 8 week, one and a half hour art therapy intervention created to target emotion processing as a primary mechanism of change, through which art therapy has the potential to reduce symptoms (i.e., depression, pain and fatigue) of women coping with breast cancer. To obtain this goal we used template for intervention description and replication (TIDieR) and GUIDance for the rEporting of intervention Development (GUIDED) guidelines for intervention development description, with the goal of ensuring successful implementation for clinical and research use.

KEYWORDS

art therapy (AT), psycho-oncological care, emotion processing, depression, pain, fatigue

Introduction

Globally, there were 2.26 million breast cancer (BC) cases diagnosed in 2020 (Wilkinson and Gathani, 2022) and at the end of 2020, there were 7.8 million women alive who had been diagnosed with BC since 2015, making it the most prevalent cancer (World Health Organization [WHO], 2021). Cancer survivorship is defined as living with the challenges that occur as the result of a cancer diagnosis and treatment (Gage et al., 2011). Many BC patients cope with depression. Stress and negative emotion are normative responses to cancer diagnosis and treatment, but approximately one-third of individuals coping with cancer experience the debilitating consequence of depressive disorders (Mitchell et al., 2011) which have been linked with functional limitation in survivorship (Steiner et al., 2008). Depressive symptoms are clinically elevated in the year following cancer diagnosis in 38% of BC survivors (Stanton et al., 2015; Wu and Harden, 2015). These individuals suffer more physical symptoms, problems with treatment adherence, functional limitation in survivorship (Wu and Harden, 2015) and increased mortality (Cuijpers et al., 2014).

There are several physical symptoms that occur commonly in BC survivors. Pain and fatigue are some of the most prominent symptoms that affect their quality of life (QoL) and wellbeing. A reported 25 to 60% of women develop chronic pain after BC treatment and chronic fatigue is reported in between 30 and 60% of survivors (Gage et al., 2011; Bower, 2014). Physical symptoms co-occurring with emotional distress are some of the most difficult to treat. Cancer survivors with high symptom burden suffer from diminished QoL, which compromises physical, psychological and social functioning (Wu and Harden, 2015).

Emotion processing has been associated with improved physical and psychological health in BC survivors. Emotion processing is comprised of (1) awareness, (2) acceptance, and (3) expression of emotions. Increased emotion awareness occurs when knowledge is transferred from sensorimotor or bodily information to patterns of explicit thought that include conscious processing through language or other symbolic formations, such as visual art (Lane and Schwartz, 1987; Lane et al., 1990). Low levels of emotion awareness are associated with somatoform disorders (Subic-Wrana et al., 2010). Acceptance of emotion is an emotion regulation strategy in which individuals embrace an attitude of being accepting, friendly, and nurturing toward their feelings (Politi et al., 2007; Weihs et al., 2008). Acceptance of emotion has been associated with experiencing less fear, catastrophic thoughts, avoidance behavior and better recovery from negative affect as compared to suppression of emotion. Women coping with BC who were less accepting of their emotions also report greater distress (Politi et al., 2007) and sickness symptoms (Reed et al., 2016). Emotion expression refers to the extent to which feelings are intentionally (Kring et al., 1994) (mainly verbally) and non-intentionally (Collier, 2014) (body language, facial expressions) conveyed to others. Increased emotion expression and reduced avoidance have long been associated with improved wellbeing (Stanton et al., 2002; Weihs et al., 2008; Giorgio et al., 2010; Bardeen et al., 2013). Increased emotion expression is also associated with improved psychological and physical adjustment to BC (Rost et al., 2012; Hoyt et al., 2014). These components of emotion processing are promising as potential mechanisms through which art therapy may improve physical and psychological health in BC survivors.

There are ethno-cultural differences in response to cancer diagnosis. Women from traditional backgrounds, in which there is an emphasis on collectivism as opposed to individualism and a reliance on religion as a major coping strategy, may respond differently to cancer diagnosis and treatment than do more modern/secular women. Women from traditional backgrounds may see cancer diagnosis as fate and fear stigma related to exposing their diagnosis. Furthermore, out of fear of their loss of role in the traditional family, women may not express their distress openly, which leaves them at risk for loneliness and not receiving help for their symptoms (Stanton et al., 2000; Low et al., 2006; Rost et al., 2012). BC survivors from ethnic minorities report poorer social, emotional, spiritual and physical quality of life (Azaiza and Cohen, 2006, 2008). Since expression of emotion and venting is distressing for some ethnic minorities (Goldblatt et al., 2016), art making and the use of metaphors for emotion processing may be less distressing and more helpful in reducing symptoms and increasing quality of life (Goldblatt et al., 2013; Miller et al., 2015).

Art therapy interventions encourage emotion processing. Art therapy is a form of psychotherapy that involves the use of visual artmaking (drawing, painting, sculpting, collage, etc.) for expression and communication within a safe and supportive relationship, in a therapeutic setting. Art therapy has been well documented in cancer settings to alleviate psychological symptoms and reduce physical complaints (Monti et al., 2006; Nainis et al., 2006; Öster et al., 2006; Svensk et al., 2009; Thyme et al., 2009; Slayton et al., 2010; Archer et al., 2015). In a qualitative study, women with BC reported that art making was helpful through increased access to emotional content and its expression (Collie et al., 2006). The above-described literature demonstrates the extensive clinical and research documenting the benefits of art therapy with cancer survivors. However, the literature does not describe in detail the interventions conducted. Thus, one of the goals of this paper is to provide both clinicians and researchers with a detailed account of the intervention development and implementation for the purposes of replication and further research, and more importantly, the accurate implementation of the REPAT intervention with BC survivors.

Intervention development is a complex process through which clinicians attempt to understand their client's needs and develop ways to intervene so they can experience meaningful behavioral, cognitive, and emotional changes to improve their psychological and physical health, and their general wellbeing. This paper describes the rationale, model, and content of the intervention that we designed, which we call the role of emotion processing in art therapy (REPAT) intervention. We chose to use the template for intervention description and replication (TIDieR) checklist for this purpose, as it is helpful in assuring that interventions are described in ways that other clinicians and researchers can implement and study successfully (Hoffmann et al., 2014). We are also following the GUIDED intervention development reporting items, as it builds on the TIDieR template and was developed through a more recent census-based approach (Duncan et al., 2020).

The "REPAT" intervention (TIDieR item two)

Rationale

Role of emotion processing in art therapy (REPAT) (TIDieR item one) intervention was created by the authors of this paper to target emotion processing as a primary mechanism of change through which art therapy has the potential to reduce symptoms of women following the experience of coping with BC. The purpose of this paper is to describe the development of the intervention, which is based on the clinical experience of both authors, who are an art therapist and psychiatrist, respectively, with extensive clinical and research experience in psycho oncology. In addition, the intervention development is based on the results of previous qualitative and quantitative research on the effect of art therapy with cancer patients in general and BC survivors, specifically (GUIDED item one).

Theoretical framework

The bodymind model is a developmental theoretical model of the mechanisms through which art therapy potentiates salutary gains (Czamanski-Cohen and Weihs, 2016). Furthermore, the bodymind model offers validated tools through which the proposed

mechanistic changes can be measured in empirical studies. This theoretical standpoint assumes there are specific mechanisms activated through art therapy, and through these mechanisms art therapy has the potential to improve psychological and physical health (GUIDED item six). At the time of this writing, to the best of our knowledge, the bodymind model is the only model of art therapy offering potential mechanisms and ways to measure them. Thus it was chosen as a framework for the design of the intervention, which was designed to activate the mechanism of emotional processing, deemed potentially important for the reduction of symptoms in BC survivors. The treatment protocol also derives elements from the application of focusing to art therapy (Rappaport, 2008) for the purpose of body awareness and focusing ("being friendly, accepting, non-judgmental and welcoming to one's inner felt sense") as well as some interventions from the Cognitive Behavioral Art Therapy (CBART), which is a six session cognitive behavioral intervention that utilizes art making for stress reduction and self-expression and was developed for work with individuals coping with chronic illness (pain and cancer), and has been adapted for working with women coping with post-partum depression and infertility (Czamanski-Cohen et al., 2014) (GUIDED item seven).

Aims

The target population of the originally designed REPAT study are BC survivors, however, we believe the intervention in its current form can be easily utilized with other cancer survivors (GUIDED item three). In addition, our team is currently adapting the intervention for work with individuals coping with inflammatory bowel disease as well as individuals coping with social anxiety. The outcome targets of the intervention are reductions in symptoms of depression, pain and fatigue as well as increases in emotion processing. The art therapy session includes (i) an introductory period in which the therapist engages with participants to establish rapport and begins to understand participants' current state of mind, (ii) an art making period which entails much of the time, and (iii) a processing period in which the art made is reflected upon and discussed. We hypothesize that increased Emotion Processing is a primary mechanism through which art therapy effects psychological and physical symptom reduction in BC survivors and thus we designed the REPAT intervention to test this hypothesis.

Materials and equipment

Materials used in the intervention delivery or in the training of intervention providers (TIDieR item three)

The art therapist provides a variety of art materials, that are either presented in the middle of the table, if the intervention is being delivered face to face, or mailed to each participant, if the intervention is being delivered virtually through an internet-based program, such as Zoom. We specifically kept the list of materials simple to be able to conduct the intervention in hospital conference rooms, which at the time of the design of the study, were the rooms we thought we would be using for the intervention groups. The following is a list of materials that we used in the intervention, and recommend to others. However, we also believe that flexibility may be required when adapting the intervention for use with other populations and settings. #1: a 24 color package of Panda oil pastels (Royal Talens, Apeldoorn, Netherlands). We chose these pastels as they are made with pure pigments, mineral oils, and wax binders for a soft and smooth laydown with no dust, and they work on various platforms. The color selection in the 24-color set includes: white (100.5), light yellow (201.5), deep yellow (202.5), lemon yellow (205.5), yellow ochre (227.5), orange (235.5), vermillion (311.5), scarlet (334.5), deep rose (362.5), burnt umber (409.5), burnt sienna (411.5), sepia (416.5), ultramarine (504.5), Prussian blue (508.5), turquoise blue (522.5), violet (536.5), red violet (545.7), blue violet (548.5), Phthalo blue (570.5), permanent green medium (614.5), sap green (623.5), fir green (654.5), phthalo green (675.5), and black (700.5), #2: sets of 24 color Birello double tip felt pens (Carioca, Italy), #3: sets of 24 colorpeps colored pencils [Manufacture d'Articles de Précision Et de Dessin (Maped), France], #4: HB pencils, #5: pencil sharpeners, #6: erasers (Milan, Spain) and #7: A4 printer paper (Kravitz, Israel).

At the end of the intervention, participants received a package of 12 color Panda oil pastels (Royal Talens Apeldoorn, Netherlands) which includes: white (100.5), lemon yellow (205.5), orange (235.5), vermillion (311.5), carmine (318.5), light blue (501), ultra marine (504.5), light green (601), green, yellow ochre (227.5), light brown (401), and Black (700.5) to take home along with a drawing block with 35 cm × 50 cm, 240 gram weight paper (Metro, Israel).

Methods

Procedures, activities, and processes (TIDieR item four)

The REPAT intervention is an 8 week group intervention comprised of eight one and a half-hour weekly sessions. The art therapist initiates metaphorical or concrete discussions with clients in order to facilitate their transition from one core therapeutic process to the next. For example, after creating a safe environment through the triangular relationship (client, therapist and art) the client is encouraged to engage their self through art making. In this process the therapist is supportively present. The client may make new discoveries about their self through the movement of emotional material from the implicit to explicit arena.

The therapist (based on their theoretical approach and the needs of the client) may remain in the metaphor while discussing the content of the art with the client (art as therapy, phenomenological approach) or they may use a more explicit conversation about the content and its meaning (art psychotherapy). If these discoveries are distressing, the client may need to receive additional support by returning the focus to strengthen the attachment relationship with the art therapist. The client, with guidance of the art therapist can use the content of the art expression to take a reflective stance and observe multiple perspectives thus enhancing meta-cognitive processes related to increased physical and emotional health (Fledderus et al., 2010, 2012; Fonagy et al., 2011; Lengacher et al., 2015). After the expression of somato-emotional and cognitive knowledge, the art

therapist can facilitate engagement in reflective or perspective taking processes, or in broader metacognition (thinking about thinking).

The development of the reflective self: social understanding

Through the appreciation of the reasons behind the actions of caretakers and siblings the child learns to acquire a representation of her own desires, wishes and mental states, coined intentionality. Playful interpersonal interactions through art making provide the basis for additional growth in intentionality for adults. They will develop self-agency if they permit: (a) the registration of perceptions, thoughts, and emotions as causes and consequences of action and (b) the contemplation of these mental states without fear.

Art therapy sessions start with a 10-min rapport building discussion and continue with a brief relaxation exercise followed by 40 min of art making in a calm and supportive environment. Art materials are on the table and after the art therapists provides a brief explanation of the use of the materials, participants were encouraged to explore and experience as they wish. The art therapist encourages participants to refrain from conversation and instrumental music is played to encourage introspective experiences. The role of the art therapist is to encourage a non-judgmental and exploratory approach to artmaking in which the process is emphasized over product. The art therapist fosters this approach by creating an atmosphere that is calm and by remaining tuned-in to the verbalizations and body language of participants. If needed she can provide individual attention that is geared toward neutralizing concerns regarding performance during the art making. This approach is defined as providing a "Third-hand" (Kramer, 2001): assisting in problem solving and dilemmas related to the art making process. The sessions end with 30 min of processing and discussion in which the art therapists request each participant to share and briefly present their work, to which group participants respond and/or provide support. The art therapist reminds group members to be respectful and non-judgmental toward other participants and themselves when they share their artwork.

The following is a detailed description of each session, each of which has its own objective (delineated in **Table 1**):

Session one

Getting familiar and safe

The group leader will speak about motivation for exploration via art and remaining open to new experiences. This includes the awareness that our emotions are information that is provided to us about how our needs and wants are being fulfilled. At this point the discussion is more general and is focused on reducing judgmental self-talk and paying attention to somatic experiences and using art materials to explore with the purpose of becoming more self-aware. The art therapist introduces the art materials and art making from a non-judgmental stance and will emphasize the importance of process over product. The concept of safe place will be introduced to the group and members will be asked to create a safe place via art (Czamanski-Cohen et al., 2014). The goals of this session: rapport building, contract building, and getting familiar and comfortable with the art materials.

The concept of the group is introduced by the art therapist, to include expectations for what will be gained from participation in the 8-week protocol, along with the group rules (arriving on time, respecting all members, keeping information about other group members private, etc.). The art therapist introduces the art materials and art making from a non-judgmental stance and the importance of process over product. The concept of safe place is then introduced to the group through a guided imagery exercise through which the art therapist invites the participants to imagine a place (real or imaginary) that they find beautiful and that encourages a sense of safety. The participants are guided by the art therapist to activate their five senses and imagine the sights, sounds, smell, taste of the air, and sensation on their skin of their chosen safe place. Participants are then instructed to create a safe place either concrete or abstract using the art materials. They are asked to remain open to exploration via art while also remaining open to new experiences in general.

Session two

Art making will be exploratory in the framework of open studio in which a specific topic is not provided, and participants are encouraged to explore the art materials. The goal of this session is to provide an experiential encounter with the art making process. There will be a 10-min psychoeducation presentation on the nature of emotions at the beginning of the session (see Appendix).

After a 10-min rapport building exercise that invites checking in by each group member, the art therapist conducts a brief 10-min psychoeducation presentation on the nature of emotions. We utilize the constructivist theory of emotions through which emotions begin as a somatic experience that is translated and defined as a specific emotion based on our past experiences (for additional reading see Barrett, 2017). The participants are requested to "play" with the materials and create whatever they would like, in the framework of an open studio in which a specific topic is not provided. Participants are encouraged to explore the art materials and are encouraged to focus on their process.

Session three

Group members will introduce themselves to the group by making a drawing about an emotion. The goal of this session is for participants to continue learning about the nature of their emotions and to increase awareness of their emotion responding patterns. Participants are asked to choose an emotion to draw as an introduction of themselves to the group. The art therapist encourages the participants to continue learning about the nature of emotions and to increase awareness of their emotion responding patterns. Participants are asked to create a drawing about an emotion.

Session four

The art therapist requests the participants to create an image of something that is distressful to them and sit with it for a while. Then, they are requested to create an additional drawing that changes one element of the distress drawing, a feature, a color, a shape, or just a change in composition. The images are discussed among group members and implications for real life situations are

TABLE 1 The REPAT intervention.

	Treatment goals	Intervention
Session 1: getting familiar and feeling safe	Rapport building Contract building Getting familiar and comfortable with the art materials	The concept of safe place will be introduced to the group. Motivation for exploration via art and remaining open to new experiences. The concept of the group will be introduced, expectations, group rules, homework introduce the art materials and art making from a non-judgmental stance and the importance of process over product. Participants are instructed to create a safe place via art.
Session 2: exploratory art making	Provide an experiential encounter with the art making process	A 10-minute psychoeducation presentation on the nature of emotions at the beginning of the session. The framework of open studio in which a specific topic is not provided, and participants are encouraged to explore the art materials
Session 3: engaging the emotional self	Participants are asked to introduce themselves to the group. Participants are encouraged to continue learning on the nature of emotions and increase awareness of emotion responding patterns.	Participants are asked to create a drawing about an emotion.
Session 4: image transformation	Participants will learn how to identify the location of distress in the body, increase distress tolerance and increase cognitive flexibility and reframing.	Participants are asked to create an image of somethings that is distressful to them and sit with it for a while. Afterwards they are asked to create an additional drawing that changes one element of the distress drawing, a feature, a color, a shape, or just a change in composition. The images are discussed among group members and implications for real life situations are discussed.
Session 5: open studio	Help participants identify how they react and respond to their emotions and help them increase their awareness of emotional experiences.	Participants are encouraged to engage freely with the art materials using artmaking to identify feelings and experiences with awareness that feeling are not reality.
Session 6: reframe	Increase cognitive flexibility and reframe.	Clients are requested to draw two sides of a current conflict in their life. It can be something small, like deciding where to go for lunch, or something large, like which treatment to engage in. All conflicts are welcome, but it should have significance to its creator and be something that they are struggling with and would like to learn more about. After the drawing period, clients are requested to look at both options and examine their sensations, feelings, and thoughts about each. Through creating 2 pictures participants will be able to view a situation from 2 points of view and identify more than one option for coping with the conflict they presented.
Session 7: body image	Increase interoceptive awareness and assist in processing emotional content from implicit experience to explicit expression. Increase distress tolerance.	Participants are requested to create art using body outline templates as a framework for art making.
Session 8: summary	Create art that is a summary of their experience and then engage in and review their achievements and encourage incorporating what was learned in day-to-day life after the intervention is over.	A summary of all that has been experienced and clients is provided with a letter that summarizes their progress. Each client receives a package of oil pastels and blank journal for the encouragement of their continued process at home.

discussed (Czamanski-Cohen et al., 2014). The goal of this session is twofold- to identify the location of distress in the body, increase distress tolerance, cognitive flexibility, and reframing. Participants are asked to create an image of their distress and sit with it for a while. Afterward they are asked to create an additional drawing that changes one element of the distress drawing, a feature, a color, a shape, or just a change in composition. The images are discussed among group members and implications for real life situations are discussed.

Session five

Due to the intensity of session four, which can be seen as a pinnacle of the REPAT intervention, session five is an open studio, in which participants can use art, however, they choose. This session is open studio in which participants are encouraged to engage freely with the art materials. The goal of this session is to help participants identify how they react and respond to their emotions and bring an awareness of emotional experiences and learn the skill of "Clearing the Space"-using artmaking to identify feelings and experiences without the need to identify with them. This means that participants are asked to become in tune with somatic experiences and express them on paper with art material in an exploratory manner. This externalization of emotional material enables both a distancing and reflection upon this material, and an awareness of these emotions as informative and transitory (Rappaport, 2008).

Session six

Participants are requested to draw two sides of a current conflict in their life. It can be something small, like deciding where to go for lunch, or something large, like which treatment they want to receive. All conflicts are welcome, but the one chosen as a focus for this activity should have significance to its creator and be something with which she is struggling and about which she would like to learn

more. After the drawing period, clients are requested to look at both options and examine their sensations, feelings and thoughts about each. Their art, thoughts and feelings are shared with the group. The goal of this session is to increase cognitive flexibility and to reframe ones perspective on the conflict. This means that through creating two pictures participants will be able to view a situation from two points of view and identify more than one option for coping with the conflict they presented. Clients are requested to draw two sides of a current conflict in their life. It can be something small, like deciding where to go for lunch, or something large, like which treatment to receive. All conflicts are welcome, but it should have significance to its creator and be something with which they are struggling and about which they would like to learn more. After the drawing period, clients are requested to look at both options and examine their sensations, feelings, and thoughts about each. Through creating two pictures, participants will be able to view a situation from different points of view and identify more than one option for coping with the conflict they presented. The goal of session six is to increase cognitive flexibility and the ability to reflect upon and to reframe a difficult situation.

Session seven

Body image

In this module participants create art using body outline templates as a framework for art making. The goal of this session is to increase introceptive awareness and assist in processing emotional content from implicit experience to explicit expression. It also aims to increase distress tolerance.

Session eight

Summary

This session will be a summary of all that has been experienced and clients will be provided with a letter that summarizes their progress from the perspective of the art therapist. Each client will receive a package of oil pastels and blank journal for the encouragement of their continued process at home. The participants are asked to draw an image that reflects what they have obtained during the part 8 weeks, and what they wish for themselves for the future. The group then conducts a portfolio review where they look at all the art created in the past 8 weeks. The goal of this session is to review achievements and encourage incorporating what was learned in day-to-day life after the intervention is over.

Expertise and background of program facilitators (TIDieR item five)

Program facilitators are experienced Master of Arts level art therapists who participate in a 4–6 h training program. Details of the training module can be obtained by contacting the corresponding author of this paper. It is recommended that the art therapists have previous experience working with adult cancer patients and survivors and are aware of the common issues with which these individuals are coping. During the implementation of the intervention, it is recommended that the art therapists receive supervision from a senior clinician who is well versed in the REPAT intervention.

How, when and how much (TIDieR items six and eight)

The intervention was designed to be implemented face to face in a group setting for 1 h and a half, each week for 8 weeks. See previous section for details of how, when and how much.

Location(s) where the intervention occurred, including necessary infrastructure or relevant features (TIDieR item seven)

The intervention was designed to be implemented in hospital meeting rooms, in lieu of the availability of a preferred art therapy studio. The minimal necessities to conduct the intervention are a room with a table in the middle and chairs, with enough space for 10 participants and the art therapist. Lighting needs to be bright enough for participants to clearly see what they are creating. The art supplies mentioned above should be placed in the center of the table so that each type of material is easily accessible to all participants. A photocopy of a human figure is needed for session seven. **Figure 1** shows the human shape used in our intervention.

Tailoring (what, why, when, and how) (TIDieR item nine)

During the COVID-19 pandemic, we had the opportunity to pilot and implement the study online, in a virtual setting through which each participant logged on to an online platform, such as Zoom (Zoom Video Communications, Inc, 2020). Due to the technical needs of conducting the intervention online, we had an assistant present to assist participants with technical difficulties, or to support the group if the art therapist needs to provide additional support to a group member. Furthermore, we extended the time for the online groups to 2 h instead of one and a half hours to accommodate adjustments to technical and logistic issues that were inherent in the use of the online platform. We found this was an important adaptation as time seemed to flow differently online, and more time was needed for the checking in as well as the summation portions of each session.

To adapt to an online setting, we mailed art supplies, paper and the photocopy of the body outline to the participants several weeks before the intervention began. We were also able to provide tablet computers with data service and a headset for participants who did not have access to the internet (GUIDED item ten).

Modifications, adherence, and fidelity (TIDieR items ten and eleven)

We utilized a fidelity chart (**Table 2**) completed by the art therapist after each session. If fidelity in any area was below 80% the first author conducted an additional supervision session with the art therapist who conducted the session to determine how fidelity could be improved for increased adherence to the protocol.

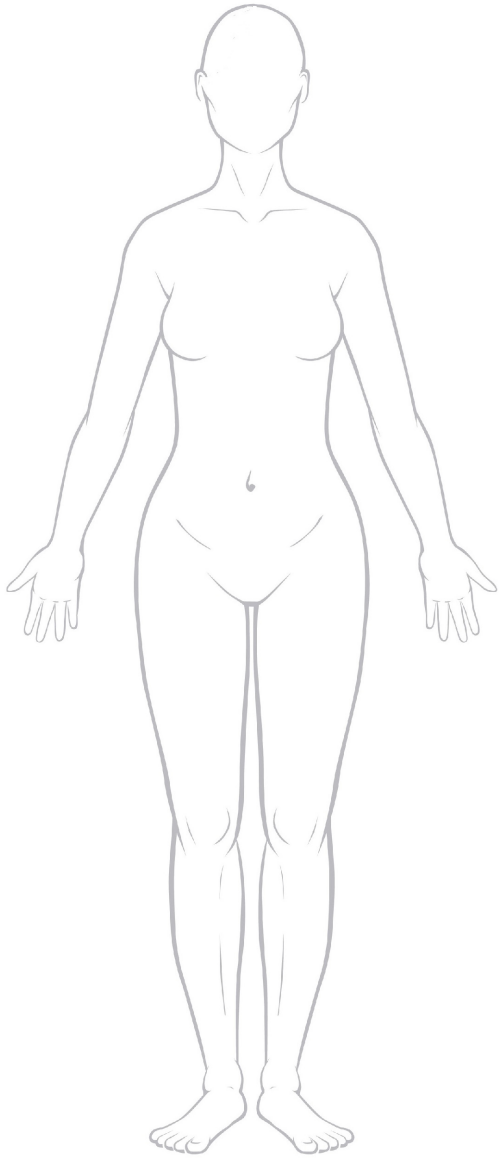

FIGURE 1
Template of body outline used in session seven.

An additional strategy that is preferred, however, not always feasible, is to have an experienced trained art therapist observe the newly trained art therapist while they implement the intervention for the first time. Following being observed for the first time implementing the intervention, and receiving supervision and direct feedback, a newly trained art therapist is observed for a second time and, if fidelity to the protocol is achieved, they can be considered "certified" in the REPAT intervention and continue to provide fidelity reports for her own interventions.

Strategies to improve and maintain fidelity (TIDieR item eleven)

To improve and maintain the fidelity of the intervention, it is recommended to conduct fidelity checks, such as the one provided in Table 2. The fidelity checks ensure the main elements of the protocol regarding the division of time, art making and processing discussion are occurring in the intervention provided.

Results

In the following section we describe and illustrate the results of the REPAT intervention, using examples from participants' artwork and quotes of participants regarding their experience that we collected following the pilot study of the online intervention. Furthermore, we describe where the intervention has been implemented and how it was received.

Session one of the REPAT intervention is a "safe place" intervention. Figure 2 is an example of a safe place created by a group member who stated that "growing flowers" is her safe place, and this activity makes her feel connected. Session two focuses on exploratory art making which provides an experiential encounter with the art making process. Figure 3 is an example of art made by a participant in session two in the REPAT study. Session three deals with engaging the emotional self. Figure 4 is a drawing of a participant in the REPAT study who stated that she was drawing about happiness, and that she rarely gave herself enough time to have in depth experiences with herself. She stated that she identified with emotions created by other group participants such as anger and feeling shaken by the experience of cancer.

Session four is an image transformation exercise. Participants are guided by the art therapist to identify the location of distress in the body, and get in touch with this sensation for several moments with the goal of increasing distress tolerance. The goal of the session, other than distress tolerance is increasing cognitive flexibility and reframing., that occurs by creating the second drawing and creating a shift in the experience of distress, initially on paper, and eventually as a whole-body experience. This participant drew her physical pain in Figure 5. The drawing depicts the pain surrounding her and splitting her upper body in to two parts. In Figure 6, we see that the participant removed the body from the drawing and these are replaced by colorful squiggles and a flowerlike shape. She stated "When I am in pain, I can't talk to anybody, or think of anything. I don't even have words to describe it. When the pain goes away, I can communicate, I can think." She later responded to another participant, saying "It feels really good to get all of our feelings out on the paper, right?" The goal of this session is to continue to help participants identify how they react and respond to their emotions and bring an awareness of emotional experiences. Participants are encouraged to engage freely with the art materials using artmaking to identify feelings and experiences with awareness that feeling are not reality. Figure 7, is a drawing in which a participant is split in half so that that the left side represents all the "filth" in her life. She shared with the group, that even before her cancer diagnosis, she had to deal with her husband being in jail for 12 years. She stated that despite all her difficulties, she was able to maintain optimism, that is depicted on the right side of the drawing, and the word "optimism" is written in Hebrew in the right upper corner of the drawing. She received feedback from the group that it was her optimism that enables the figure to stand stable and strong amid these difficulties, and she thanked the group for the feedback, stating that she was not previously aware of the fact that being optimistic had such a positive effect on her.

TABLE 2 Fidelity assessment.

	1 not at all	2 a little bit	3 neither yes or no	4 quite a bit	5 very much so	Not applicable
(1) Was there a sense of calm in the room?	1	2	3	4	5	N/A
(2) Did you feel like you were able to support the participants?	1	2	3	4	5	N/A
(3) Were the participants deeply engaged in art making?	1	2	3	4	5	N/A
(4) Was the session divided in to a 10-min intro, 60 min art making and 20 min discussion?	1	2	3	4	5	N/A
(5) Was the art making done with minimal conversations?	1	2	3	4	5	N/A
(6) Was the group discussion respectful and safe?	1	2	3	4	5	N/A

FIGURE 2
Drawing of participant from session one.

FIGURE 3
Drawing of participant from session two.

Session six is designed to deal with the concept of reframe. In Figure 8 a participant depicted how she feels stressed at her current job, and in Figure 9, how relaxed she felt while she was going through cancer treatment, and she took time off, and was able to spend time with her family. During that time, she promised herself not to return to her stressful position, however, now she understands that it is more complicated than she previously perceived.

Session seven is focused on body image using body outline templates as a framework for art making, however, they are instructed to use the template, or more than one template in any way they desire (Figure 10). A participant in the REPAT study shared that she drew herself as she envisioned in her mind's eye, as healthy. She drew herself wearing a skirt which she found strange because this is not what she usually wears when she feels well and wore skirts for chemotherapy because it was more convenient to place the IV when she was in a skirt. She drew her surgery on the right breast. She stated that she drew her hair, which was very long before cancer treatment and she is amazed at how fast it is growing back. She remembered that she cut off two braids that she intended on donating but ended up making a wig for herself out of them. She added the sun, stating that the sun is very important to her, she wants to return to her life.

Session eight is the last session of the REPAT intervention and is intended to be a summary of the participant's experiences and is designed to engage in and review their achievements and encourage incorporating what was learned during the sessions in their day-to-day life after the intervention is over. The art therapist writes a letter to each participant that summarizes all that has been experienced and their progress. Participants are asked to create a drawing that creates a summary for themselves and that includes what they wish for themselves going forward. A participant in the REPAT study stated: "I can't believe its already over. A lot of interesting things have been happening to me in the past few weeks, I can feel newfound strength. Last week's drawing released something in me, like the bottle I drew. These drawings demonstrate the process, the clearing, and questions that I still have. . ." Her drawing (Figure 11) shows her on a playground and engaging in activities such as rowing and riding a bike. Her playfulness and enlivenment

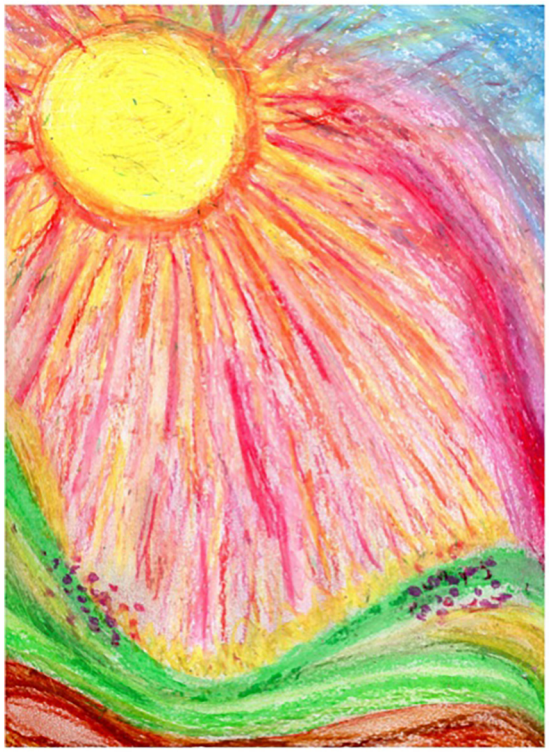

FIGURE 4
Drawing of participant from session three.

FIGURE 5
First drawing of participant from session four.

FIGURE 6
Second drawing of participant from session four.

FIGURE 7
Drawing of participant from session five.

are also demonstrated in the color choices and smiley emoji's drawn in between the playing figures. Each participant receives the letter from the therapist at the end of the session along with a package of oil pastels and blank journal for the encouragement of their continued process at home.

Discussion

The REPAT intervention was designed to improve emotion processing and reduce symptoms of depression, pain, and fatigue of cancer survivors. Its theoretical framework is based on the bodymind model of art therapy (Czamanski-Cohen and Weihs, 2016) and findings from the My year after cancer (MYA) study that documented trajectories of persistently high, persistently low

FIGURE 8
First drawing of participant from session six.

FIGURE 9
Second drawing of participant from session six.

FIGURE 10
Drawing of participant from session seven.

FIGURE 11
Drawing of participant from session eight.

and recovering from depressive symptoms of women in the first year after cancer diagnosis (Stanton et al., 2015). The REPAT protocol is unique in its emphasis on emotion processing. While art therapy is described in the literature to be helpful in reducing symptoms of depression and anxiety and improving quality of life (Kievisiene et al., 2020; Bosman et al., 2021), and seen as important in enabling women coping with cancer (and others) to get in touch with and express their emotions (Collie et al., 2006; Puig et al., 2006; Lipson, 2011; von Wietersheim, 2019), and using art for meaning making (Collie et al., 2006) the REPAT protocol, to the best of our knowledge, is the first intervention protocol specifically designed with the goal of increasing awareness, expression and acceptance of emotion, explicitly. Furthermore, the use of body maps is occasionally used in art therapy, as full body tracings for trauma work (Scott and Ross, 2006), as a communication tool for working with pain of cancer patients (Luzzatto et al., 2003), and as an arts based research method (Smit, 2020), this is the first use of body outlines as a way to engage the body, as part of an art therapy protocol.

Along with its strengths, the REPAT protocol should be considered along with its limitations. The REPAT protocol was designed as an 8-week group for the purpose of research; however, our clinical experience shows that BC survivors need much longer than 8 weeks to process the changes that they experience following treatment. How long is not clear, however, Perhaps future studies can examine this. Furthermore, the REPAT protocol is designed for groups, and while we believe in the power of groups, some women may need more individualized attention to become comfortable in exploring difficult emotions.

To date, REPAT has been implemented with women coping with and survivors of BC. The intervention was first piloted in 2015–2016 with ten BC survivors, and the results of the pilot were published (Czamanski-Cohen et al., 2019). Following our successful pilot, we sought funding for a mechanistic study, and were successful in obtaining an RO1 (independent investigator) grant through response to a program announcement with review (PAR)–PAR-14-294- Arts-Based Approaches in Palliative Care for Symptom Management, from the National Institutes of Health

Nursing Research institute (NINR; award number R01NR017186). This PAR aimed to support mechanistic clinical studies that would increase understanding of the impact of arts-based approaches in palliative care for symptom management and provide an evidence base for the use of the arts in palliative care for symptom management. It also aimed to support investigation of the biological, physiological, neurological, psychological, and/or sociological mechanisms by which the arts exert their effects on symptom management during and throughout the palliative care continuum. The REPAT study was conducted from 2018 to 2022, and during this time 318 BC survivors were randomized to participate in the REPAT intervention, or a mandala coloring control group. The REPAT study protocol has been published (Czamanski-Cohen et al., 2020) and can be read online, and the results of the REPAT study are currently being analyzed and will be published and presented in the coming years. Links to published work can be found at https://repat.haifa.ac.il/en/.

On October 30th, 2022 we conducted a 1 day conference at the University of Haifa, as a final event of the REPAT study. We presented preliminary results of the study and we gave the participants a forum to ask the team questions about the results and share their experiences with us and the other participants. The most important feedback from the conference attendees was that 8 weeks is not long enough for the support that BC survivors need in the year following primary treatment for BC. Thus, while the REPAT intervention is an 8-week, beneficial protocol for the reduction of symptoms and improving emotion processing, it is likely that women need prolonged support beyond these 8 weeks (GUIDED item nine and ten).

The REPAT intervention is now being adapted in the laboratory for the psychosomatic study of art therapy, at the University of Haifa for individuals coping with inflammatory bowel diseases and for adolescents coping with social anxiety. We hope this intervention protocol will be helpful for art therapy clinicians working with cancer survivors and we would be glad to collaborate with individuals interested in further studying the impact of this intervention.

Conclusion

The REPAT protocol is an art therapy intervention designed to increase emotion processing and reduce symptoms of depression pain and fatigue of BC survivors. The intervention has been piloted and implemented both online and face to face. It is currently being adapted for and examined with additional populations. While initially designed for research, the REPAT intervention can be implemented in clinical settings, and should possibly be extended to meet the ongoing needs of BC survivors, in the years following coping with cancer and its treatment.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by the Ethics Committee of the Faculty of Social Welfare and Health Sciences at the University of Haifa. The patients/participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

Both authors listed have made a substantial, direct, and intellectual contribution to the work, and approved it for publication.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1208901/full#supplementary-material

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Productive arts engagement at the Tokyo Fuji Art Museum and its health effects on the older Japanese population: results of a randomized controlled trial

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Background: This randomized controlled trial aims to compare changes in mental and physical health in older Japanese community-dwellers who participated in a productive art-based activity at the Tokyo Fuji Art Museum (intervention group) and in their counterparts, who did not participate in the intervention (control group).

Methods: A total of 73 older community-dwellers living in Tokyo participated in a single-blind RCT in two parallel groups (intervention group versus control group). The intervention was 2h of productive art-based activities per week. The weekly sessions were carried out at the Tokyo Fuji Art Museum over a 12-week period. The control group did not participate in any productive art-based activity over the study period. Well-being, quality of life and frailty were assessed before the first, and after the last, art-based activity. These outcomes were assessed with the same schedule in both groups.

Results: The intervention group saw a significant improvement in their quality of life ($p<0.044$) and mixed results on their physical health (i.e., decreased frailty status) when compared to the control group. The comparison of changes in frailty scores between M0 and M3 showed improvement in the intervention group ($p=0.014$), but when adjusted for baseline characteristics by linear regressions, revealed only a trend ($p=0.070$). No conclusive effect was shown with well-being.

Interpretation: This RCT showed mixed health effects of productive art engagement in older Japanese community-dwellers in Tokyo. Benefits were reported for quality of life and mixed effects were observed for frailty, while no significant effect was found for well-being.

Clinical Trial Registration: Ethic committee of Shobi University, Tokyo (Japan), ref. A-2021-1; Clinical Trial Number NCT03679715.

KEYWORDS

randomized controlled clinical, well-being, quality of life, frailty, Art Museum, productive art engagement

1. Introduction

Participating in art-based activities in a museum setting may have health benefits for older adults (1). Both mental and physical health improvements have been associated with productive arts engagement (i.e., doing hands-on activities), such as fine arts-based group activities carried out at the museum, as well as with receptive engagement with art (i.e., attendance of arts-based events and venues) such as guided museum tours (1–3). Visiting museums has also been associated with reduced risk of major neurocognitive disorders and has been shown to contribute to the prevention of cognitive decline (4, 5). Furthermore, an association between art engagement and a lower risk of mortality - particularly among older adults - has also been reported (5, 6).

The health benefits of art engagement have also been confirmed by the World Health Organization's scoping review on the subject, published at the end of 2019 (3). This review also underscores the need for evidence-based study design, like randomized controlled trials (RCT). Because of their efficacy at reducing confounding factors, RCTs are more likely to generate findings that capture the true effect of an intervention when compared to other research methods (7). Nevertheless, few studies cited in the review used this method (7).

All previous studies on the health benefits of art engagement have been performed in either North America (Canada and the United States) or in Europe, including the United Kingdom (1, 3). Thus, most participants of these studies were Caucasians (3). Ethnicity may influence the health benefits of art engagement, regardless of its type (i.e., productive versus receptive) (8, 9). For instance, there is evidence for lower rates of arts engagement in Black ethnic groups in the United States (9). Currently, there is a lack of data on arts engagement and its health benefits in the Asian population (10). Overall, being Asian does not seem to predict a different rate of engagement with the arts (when compared to white counterparts) after considering factors which may influence this association, like education and income (9). It is clear, however, that this engagement is socially stratified, with people of higher socio-economic status being more likely to engage in the arts (8, 9, 11). Yet both productive and receptive arts engagement have been associated with better holistic wellness and social support in Asian adults aged 50 and above living in Singapore (10).

To date, there have been no published clinical trials involving the older Asian population that track the health benefits of productive arts engagement in a museum setting. Asia is aging at a much faster rate than anywhere else in the world - particularly Japan, which has the highest ratio of people aged 65 and older both in Asia and in the world (12). Because of the potential health benefits of arts engagement in the aging population, there is a need to confirm its effects on the older Japanese population.

Productive arts engagement in a museum setting may improve mental and social health in the older Singaporean population (10). It may also improve physical health in the older North American older population (13). Thus, we hypothesized that productive arts engagement at art museums could improve both the mental and physical health of older Japanese community-dwellers.

This randomized controlled trial aims to compare changes in mental and physical health in older Japanese community-dwellers who participated in a productive art-based activity carried out at the Tokyo Fuji Art Museum (intervention group) and in their counterparts, who did not participate in these art activities (control group).

2. Methods

2.1. Population

A total of 73 older community-dwellers, aged 65 and above, who lived in Tokyo and its vicinity (Japan), agreed to participate in this RCT. Arts Alive, which is a non-profit organization in Tokyo, carried out recruitment using various media channels, including direct mailing, college alumni associations, community newspapers, magazine advertisements, and articles in local newspapers, distributing flyers at the museum as well as social networks including Facebook and Twitter. A total of 118 individuals applied to the call. They were then asked to send in signed consent forms to participate in the RCT. We excluded 30 individuals (25.4%), as they declined to participate after being informed of the details of the trial and/or due to an inability to participate due to physical disability. Following the signing of the consent forms and randomization, 4 (3.3%) participants in the intervention group withdrew their consent before the baseline assessment, and 11 participants (9.3%) dropped out over the 3-month intervention period (5 in the intervention group and 6 in the control group). Figure 1 shows the consort flow diagram detailing participant selection and follow-up in the RCT. Participants in the intervention and control groups were recruited and followed over the same period. All recruited participants have no previous experience in arts-based activities. In addition, the control group did not participate in any productive arts-based activity over the study period.

2.2. Study design

The study design was an RCT in two parallel groups (intervention versus control). This RCT is registered on the ClinicalTrials.gov website (project number NCT03679715) and followed the RCT guidelines (14). The participants were randomly divided into two groups, intervention (productive arts-based activity) and control (no productive arts-based activity), by block randomization with a block size of 1. The randomization list was generated by an independent assistant coordinator using the N'Query randomization software. The principal investigator and representatives involved in the recruitment and follow-up of participants were blinded to participants' group assignment. Participants were blinded to assessment results.

2.3. Intervention

The current research adopted the standardized 12-week Montreal A-Health participatory art framework with culturally specific modifications that is suitable for the Japan context (i.e., A-Health Japan Framework) (13). The arts intervention designed and executed by Arts Alive in cooperation of the museum consisted of 12 (consecutive) weekly 2-h sessions, which took place at a gallery as well as a lecture hall at the Tokyo Fuji Art Museum over a 3-month period (from May to August 2019). Participants in the intervention group were randomly separated into two smaller groups, so that the same

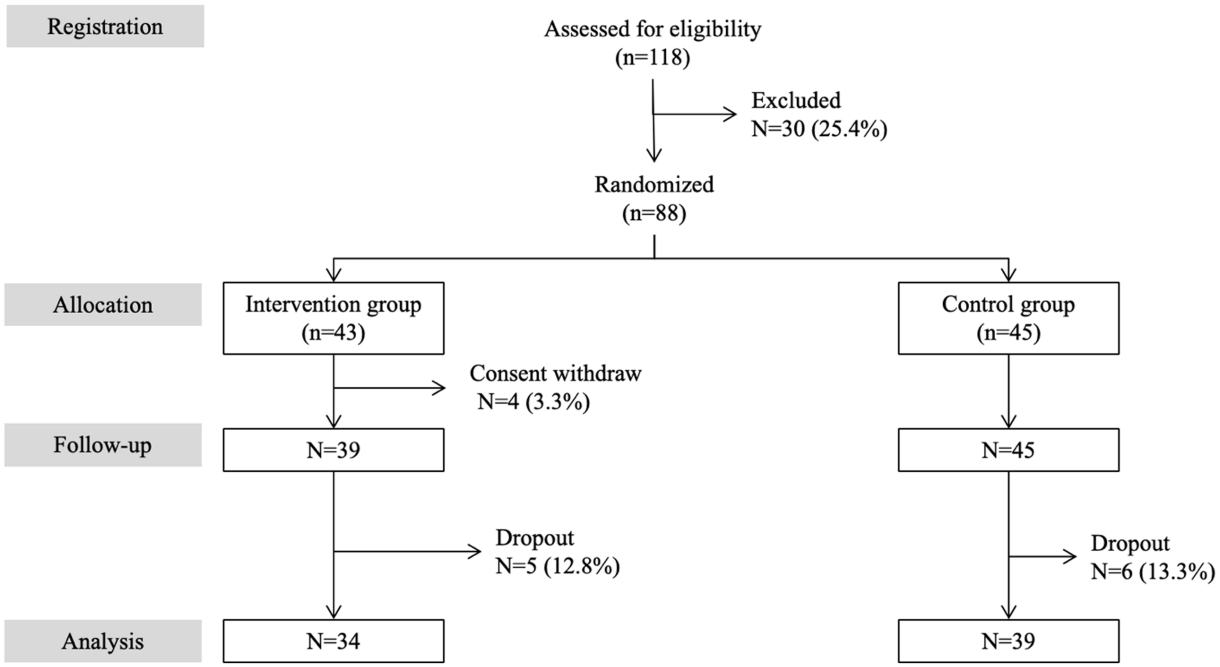

FIGURE 1
Consort flow diagram detailing selection and follow-up of participants in the RCT.

activities were held both in the morning and afternoon on either Saturday or Sunday (due to the availability of the museum space). The 3-month intervention was centered around 3 separate topics, with each topic consisting of 4 consecutive workshops. Once a month, participants also participated in a 30-min-long, dialogue-based art appreciation program called ARTRIP, in which they observed and had discussions on gallery art works in small groups (for a total of three times) with Arts Alive facilitators. The 3 topics of art-making workshops were i) "mural painting with collage" (where participants first made watercolors of plants, animals and other items which constituted a kind of landscape then created a mural with a collage of those watercolors), ii) "from 2 dimensions to 3 dimensions" (which consisted of creating sculpture with paper as well as balsa), and iii) "Japanese mineral pigment painting" (where participants produced their own pigment from mineral rocks and made paintings with them). The workshops and modules were designed to become more challenging as they progressed, so that participants would feel a sense of accomplishment at the end of each session. They were designed by three professional artists together with Arts Alive, while the museum provided the facilities. All workshops were involved interactive, hands-on activities, designed to improve participants' creativity, observation skills, handicraft techniques, and fine motor skills.

2.4. Baseline and follow-up assessments

Assessments were performed before the first workshop (M0) and after the last workshop (M3). Age, sex, polypharmacy (defined as taking 5 or more drugs daily), activities of daily living (ADL) and instrumental activities of daily living (IADL) scales, mood, practice of regular physical activity and history of falls in the past 12 months were assessed (15). In addition, the Centre of Excellence Self-Administered questionnaire (CESAM) was used to assess frailty (16). This validated questionnaire used the deficit accumulation frailty model, which counts health deficits (17, 18). A greater number of deficits indicates a higher frailty state. All CESAM items are close-ended questions: yes = 1 indicates a deficit and no = 0 indicates the absence of a deficit. Two complementary scores are provided by CESAM: 1) a frailty score ranging from 0 (i.e., no deficits) to 18 (i.e., all deficits present) and 2) a frailty stratification into four levels: vigorous (score 0–3), mild frailty (score 4–7), moderate frailty (score 8–12) and severe frailty (score above 12). The Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) questionnaire was used to assess well-being (19). This questionnaire is composed of 14 positively worded items with five response categories. Its score ranges from 14 (i.e., none of the time) to 70 (i.e., all the time). Quality of life was assessed using EuroQol-5D (EQ-5D) (20). This questionnaire is composed of 5 items, with each question's score ranging from 1 (i.e., no issue) to 5 (i.e., worst issue), yielding a summary score between 0 (i.e., no issue) and 25 (i.e., worst issue). It also includes a visual analogue scale (VAS) representing respondents' self-perceived health ranging from 0 (i.e., worst health participant can imagine) to 100 (i.e., best health participant can imagine).

2.5. Outcomes

The outcomes were (i) mean values of WEMWBS, EQ-5D questionnaires, EQ-5D VAS and CESAM scores, (ii) the distribution of frailty categories (vigorous versus mild, moderate and severe frailty) at M0 and M3, and (iii) changes in outcome mean scores between M0 and M3 using the following formula: [(score M3 – score M0)/(score M3 + score M0)/2] × 100.

2.6. Ethical considerations

Recruited participants gave their written informed consent to participate. Ethical approval was obtained for the protocol (Ethics committee of Shobi University, Tokyo (Japan), A-2021-1).

2.7. Statistics

Participants' characteristics were described using means, standard deviations (SD), frequencies and percentages. Unpaired and paired *t*-tests and Chi-squared tests were used for inter and intra-group comparisons. Multiple linear regressions were performed for changes in outcomes between baseline (M0) and the end of the follow-up period (M3), which were significantly different when comparing the intervention and the control group. These linear regressions examined the association of changes in outcome measures (used as dependent variables, separated models for each variable) with the intervention (used as independent variable), adjusted based on the number of workshops performed and the baseline characteristics of participants. *p*-values less than 0.05 were considered statistically significant. All statistics were performed using SPSS (version 26.0; SPSS, Inc., Chicago, IL).

3. Results

There was no significant difference among the baseline characteristics of participants, except for mood (Table 1). The participants in the control group were more frequently happy compared to those in the intervention group ($p = 0.008$). No significant change between M0 and M3 in all outcome measures were observed in the control group (Table 2), whereas quality of life (both the EQ-5D questionnaire score and the visual analogue scale) and frailty scores, as well frailty distribution, improved between M0 and M3 ($p \leq 0.015$) in the intervention group. Comparison of changes between M0 and M3 in outcome measures showed a greater significant improvement in the intervention group compared to the control group for EQ-5D questionnaire scores ($p = 0.003$) and frailty scores ($p = 0.014$) (Table 3). As illustrated in Table 4, linear regressions showed that only the change of the EQ-5D questionnaire score between M0 and M3 was associated with the Tokyo Fuji Art Museum productive arts workshops (coefficient of regression beta = −9,94 with *p*-value = 0.040). Only a trend was observed for the frailty score (coefficient of regression beta = −30.03 with *p*-value = 0.070).

4. Discussion

The findings showed mixed health effects of museum-based, productive arts engagement by older Japanese community-dwellers living in Tokyo. Benefits were reported for quality of life, while mixed results were observed for frailty and non-conclusive effect was found for well-being.

Both improvement of quality of life and mental health benefits are the most commonly reported positive effects of arts engagement, regardless of the type (i.e., productive versus receptive) and setting (3). Arts engagement is a multimodal intervention involving imagination, sensory activation, cognition and emotion (1–3, 14, 20–23). This multimodal stimulation produces psychological effects including happiness, enhanced self-efficacy, self-esteem, and positive emotions (1–3). All these psychological effects may improve quality of life because they influence the individual's perception of their life (19). Quality of life is defined by the World Health Organization as the "individuals' perception of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards and concerns" (24).

In our study, we reported an improvement in quality of life, but no effect on well-being was observed. Well-being and quality of life both refer to a positive and subjective sense of health (3, 24, 25). And while the link between the two is undeniable, they refer to two separate, yet complementary domains of wellness (25). Quality of life is located in the objective realm, at the intersection of individual needs and external resources. Well-being, on the other hand, captures one's

TABLE 1 Baseline characteristics of participants (*n*=73).

	Participants		
	Control (*n*=39)	Intervention (*n*=34)	*p*-value[a]
Age (years), mean ± SD	70.4 ± 4.1	68.7 ± 8.4	0.685
Female, *n* (%)	20 (51.3)	20 (58.8)	0.376
Polypharmacy[b], *n* (%)	28 (71.8)	25 (73.5)	0.868
ADL score (/6)[c], mean ± SD	5.9 ± 0.3	5.9 ± 0.3	0.838
IADL score (/4)[d], mean ± SD	3.1 ± 0.4	3.0 ± 0.3	0.154
Mood happy[e], *n* (%)	31 (79.5)	17 (50.0)	**0.008**
Practice of physical activity[f], *n* (%)	34 (87.2)	27 (79.4)	0.372
History of falls in the past 12 months, *n* (%)	17 (17.9)	4 (11.8)	0.461

SD, Standard deviation; ADL, Activity daily living; IADL, Instrumental Activity daily living; CPQ, Computer proficiency questionnaire; *p*-value significant (i.e., <0.05) indicated in bold.
[a]Comparison based on Mann–Whitney test or chi square, as appropriate.
[b]Number of drugs taken daily ≥ 5.
[c]Ranged from 0 (dependent) to 6 (independent).
[d]Ranged from 0 (non-autonomous) to 4 (autonomous).
[e]Based on answer to the question "How do you feel today?" with three possible answer including unhappy, happy, neither one nor the other.
[f]Regular physical activities (walking, bicycle, etc.) at least 1 h per week in the past month.

TABLE 2 Comparisons of mean scores of well-being, quality of life and frailty as well as of frailty categories between control and intervention groups (n=73).

	Participants						Participants control versus intervention *p*-value	
	Control (*n*=39)			Intervention (*n*=34)			M0	M3
	M0	M3	*p*-value[a]	M0	M3	*p*-value[a]		
Warwick-Edinburgh Well-being scale (/70)[b], mean ± SD	57.4 ± 5.8	58.6 ± 6.4	0.150	57.6 ± 8.3	59.6 ± 7.7	0.105	0.591	0.438
EQ-5D								
Questionnaire score (/25)[c], mean ± SD	5.7 ± 0.9	5.9 ± 1.1	0.709	3.4 ± 3.3	5.2 ± 0.4	**0.001**	0.691	**0.004**
Visual analogic scale (/100)[d], mean ± SD	72.5 ± 22.9	80.5 ± 9.4	0.222	69.0 ± 25.5	85.6 ± 10.0	**0.004**	0.525	**0.018**
Frailty[e]								
Score (/18), mean ± SD	3.4 ± 2.0	3.3 ± 1.9	0.503	3.9 ± 2.0	2.5 ± 1.5	**≤0.001**	0.310	**0.047**
Vigorous, *n* (%)	10 (25.6)	13 (33.3)	0.456	10 (29.4)	21 (61.8)	**0.007**	0.719	**0.015**
Mildly frail, *n* (%)	28 (71.8)	24 (61.5)	0.337	23 (67.6)	13 (38.2)	**0.015**	0.700	**0.047**
Moderately frail, *n* (%)	1 (2.6)	2 (5.1)	0.556	1 (2.9)	0 (0)	0.314	0.922	0.181

SD, Standard deviation; EQ-5D, EuroQol 5D; M, Month; M0, baseline assessment before intervention; M3, assessment at the end of the 3-month period of intervention; a 'mild' frail score ranges from 4 to 8; a 'moderate' frail score ranges from 9 to 14; a 'severe' frail score is ≥ 15; *p*-value significant (i.e., <0.05) indicated in bold.

[a]Comparisons based Wilcoxon or chi squares, as appropriate.

[b]Ranged from 14 (i.e., none of the time) to 70 (i.e., all the time).

[c]score ranged from 0 (no problem) to 25 (unable to do).

[d]scored ranges from 0 (the worst health condition) to 100 (the best health condition).

[e]Mean score calculated from computerized self-administered questionnaire composed of 20 questions providing a score ranged from 0 (vigorous) to 18 (severe frail) and three categories (a 'vigorous' score ranged from 0 to 3).

ability to take advantage of available resources and experience satisfaction, which places well-being in the subjective realm (25). In our study, the mood status, respectively, reported by intervention and control groups differed at baseline. A happy mood was less prevalent in the intervention group compared to the control group, which may influence their receptiveness to arts engagement. Furthermore, we used the WEMWBS questionnaire, which is composed of 14 positively-worded items, to assess well-being (19). Thus, it may be suggested that participants with a positive mood tended to score higher compared to those with a lower mood. In addition, the WEMWBS has been developed and validated in United Kingdom in Caucasian population (19). A cultural effect in the Japanese participants of our RCT may be evoked to explain the absence of significant improvement of WEMWBS score. A cultural effect encompasses the ways in which culture shapes and molds people's behaviors, attitudes, values, customs, and social interactions. Its effect may influence one's sense of happiness (i.e., in what circumstances one feels happy). Thus, WEMWBS may be not adapted to assess well-being in the Japanese population.

We observed mixed results for physical health. The comparison of changes in frailty scores between baseline and the end of the follow-up period showed that the level of frailty decreased significantly in the intervention group when compared to the control group. However, we reported only a trend of this improvement when adjusting for baseline characteristics. It has been reported in previous clinical trials that arts-based activities practiced at the museum improved the frailty state of older community-dwellers (13, 26–28). Our results are consistent with these previous results. We showed that there was a significant decrease in CESAM scores in the intervention group compared to the control group at M3, indicating a physical health improvement. Moreover, the change in CESAM scores between M0 and M3 was greater in the intervention group compared to the control group. It has been reported that frailty may be prevented or even reversed, especially at its onset (29). Older individuals with mild frailty seem to benefit the most from interventions that can promote health and prevent frailty from worsening. The result of our RCT seems to confirm this statement. However, the non-conclusive results underscored by the linear regression and its adjustment by the baseline characteristics suggested that the association is weak. One explanation of this result may be related to the low number of participants in the RCT and, thus, a lack of power to show a significant association. At a health policy level, as exemplified by the English Alliance of Museums for Health and Well-being (30), the results of this RCT highlight that art museums may become important agents of health promotion among the older population.

The present RCT has a number of limitations that should be taken into account. First, it was carried out only at the Tokyo Fuji Art Museum. Second, the control group may have been exposed to various activities that influenced the outcomes over the 3-month period of the RCT. We suggest that this effect was limited by our control methods. Third, although we controlled for characteristics that may impact the intervention, residual confounding might still be present. For instance, analyses were adjusted for the covariates measured at baseline, but not for their change from baseline to follow-up. As confounding can impact both the magnitude and direction of associations, it is difficult

TABLE 3 Comparisons of score variations of well-being, quality of life and frailty between the baseline assessment and the end of the 3-month period of follow-up in control (n=39) and intervention (n=34) groups.

Variations[a] of scores between the baseline assessment and the end of the 3-month follow-up, mean±SD (%)	Control (n=39)	Intervention (n=34)	p-value[b]
Warwick-Edinburgh Well-being scale[c]	2.0 ± 7.9	3.7 ± 14.2	0.699
EQ-5D			
Questionnaire score[d]	1.7 ± 18.1	−13.3 ± 25.9	**0.003**
Visual analogic scale[e]	16.4 ± 45.3	27.8 ± 51.7	0.174
Frailty score[f]	−6.1 ± 60.2	−47.7 ± 68.3	**0.014**

SD, Standard deviation; EQ-5D, EuroQol 5D; p-value significant (i.e., <0.05) indicated in bold.

[a]Calculated with the formula: Difference between the baseline assessment (M0) and the end of the 3-month period of follow-up (M3): ((score after − score before)/((score after + score before)/2)) × 100.

[b]Based on Mann–Whitney test.

[c]Ranged from 14 (i.e., none of the time) to 70 (i.e., all the time).

[d]Score ranged from 0 (no problem) to 25 (unable to do).

[e]Scored ranges from 0 (the worst health condition) to 100 (the best health condition).

[f]Mean score calculated from computerized self-administered questionnaire composed of 20 questions providing a score ranged from 0 (vigorous) to 18 (severe frail).

TABLE 4 Multiple linear regressions showing the association of score variations of quality of life and frailty between the baseline assessment and the end of the 3-month follow-up (used as dependent variables, separated models for each variable) with the intervention (used as an independent variable), adjusted according to the number of workshops performed and the baseline characteristics of participants (n=73).

Variations[a] of scores between the baseline assessment and the end of the 3-month period of follow-up	Intervention		
	ß	[95%CI]	p-value
EQ-5D Questionnaire score[b]	−9.94	[−19.59;-0.29]	**0.044**
Frailty score[c]	−30.03	[−62.57;2.51]	0.070

EQ-5D, EuroQuol 5D; ß, coefficient of regression beta; CI, Confidence interval; p-value significant (i.e., <0.05) indicated in bold.

[a]Calculated with the formula: Difference between the baseline assessment (M0) and the end of the 3-month period of follow-up (M3): (score after − score before)/(score after + score before)/2) ×100.

[b]Score ranged from 0 (no problem) to 25 (unable to do).

[c]Mean score calculated from computerized self-administered questionnaire composed of 20 questions providing a score ranged from 0 (vigorous) to 18 (severely frail).

to speculate on the possible impact of residual confounders on the associations found in the present study. In addition, we did not adjust according to education level and the socio-economic condition of participants, which are two covariates which may influence the examined association. Fourth, data were collected through self-assessments, specifically self-reported questionnaires. The main disadvantage of these questionnaires is the subjectivity of responses, which may lead to biases, such as the desirability or response bias, resulting in inaccurate answers (31). Fifth, the low number of participants and the short period of intervention and follow-up of 3 months are limitations. Non-conclusive results may be explained by a lack of power or a too-short intervention period. All these limitations underscore the need to reproduce the RCT with more participants, a longer follow-up period, an analysis of the cost effectiveness of the productive art activities and a mixed design combining quantitative and qualitative data.

In conclusion, this RCT showed mixed effects of productive arts engagement in older Japanese community-dwellers residing in Tokyo. Benefits for quality of life and frailty were reported but no significant effect for well-being was demonstrated. Further research needs to be performed to determine the possible benefits of productive, museum-based arts engagement in Asian populations.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by Ethics committee of Shobi University, Tokyo (Japan). The patients/participants provided their written informed consent to participate in this study.

Author contributions

OB and YH conceived and designed the experiments. YH performed the experiments. OB and KG analyzed and interpreted the data. YH and KG contributed reagents, materials, analysis tools or data. OB, KG, and YH writing of the manuscript. JM revision of manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The role of arts engagement in reducing cognitive decline and improving quality of life in healthy older people: a systematic review

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In recent years, arts engagement has been proposed as a non-pharmacological approach to reduce cognitive decline and increase well-being and quality of life in specific populations such as the elderly or patients with severe disease. The aim of this systematic review was to assess the effects of receptive or active arts engagement on reducing cognitive decline and improving quality of life and well-being in healthy populations, with a particular focus on the role of arts engagement in the long term. A comprehensive search strategy was conducted across four databases from February to March 2023. Ten studies with a total of 7,874 participants were incorporated in accordance with the PRISMA guidelines. Active and receptive arts engagement was found to be an effective approach to reduce cognitive decline and improve well-being and quality of life in healthy populations. The role of the positive effects of arts engagement could be determined by the combination of several factors such as exposure to cultural activities and the group effect. There is limited evidence of the protective effects of active arts engagement over a long period of time. Given the increasing demand for preventive programmes to reduce the negative effects of population ageing, more research on arts engagement should be conducted to identify its mechanisms and long-term effects.

KEYWORDS

arts engagement, cognitive decline, quality of life, well-being, healthy population, elderly

1. Introduction

According to a recent report by the World Health Organisation (WHO), engaging in the arts offers a wide range of health benefits, from supporting social determinants of health to preventing mental and physical illness and helping manage and treat various health conditions such as cancer, dementia, schizophrenia, anxiety and depression (Fancourt and Finn, 2019).

Engaging in art promotes the process of creativity and autonomy that cultivates mindfulness, self-knowledge and new insights and involves a number of physiological mechanisms such as stimulating the parasympathetic nervous system or neuroplasticity and building cognitive reserves, enhancing social interaction or changing lifestyle habits such as reducing sedentary behaviour (Weiss et al., 1989; Lane, 2005; Vance et al., 2012; Bolwerk et al., 2014;

Poulos et al., 2019; Odeh et al., 2022). Artistic activities are indeed multimodal health interventions that combine several psychological, physical, social and behavioural factors and include a relevant aesthetic engagement (Fancourt, 2017). They offer people the opportunity to explore personal problems without relying on a verbal form of communication as well as helping them deal with symptoms, stress and traumatic experiences in their lives and to connect with their inner selves (Kim, 2013; Stevens et al., 2019; Moula et al., 2020).

Arts engagement is generally understood to have a broad definition involving artistic creativity expressed or experienced by people. Formally, arts engagement can be defined as active (e.g., creating or making art) or receptive (e.g., attending or viewing art) participation in creative events or activities within a variety of art forms (Davies et al., 2016; Davies and Clift, 2022). Active or receptive participation in visual arts, theatre, literature or music has been shown to contribute significantly in increasing the well-being and quality of life, reducing the risk of illness, accelerating disease recovery, increasing life expectancy, reducing grief and negative emotions, as well as improving immune system response, slowing disease progression, promoting positive social contact, enhancing cognitive status (Cohen et al., 2006; Kim, 2013; Schneider, 2018), and reducing depression and anxiety (Mann et al., 2017). With its potential to help individuals express themselves, gain coping skills, improve interpersonal skills, resolve conflicts and problems, reduce stress, manage behaviour, increase self-esteem and self-confidence (Davies et al., 2016; Davies and Clift, 2022; Mollaoglu and Yanmis, 2022; Shukla et al., 2022), arts engagement is proposed as a non-pharmacological therapeutic approach with significant effect in alleviating chronic stress and depression and in providing emotional, cognitive and social coping resources that support biological regulatory systems (Beerse et al., 2020). Moreover, it also has a positive impact on social capital by helping people in reducing loneliness (Gordon-Nesbitt, 2015; Roe et al., 2016).

A recent prospective longitudinal study conducted on a sample of 6,710 community-dwelling adults aged 50 and older found that arts may have a protective effect on longevity by affecting cognition, mental health and physical activity, and establishing a kind of dose–response relationship with longevity such that people who engaged in arts activities infrequently (once or twice a year) had a 14% lower risk of death than those who did not, and those who engaged frequently (every few months or more often) had a 31% lower risk (Fancourt and Steptoe, 2019).

To date, several studies conducted have shown a stronger association between arts engagement, improved cognitive function, increased well-being and quality of life in patients with certain medical diagnoses such as cancer or dementia (Jiang et al., 2020; Chacur et al., 2022; Letrondo et al., 2023). In addition, arts engagement has been shown to have a protective effect against cognitive decline, in reducing distress and discomfort, and in mitigating loneliness or hopelessness in the elderly (Chacur et al., 2022). However, the role of the arts in reducing cognitive decline and improving quality of life and well-being in healthy populations [i.e., optimal physical and mental functioning, absence of debilitating diseases, and delayed age-associated disease onset (Behr et al., 2023)] is much less studied (Fancourt and Steptoe, 2019; Galassi et al., 2022). To date, a few reviews, primarily scoping reviews, have been conducted on the role of creativity, art therapy, and group-based arts interventions in reducing cognitive decline and improving quality of life in older adults, showing that active engagement in arts activities such as dance, music, or song plays a role in promoting health and mitigating disease in older adults (Fraser et al., 2015; Galassi et al., 2022; McQuade and O'Sullivan, 2023). To our knowledge, there are no systematic reviews of the role of arts engagement in healthy populations that address the potential role of arts engagement in reducing cognitive decline and improving long-term quality of life and well-being. Hence, the aim of this systematic review was to assess the impact of receptive or active engagement with the arts on the reduction of cognitive decline and the improvement of the quality of life and well-being in healthy populations. Specifically, we aimed to answer the following two research questions:

1. Does arts engagement improve cognitive function?
2. Does arts engagement improve quality of life and well-being in the long term?

2. Methods

A detailed systematic review of published data was performed according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (Moher et al., 2009). The methodological approach was registered in the PROSPERO database under the protocol number CRD42023414916.

2.1. Eligibility criteria

We included studies published (i.e., peer-reviewed journal articles) that evaluated adult (age $\geq$ 18 years) healthy individuals without cancer, schizophrenia, or dementia diagnosis. No exclusions were made based on gender, ethnicity or socioeconomic status of participants.

2.2. Studies design

We included observational studies and randomised controlled trials (RCTs), quasi-RCTs and non-RCTs. Quasi-randomisation was defined as allocation that is not truly random but intend to produce balanced groups (e.g., allocation by date of birth or alternation). Qualitative studies were not included because of possible large heterogeneity due to different approaches, that could affect the understanding of the net role of arts engagement, especially in the case of receptive arts engagement.

We included studies that evaluated cognitive decline, quality of life, and/or well-being in the healthy population that was involved in art engagement activities, such as visual arts, dance, drama, poetry, reading, storytelling, collage, pottery, museum/gallery visits and painting, considering a variety of settings such as community centres, parks, workplaces, schools, universities, museums, theatres, art galleries, concert halls or online. Studies involving a contemporaneous evaluation of the effect of art engagement and other activities (e.g., gardening or physical activities) or which only determined art therapy impact on anxiety or self-esteem were excluded.

2.3. Outcome

The primary outcomes were cognitive decline parameters (results from mini-mental state examination, word-list recall, delayed word-list recall, category fluency, digit span, story recall task, problem solving); quality of life (score from Quality-of-Life questionnaire or Life Satisfaction scale) and well-being (Warwick-Edinburgh Mental Well-being Scale, Loneliness Scale or Hopelessness Scale).

2.4. Search strategy and study selection

A systematic search was carried out on PubMed, Web of Science, Cochrane Library, and Scopus from February to March 2023 without time and language restrictions. The literature search strategy was based on the following keywords: ("arts engagement" OR "art therapy" OR "arts intervention") AND (cognitive function OR "cognitive decline" OR cognition OR "cognitive impairment" OR "quality of life" OR QoL OR mortality OR well-being). The first (title/abstract screening) and second (full-text assessment) steps of the search process were performed by two independent reviewers (MGR and MLG), and any disagreement was discussed until a consensual decision was made with a third experienced reviewer (MF).

The complete list of articles obtained through the systematic search was screened to remove duplicates and exclude ineligible articles. The potentially relevant articles that answer the research questions were screened by reading titles and abstracts. Two reviewers (MGR and MLG) independently selected the eligible studies. Full texts of the remaining potentially relevant articles that met the inclusion and exclusion criteria were retrieved. The final eligibility of each study was independently assessed by each reviewer using the above eligibility criteria. Studies that did not meet the eligibility criteria, whose study design was not defined, or whose reporting was incomplete were excluded. The reasons for exclusion were recorded. All authors executed the definitive article selection. When there was disagreement, it was solved by consensus with a third experienced reviewer (MF).

2.5. Data extraction

Two reviewers (MGR and MLG) independently extracted data from included studies and recorded them in a datasheet. In this case also, any disagreement was resolved by consensus. The data collected included (1) study characteristics (name of the first author, year, study design, aims, number of participants); (2) arts engagement intervention or activity; and (3) main outcomes and analysis methods. No numerical information was extracted from the figures reported in the study publications.

2.6. Risk of bias assessment

Two authors (MGR and MLG) independently assessed the risk of bias of included studies using RoB2 in case of RCT,[1] NIH Tool for Before-After study without control group and for cross-sectional studies.[2] The RoB2 algorithm was fully applied in the assessment of the studies, evaluating the potential bias in the context of specific study. For both NIH instruments, after evaluating the risk of bias related to each negative response, the final assessment was performed independently by the two reviewers. Disagreements were resolved by consensus with a third experienced reviewer (MF).

2.7. Data synthesis

Results were presented as a narrative summary in which studies characteristics were reported in detail. A deeper analysis about the possible difference in art form and active vs. receptive participation were explored in the synthesis.

3. Results

3.1. Search results

The search strategy retrieved 1,662 articles from databases (PubMed: 154; Web of Science: 540; Scopus: 961; Cochrane Library: 7) (Figure 1). After excluding duplicates ($n = 375$) through EndNote (The EndNote Team, 2013), 1,287 articles were screened by reading the title and abstract. Forty-five articles met the inclusion criteria and were subsequently screened in full text. Of these, six were not found; one was excluded because it was a protocol; eight were excluded because they were qualitative studies; six included patients with dementia or cancer or patients who are <18 years; six studies combined art therapy with other activities such as gardening or physical activity and, finally, eight did not report quality of life, well-being or cognitive parameters as a quantitative outcome. Twelve further studies were found through a citation search; the reasons for exclusion are listed in Figure 1. Finally, 10 studies with a total of 7,874 participants (Noice et al., 2004; Noice and Noice, 2008; Thomson and Chatterjee, 2016; Fancourt and Steptoe, 2018; Cetinkaya et al., 2019; Ho et al., 2019; Beauchet et al., 2020; Tymoszuk et al., 2020; Aydin and Kutlu, 2021; Johnson et al., 2021) were included in the study. The average age of the patients was around 70 years, with the exception of one study that reported patients with an average age of over 80 years (Noice and Noice, 2008).

3.2. Characteristics of the studies

Three of the 10 studies were conducted in the USA, three in the UK, two in Turkey, one in Canada and one in Singapore. Five studies were prospective longitudinal studies, three were randomised controlled trials, one was a non-randomised clinical trial and one was a cross-sectional study. Two studies started in 2004–2005 and had an observation period of 10 years (Fancourt and Steptoe, 2018; Tymoszuk et al., 2020). The remaining studies were conducted between 2015 and 2018. Well-being and quality of life were examined in six studies,

1 https://methods.cochrane.org/bias/resources/rob-2-revised-cochrane-risk-bias-tool-randomized-trials

2 https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools

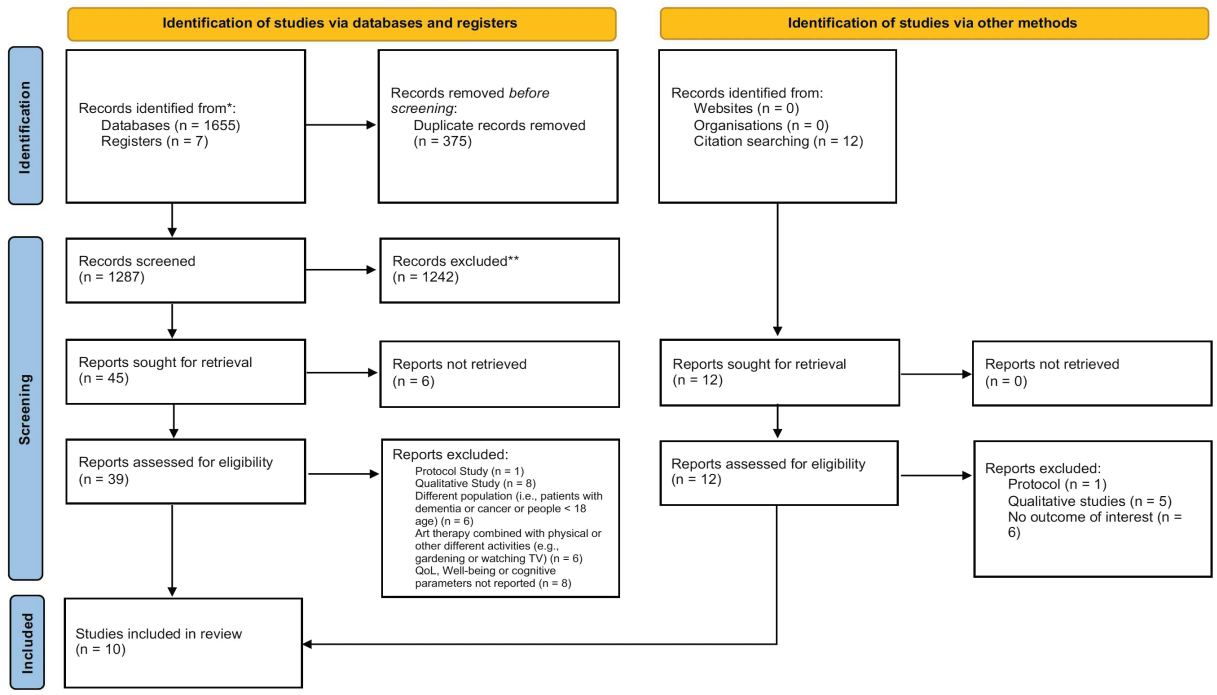

FIGURE 1
PRISMA flowchart.

cognitive parameters were examined in four studies, while quality of life was examined in four studies along with other outcomes. Well-being and quality of life were assessed using different approaches, while cognitive parameters were analysed using similar tests: word recall task, listening span task, problem solving, delayed word-list recall, category fluency, digit span or story recall task. A complete description of included studies characteristics is reported in Table 1.

3.3. Risk of bias

All three RCTs had high or moderate risk of bias in the measurement of the outcome or the selection of the reported outcome. In particular, concerns arose in all three studies regarding the investigator's awareness of the group assignment of participants and a possible influence of this awareness in the evaluation of the received intervention. Some concerns arose in the selection of the reported outcome: the presence of a pre-specified analysis plan was not reported, and it was unclear whether there were multiple people who provided ratings. The full report can be found in Table 2.

For observational studies, the absence of blinded assessors and the absence of multiple measurements before the intervention and in subsequent phases were reported for all included studies. In addition, in two studies, the sample size was not large enough. The risk of bias for before-after studies without a control group and for cross-sectional studies is reported in Tables 3, 4.

3.4. Art engagement and cognitive function

Four studies (Noice et al., 2004; Noice and Noice, 2008; Fancourt and Steptoe, 2018; Cetinkaya et al., 2019) investigated the relationship between artistic activity and cognitive functions (Table 5): Three of these studies compared, in an experimental setting, the cognitive improvement of older participants who actively participated in some form of artistic activity (e.g., ceramic painting, theatre or fine arts classes) with a control group who were treated without any form of art or other leisure activities (Noice et al., 2004; Noice and Noice, 2008; Cetinkaya et al., 2019), while the fourth study examined the effects of receptive arts engagement on cognitive functions over an observation period of 10 years (Fancourt and Steptoe, 2018).

In the randomised controlled trial conducted on a sample of 122 participants, Noice and Noice (2008) demonstrated that active theatre and voice activities conducted in two groups of 42 and 40 participants, respectively, over a four-week period significantly improved the problem-solving ability compared to the control group ($n = 40$) who were without any form of activity (theatre: 9.98 ± 2.68, voice: 7.45 ± 2.55, control: 6.78 ± 2.65, $p < 0.001$); verbal fluency (theatre: 37.02 ± 9.20, voice: 29.68 ± 7.08, control: 30.25 ± 5.88, $p < 0.001$); immediate word recall (theatre: 24.31 ± 3.95, voice: 20.48 ± 4.41; control: 19.63 ± 3.70, $p = 0.001$); and delayed word recall (theatre: 7.83 ± 2.19; voice: 6.08 ± 2.73; control: 6.13 ± 2.12, $p < 0.05$). For other cognitive parameters, such as digit span and the East Boston Memory Test, participants reported no significant improvement compared to the control group (Noice and Noice, 2008). In the context of a more rigorous study design, these results confirmed what the same authors had already demonstrated in an earlier study (not RCT) in 2004. In that study, conducted on a sample of 124 participants (mean age 73.7 ± 5.99 years) randomly divided into three groups (44 in the theatre group, 36 in the voice group and 31 in the control group), Noice et al. (2004) showed a significant improvement in word recall (theatre: 17.16 ± 3.91, visual: 15.83 ± 4.07; control: 13.10 ± 4.53, $p = 0.02$); total memory span (theatre: 24.39 ± 2.72, visual: 22.89 ± 5.10,

TABLE 1 Studies characteristics.

Author	Country	Study design	Period	Inclusion/exclusion criteria	Intervention	Intervention description	Interaction	Comparator	Duration	Outcome measurement
Aydin and Kutlu (2021)	Turkey	RCT	May–October 2018	Individuals over 65 years old, Minimal Mental State Examination scale ≥19, Beck Depression Scale <30, UCLA-LS ≥ 32, BHS ≥ 4, no perception of disorder that could prevent communication, no neurological or physical condition that could affect hands, no mental disorder diagnosis	Weekly clay-based art therapy sessions of 60–90 min	Clay-based art therapy	Active	Two 30-min face-to-face interviews about health, social life, and financial issue topics	6 weeks	UCLA Loneliness Scale (UCLA-LS), Beck Hopelessness Scale (BHS)
Beauchet et al. (2020)	Canada	Prospective cohort study	January–June 2018	Community-dwelling older adults over 65 years old, having Internet access where they lived, understanding and writing French or English, life expectancy estimated over 3 months, no planned relocation outside of the recruitment living area in the follow-up period of the study and concomitant participation in another experimental study	Weekly art-based activity known as "Thursday at the Museum" – 1.5 h once a week	Art-based activity in a group during which the participants were engaged directly in the creative process. Type of art activities: abstract painting, book binding, rolled paper, drawing live-model, mini-fanzine, stained glass painting	Active	NA	12 weeks	EuroQoL-5D (EQ-5D) - Warwick-Edinburgh Mental Well-being Scale (WEMWBS)
Cetinkaya et al. (2019)	Turkey	RCT	May–October 2015	Residing in the nursing home during the study period, lack of dementia, visual problem or agitation diagnosed by a physician, not being bed bound, and accepting to participate in the study voluntarily	Ceramic painting sessions (30–35 min) twice a week	Painting a ceramic object at each session	Active	No activity	8 weeks	Mini-Mental State Examination (MMSE) – Life Satisfaction Scale (LSS)
Fancourt and Steptoe (2018)	UK	Prospective longitudinal study	2004-2005	Adults aged 50 o over living in England	Culture engagement	Culture engagement: going to (1) an art gallery, museum, or exhibition; (2) theatre, a concert, or the opera; (3) the cinema	Passive	NA	10 years	Test of semantic fluency (which is often regarded as a measure of executive function since it involves self-initiated activity, organisation and abstraction, response inhibition and set shifting and calls upon memory and language processes) and an immediate and delayed recall task as a measure of memory

(Continued)

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TABLE 1 (Continued)

Author	Country	Study design	Period	Inclusion/exclusion criteria	Intervention	Intervention description	Interaction	Comparator	Duration	Outcome measurement
Ho et al. (2019)	Singapore	Cross-sectional study	2016–2017	Community dwelling Singapore residents, who were able to communicate in either English, MALAY, Mandarin, Tamil, Hokkien or Cantonese. The exclusion criteria were individuals who were visibly too ill or frail to participate or were unable to provide informed consent due to cognitive impairment as assessed by a screening question during recruitment and continuous observation throughout a face-to-face survey interview.	Active art engagement (cultural activities, e.g., creating) and Passive engagement (attending, viewing or listening cultural material)	Music, dance, theatre, literary arts, visual arts, heritage activities, film and handicraft	Both	NA	NA	WHO Quality of Life Instrument (WHOQoL-8); Short Form 20 (SF-20); Functional Assessment of Chronic Illness Therapy-Spiritual (FACIT-SP-12); Support Evaluation List Short Form (ISEL-S)
Johnson et al. (2021)	USA	Mixed method approach	June–July 2018	Age 55 and over, living in one of the four affordable housing sites, having sufficient visual and hearing acuity (with assistive devices), and being fluent in English (self-report of fairly well to very well). Exclusion criteria included having a self-reported diagnosis of dementia, a serious medical condition that would interfere with participation in the study, or plans to move out of the area within 6 months.	90 min one a week	Visual art: ceramics intervention; Literature art: creative writing intervention	Active	No activity	12 weeks	Interest in life (National Institutes of Health Toolbox Apathy Scale), Personal growth and Perceived mastery (Psychosocial and Lifestyle Questionnaire), Loneliness (NIH Toolbox Loneliness Scale), General belongingness (General Belongingness Scale), Perceived neighbourhood cohesion (Self-perception of neighbourhood social cohesion)
Noice et al. (2004)	USA	No-RCT	NR	The participants were all in reasonably good health as defined by our criteria (having good vision and hearing, being able to move about the room freely, being able to drive themselves to the training site, and having no health problems that, barring an unforeseen emergency, could prevent their attendance at every session for the entire course).	Nine 90-min sessions	The theater course (acting); Visual arts course: speculating on the intention of the artist	Active	No art activity	4 weeks	Word recall task, Listening span task, Problem solving, Self-esteem scale, Psychological Well-Being Scale

(Continued)

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TABLE 1 (Continued)

Author	Country	Study design	Period	Inclusion/exclusion criteria	Intervention	Intervention description	Interaction	Comparator	Duration	Outcome measurement
Noice and Noice (2008)	USA	RCT	NR	Being over 65 years of age, possessing sufficiently good vision (with or without glasses) to read instructional materials that were printed in very large bold type (20 pt.), and being able to move about the training area (although approximately half of the participants used canes, walkers, wheelchairs, or motorised chairs)	Twice-weekly, 1-h classes	Multi-modal approach: mental-physical-emotional exercises similar to those given to beginning acting students in college and university theatre programmes. Homework consisted of watching or listening to professional performers (actors or singers) on TV or recordings.	Active	No activity	4 weeks	Word list recall, Delayed word list recall, East Boston Memory Test, Category Fluency, Digit Span, Story recall task, Problem Solving
Thomson and Chatterjee (2016)	UK	Cohort study	NR	Older adults without diagnosis of dementia	One session of 30–40 min (one-to-one or small groups)	Museum objects comprising archaeological artefacts (amulets, flint tools, pottery), artwork (engraving plates, prints), geology samples (fossils, rocks, minerals), and zoology specimens (horns, shells, teeth) were selected from university collections on the basis of visual, tactile, and kinaesthetic properties. Facilitator-led, 30 to 40 min sessions handling and discussing museum objects	Passive	NA	Only one session	Positive Affect and Negative Affect Schedule (PANAS) and Subjective wellness ad happiness (Visual Analogue Scale)
Tymoszuk et al. (2020)	UK	Prospective longitudinal study	2004-2005 and 2014-2015	English population of people aged greater than or equal to 50 years established in 2002	Culture engagement	Art engagement measured through the number of frequency of visits to (1) cinema, (2) art galleries, exhibition or museums, (3) theatre, concerts, or the opera	Passive	NA	10 years	Pleasure domain of the Control, Autonomy, Self-realisation, Pleasure scale (CASP-19); Dieners's life satisfaction scale; Self-realisation domain of the CASP-19 and Control/ Autonomy domain of a shortened version of the CASP-19

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TABLE 2 Risk of bias assigned by ROB2 for randomised controlled trials.

Authors	Experimental	Comparator	Outcome	D1	D2	D3	D4	D5	Overall
Aydin and Kutlu (2021)	Clay-based art therapy	Two 30-min face-to-face interviews about health, social life, and financial issue topics	Loneliness, hopelessness	!	!	+	-	-	-
Cetinkaya et al. (2019)	Painting a ceramic object at each session	No activity	Cognitive parameters and life satisfaction	+	!	+	-	+	-
Noice and Noice (2008)	Multi-modal approach in theatre programmes.	No activity	Cognitive parameters	!	!	+	-	-	-

D1, Randomisation process; D2, Deviations from the intended interventions; D3, Missing outcome data; D4, Measurement of the outcome; D5, Selection of the reported results. +, Low risk; !, Some concerns; -, High Risk.

TABLE 3 Risk of bias assigned by NIH tool for before-after study without control group.

Authors	1	2	3	4	5	6	7	8	9	10	11	12
Beauchet et al. (2020)	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	NO	NA
Thomson and Chatterjee (2016)	YES	YES	YES	YES	NO	YES	YES	NO	YES	YES	NO	NA
Tymoszuk et al. (2020)	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	NO	NA
Fancourt and Steptoe (2018)	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	NO	NA
Johnson et al. (2021)	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	NO	NA
Noice et al. (2004)	YES	YES	YES	YES	NO	YES	YES	NO	YES	YES	NO	NA

1. Was the study question or objective clearly stated? 2. Were eligibility/selection criteria for the study population prespecified and clearly described? 3. Were the participants in the study representative of those who would be eligible for the intervention in the general or clinical population of interest? 4. Were all eligible participants that met the prespecified entry criteria enrolled? 5. Was the sample size sufficiently large to provide confidence in the findings? 6. Was the intervention clearly described and delivered consistently across the study population? 7. Were the outcome measures prespecified, clearly defined, valid, reliable, and assessed consistently across all study participants? 8. Were the people assessing the outcomes blinded to the participants' interventions? 9. Was the loss to follow-up after baseline 20 or less? Were those lost to follow-up accounted for in the analysis? 10. Did the statistical methods examine changes in outcome measures from before to after the intervention? Were statistical tests done that provided p values for the pre-to-post changes? 11. Were outcome measures of interest taken multiple times before the intervention and multiple times after the intervention (i.e., did they use an interrupted time-series design)? 12. If the intervention was conducted at a group level (e.g., a whole hospital, a community, etc.) did the statistical analysis take into account the use of individual-level data to determine effects at the group level?

TABLE 4 Risk of bias assigned by NIH tool for cross-sectional studies.

Authors	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Ho et al. (2019)	YES	YES	CD	YES	YES	CD	YES	YES	YES	NO	YES	CD	YES	YES

1. Was the research question or objective in this paper clearly stated? 2. Was the study population clearly specified and defined? 3. Was the participation rate of eligible persons at least 50? 4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants? 5. Was a sample size justification, power description, or variance and effect estimates provided? 6. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured? 7. Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed? 8. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)? 9. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants? 10. Was the exposure(s) assessed more than once over time? 11. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants? 12. Were the outcome assessors blinded to the exposure status of participants? 13. Was loss to follow-up after baseline 20% or less? 14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?

control: 21.58 ± 4.92, $p > 0.05$); problem solving (theatre: 8.89 ± 3.75, visual: 4.56 ± 2.16, control: 6.13 ± 3.33, $p < 0.001$); and phycological well-being (theatre: 5.50 ± 0.52; visual: 4.90 ± 0.57; control: 4.97 ± 0.59, $p = 0.001$) (Noice et al., 2004). A significant improvement in cognitive parameters was also observed in a recent RCT by Cetinkaya et al. (2019) in a sample of 30 patients (15 in the intervention group and 15 in the control group) living in a nursing home. After an eight-week, twice-weekly ceramic painting session of approximately 30–35 min led by an art specialist, the participants in the intervention group showed significant improvement in Mini-Mental State Examination scores

TABLE 5 Results of studies analysing the impact of arts engagement on cognitive decline.

Author	Sample	Intervention sample	Comparator sample	Male/female ratio	Age	Endpoints	Outcome	Outcome measurement	Results
Cetinkaya et al. (2019)	30	15	15	21/11	74.5 ± 9	Before, after 8 weeks	Cognitive parameters and life satisfaction	Mini-Mental State Examination (MMSE)	MMSE: IG: 24.2 ± 3.6; CG: 21.4 ± 4.3 ($p < 0.001$)
Fancourt and Steptoe (2018)	3445	NA	NA	1543/1902	62.9 ± 7.5	At enrolment (2004/2005); After 10 years (2014/2015)	Cognitive decline	Test of semantic fluency (which is often regarded as a measure of executive function since it involves self-initiated activity, organisation and abstraction, response inhibition and set shifting and calls upon memory and language processes) and an immediate and delayed recall task as a measure of memory	Going to galleries and museums A smaller decline in cognitive function compared with non-participation. For memory: a dose–response relationship indicating that more frequent attendance had a greater effect on cognition. For semantic fluency, attending once a year or more appeared to be protective Going to the theatre, concert or opera. A smaller decline in cognitive function. In relation to both memory and semantic fluency, attending once a year or more appeared to be protective with evidence of a dose–response relationship in particular for semantic fluency indicating that more frequent attendance had a greater effect on cognition. Going to the cinema. Significantly associated with cognition when taking baseline cognitive function and demographic factors into account, results became inconsistent in the fully adjusted models. For memory, attending every few months appeared to be protective, but there was no evidence that attending either more or less frequently than this had any benefits. For semantic fluency, only attending on an infrequent basis appeared to have any protective effect and these results were attenuated when correcting for multiple comparisons.
Noice et al. (2004)	124	Theatre: 44; Visual: 36	31	27/97	73.7 ± 5.99	At baseline; after 4 weeks	Cognitive parameters and well-being	Word recall task, Listening span task, Problem solving, Self-esteem scale, Psychological Well-Being Scale	Word recall Theatre: 17.16 ± 3.91, Visual: 15.83 ± 4.07; Control: 13.10 ± 4.53, $p = 0.02$; Total memory span: Theatre: 24.39 ± 2.72, Visual: 22.89 ± 5.10, Control: 21.58 ± 4.92, $p > 0.05$; Problem solving: Theatre: 8.89 ± 3.75, Visual: 4.56 ± 2.16, Control: 6.13 ± 3.33, $p < 0.001$; Self-esteem: Theatre: 3.64 ± 0.37; Visual: 3.37 ± 0.40, Control: 3.49 ± 0.36, $p > 0.05$; Psychological Well-being Theatre: 5.50 ± 0.52; Visual: 4.90 ± 0.57; Control: 4.97 ± 0.59, $p = 0.001$
Noice and Noice (2008)	122	Theatre: 42; Voice: 40	40	Theatre: 8/34; Voice: 7/33; Control: 4/36	Theatre: 80.24 ± 6.47; Voice: 82.65 ± 4.67; Control: 81.60 ± 5.96	Baseline; after 4 weeks	Cognitive parameters	Word list recall, Delayed word list recall, East Boston Memory Test, Category Fluency, Digit Span, Story recall task, Problem Solving	Digit span forward Theatre: 7.76 ± 1.89, Voice: 7.25 ± 2.04, Control: 7.23 ± 1.94; Digit span backward Theatre: 5.62 ± 1.87, Voice: 5.43 ± 1.63, Control: 5.53 ± 1.83; EBM (immediate) Theatre: 9.71 ± 1.95, Voice: 9.05 ± 1.92, Control: 8.80 ± 2.17; EBM (delayed) Theatre: 9.86 ± 1.75, Voice: 9.05 ± 1.92, Control: 8.33 ± 2.35; Problem Solving Theatre: 9.98 ± 2.68, Voice: 7.45 ± 2.55, Control: 6.78 ± 2.65, $p < 0.001$; Verbal Fluency Theatre: 37.02 ± 9.20, Voice: 29.68 ± 7.08, Control: 30.25 ± 5.88, $p < 0.001$; Word recall (immediate) Theatre: 24.31 ± 3.95, Voice: 20.48 ± 4.41; Control: 19.63 ± 3.70, $p = 0.001$; Word recall (delayed) Theatre: 7.83 ± 2.19; Voice: 6.08 ± 2.73; Control: 6.13 ± 2.12, $p < 0.05$.

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(24.2 ± 3.6) compared to the control group (21.4 ± 4.3) ($p < 0.001$) (Cetinkaya et al., 2019).

In the prospective 10-year study by Fancourt and Steptoe (2018), involving 3,445 participants with a mean age of 62.9 ± 7.5 years, the authors demonstrated that attendance at galleries and museums or the theatre—i.e., receptive activities—was associated with a smaller decline in cognitive function than non-attendance. More frequent attendance at such artistic activities improved memory and had a protective effect on semantic fluency, in contrast to going to the cinema, which showed a weak relationship and consequently a slight protective effect in the relationship with memory improvement and semantic fluency (Fancourt and Steptoe, 2018).

3.5. Art engagement and well-being

Seven studies, with different study design investigated the role of engagement with art in improving well-being (Table 6). In the RCT, conducted on a sample of 60 participants (intervention group: $n = 30$, control group: $n = 30$, mean age 72.6 ± 1.0), Aydin and Kutlu (2021) compared the effect of 6 weeks of weekly art therapy with clay (60–90 min) on loneliness and hopelessness with the effect of two 30-min sessions of face-to-face discussions on issues of health, social life and finances. At the end of 6 weeks, participants in the intervention group reported statistically significantly better scores on the UCLA Loneliness Scale (41.03 ± 10.33) and the Beck Hopelessness Scale (5.10 ± 2.32) than those who had participated in the face-to-face talk (UCLA-LS: 50.87 ± 10.94, BHS: 10.03 ± 2.50), although there was also significant improvement in the control group in the pre-post comparison. Similar results were also reported by Noice et al. (2004), who showed how physiological well-being significantly improved in participants who took part in dramatic and visual activities (drama: 5.50 ± 0.52, visual: 4.90 ± 0.57, control: 4.97 ± 0.59, $p = 0.001$) (Aydin and Kutlu, 2021).

In a recent mixed-methods study conducted on a sample of 69 patients (ceramic arts intervention: $n = 17$, creative writing intervention: $n = 12$, control group without any form of activity: $n = 31$), Johnson et al. (2021) reported significant improvement in many parameters of well-being in participants who took part in ceramic activities. They showed that participants who took part in such activities showed greater improvement in perceived mastery (adjusted difference 0.5, 95% CI: 0.2 to 0.7, $p = 0.003$) and interest in life (adjusted difference: 0.3 95% CI: 0.1 to 0.6, $p = 0.007$), while no statistically significant improvement emerged for loneliness (adjusted difference: 0.0, 95% CI: −0.2 to 0.2, $p = 0.99$); personal growth (0.0, 95% CI, −0.2 to 0.2, $p = 0.72$); and neighbourhood cohesion (0.0, 95% CI, −0.5 to 0.4, $p = 0.8$), while the same significant trend was not observed for participants in the 12-week creative writing intervention (Johnson et al., 2021).

Beauchet et al. (2020), who engaged a sample of 130 community-dwelling older adults aged 65 and over in a 12-week weekly arts-based activity called "Thursday at the Museum," showed significant improvement on the Warwirck-Edinburgh Mental Well-Being Scale after just 2 months (M0: 57.2 ± 7.4, M1: 57.3 ± 7.5, M2: 55.8 ± 9.1, M3: 57.5 ± 7.9; M0 vs. M2: $p = 0.040$, M2 vs. M3: $p = 0.004$) (Beauchet et al., 2020). Similar results were also found in the study by Thomson and Chatterjee (2016), in which subjective well-being and satisfaction, as measured by the visual analogue scale, were statistically significantly improved (wellness VAS: pre: 60.88 ± 23.49, post: 66.27 ± 22.07, $p < 0.005$; happiness VAS: pre: 60.32 ± 24.69, post: 68.85 ± 21.86, $p < 0.001$) after only one session in which participants handled and discussed museum objects such as archaeological artefacts (amulets, flint tools, ceramics); artworks (engraving plates, prints); geological specimens (fossils, rocks, minerals) and zoological specimens (horns, shells, teeth).

Ho et al. (2019), who conducted a cross-sectional study on a large sample of 1,067 residents of a community in Singapore, showed that both active (e.g., creative activity) and receptive (e.g., viewing or listening) engagement with art played a positive role in physical and mental as well as social and spiritual well-being. In fact, receptive participation in arts and cultural events significantly increased perceived health ($p = 0.0277$) and sense of belonging ($p = 0.03$) compared to those who did not actively engage in the arts, while active participation in participatory arts events improved self-rated health ($p = 0.0099$), spiritual well-being ($p = 0.0002$), meaning in life ($p < 0.0001$) and sense of peace ($p = 0.0002$) (Ho et al., 2019).

The prospective 10-year longitudinal study by Tymoszuk et al. (2020), conducted in the UK on a sample of 2,767 English people aged ≥50 years, showed that well-being, as measured by various subscales from the CASP-19, did not improve in the case of short-term engagement, but that repeated engagement in theatres/concerts/operas and museums/galleries/exhibitions was significantly associated with improved eudaemonic well-being, and that sustained engagement in these activities was associated with greater experienced evaluative and eudaemonic well-being (Tymoszuk et al., 2020).

3.6. Art engagement and quality of life

Five studies specifically examined a possible role of engagement with art in improving quality of life (Table 6). Specifically, Beauchet et al. (2020) reported a significant increase in quality of life after only 1 month of participation in the "Thursday at the Museum" project (EQ -5D: M0: 6.8 ± 2.0; M1: 6.4 ± 1.5; M2: 5.0 ± 1.1; M3: 4.8 ± 0.9; M0 vs. M1: $p = 0.004$; M0 vs. M2: $p \leq 0.001$; M0 vs. M3: $p \leq 0.001$; M1 vs. M2: $p \leq 0.001$; M1 vs. M3: $p \leq 0.001$; M2 vs. M3: $p \leq 0.001$). A similar trend was also seen in the study by Cetinkaya et al. (2019) after 8 weeks of ceramic painting activity (based on the Life Satisfaction Scale, IG: 10.6 ± 3.0; CG: 9.1 ± 3.8; $p = 0.115$); and in the study by Ho et al. (2019), who showed higher quality of life in participants who engaged in both receptive ($p = 0.0008$) and active ($p = 0.0003$) art.

4. Discussion

According to the World Health Organisation, by 2050, the global population of older people will have more than doubled to 2.1 billion (World Health Organization, 2020). In a society where age is no longer a parameter in judging a person's abilities, and people over 65 are considered active and able to live a life of activities and satisfactions like adults in their 40s or 50s, programmes and support that slow down the mental and physical ageing of the healthy population are seen as the new frontiers in medicine, as they can act as preventive and protective approaches that are capable of reducing the negative effects of advancing age and, thus, minimising the pressures that the rapid

TABLE 6 Results of studies analysing the impact of arts engagement on well-being and quality of life.

Author	Sample	Intervention sample	Comparator sample	Male/female ratio	Age	Endpoints	Outcome	Outcome measurement	Results
Aydin and Kutlu (2021)	60	30	30	13/47	72.6 ± 1.0	Baseline; After 6 weeks	Loneliness, Hopelessness	UCLA Loneliness Scale (UCLA-LS), Beck Hopelessness Scale (BHS)	UCLA-LS: statistically significant difference between IG and CG group after art therapy (IG: 41.03 ± 10.33, CG: 50.87 ± 10.94, $p < 0.001$) BHS: statistically significant difference between IG and CG group after art therapy (IG: 5.10 ± 2.32; CG: 10.03 ± 2.50, $p < 0.001$). Improvement in both group in pre-post comparison
Beauchet et al. (2020)	130	NA	NA	11/119	71.6 ± 4.9	Baseline (M0), after one months (M1), after second month (M2), and the third month (M3)	QoL and well-being	EuroQoL-5D (EQ-5D) - Warwick-Edinburgh Mental Well-being Scale (WEMWBS)	WEMWBS M0: 57.2 ± 7.4; M1: 57.3 ± 7.5; M2: 55.8 ± 9.1; M3: 57.5 ± 7.9 (M0 vs. M2: $p = 0.040$; M2 vs. M3: $p = 0.004$) EQ-5D: M0: 6.8 ± 2.0; M1: 6.4 ± 1.5; M2: 5.0 ± 1.1; M3: 4.8 ± 0.9 (M0 vs. M1: $p = 0.004$; M0 vs. M2: $p \leq 0.001$; M0 vs. M3: $p \leq 0.001$; M1 vs. M2: $p \leq 0.001$; M1 vs. M3: $p \leq 0.001$; M2 vs. M3: $p \leq 0.001$)
Ho et al. (2019)	1067	1067	NA	479/588*missing values	50–59: 421 (39.5%); 60–69: 372 (34.9%); ≥70:: 274 (25.7%)	Cross-sectional	Quality of life; Physical and mental well-being; Spiritual well-being; Social well-being	WHO Quality of Life Instrument (WHOQoL-8); Short Form 20 (SF-20); Functional Assessment of Chronic Illness Therapy-Spiritual (FACIT-SP-12); Support Evaluation List Short Form (ISEL-S)	Passive engagement in arts and culture-related events experienced higher quality of life ($t(728) = 3.35$, $p = 0.0008$, $d = 0.25$), perceived health ($t(728) = 2.21$, $p = 0.0277$, $d = 0.16$) and sense of belonging ($t(728) = 2.17$, $p = 0.03$, $d = 0.16$), as compared with those who did not. Active engagement in participatory arts experienced greater quality of life ($t(442) = 3.68$, $p = 0.0003$, $d = 0.36$), self-rated health ($t(442) = 2.59$, $p = 0.0099$, $d = 0.25$), spiritual well-being ($t(442) = 3.75$, $p = 0.0002$, $d = 0.37$), meaning in life ($t(442) = 5.03$, $p < 0.0001$, $d = 0.50$) and sense of peace ($t(442) = 3.72$, $p = 0.0002$, $d = 0.36$), as compared with those who did not actively engaged in the arts.
Johnson et al. (2021)	69	Ceramics intervention: 17; Creative writing intervention: 12	31	Ceramics: 17/17; Creative writing intervention: 4/8; Control group: 4/27	Ceramics: 69.3 ± 7.9; Creative writing intervention: 66.1 ± 9.7; Control group: 73 ± 7.8	Baseline; After 8 weeks	Interest in life; Loneliness; Personal Growth; Mastery; General Belongingness; Neighbourhood Cohesion	Interest in life (National Institutes of Health Toolbox Apathy Scale), Personal growth and Perceived mastery (Psychosocial and Lifestyle Questionnaire), Loneliness (NIH Toolbox Loneliness Scale), General belongingness (General Belongingness Scale), Perceived neighbourhood cohesion (Self-perception of neighbourhood social cohesion)	Ceramics: statistically significant improvements in perceived mastery (adjusted difference 0.5, 95% CI: 0.2–0.7, $p = 0.003$) and interest in life (adjusted difference: 0.3 95% CI: 0.1–0.6, $p = 0.007$). No statistically significant improvement in general belongingness (adjusted difference: 0.2, 95% CI: 0.1 to −0.0, $p = 0.11$); loneliness (adjusted difference: 0.0, 95% CI: −0.2–0.2, $p = 0.99$); personal growth (0.0, 95% CI: −0.2–0.2, $p = 0.72$); neighbourhood cohesion (0.0, 95% CI: −0.5–0.4, $p = 0.8$). Writing: no statistically significant improvements on the well-being outcomes

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TABLE 6 (Continued)

Author	Sample	Intervention sample	Comparator sample	Male/female ratio	Age	Endpoints	Outcome	Outcome measurement	Results
Noice et al. (2004)	124	Theatre: 44; Visual: 36	31	27/97	73.7 ± 5.99	At baseline; After 4 weeks	Well-being	Self-esteem scale, Psychological Well-Being Scale	Self-esteem: Theatre: 3.64 ± 0.37; Visual: 3.37 ± 0.40, Control: 3.49 ± 0.36, $p > 0.05$ Psychological Well-being: Theatre: 5.50 ± 0.52; Visual: 4.90 ± 0.57; Control: 4.97 ± 0.59, $p = 0.001$
Thomson and Chatterjee (2016)	40	40	NA	11/29	65-85 years	Baseline; After the session	Physiological well-being	Positive Affect and Negative Affect Schedule (PANAS) and Subjective wellness ad happiness (Visual Analogue Scale)	Positive PANAS: Pre: 27.96 ± 9.84; Post: 31.51 ± 10.95, $p < 0.001$; Negative PANAS: Pre: 15.93 ± 5.89, Post: 13.37 ± 4.01, $p < 0.001$; Wellness VAS: Pre: 60.88 ± 23.49, Post: 66.27 ± 22.07, $p < 0.005$; Happiness VAS: Pre: 60.32 ± 24.69, Post: 68.85 ± 21.86, $p < 0.001$
Tymoszuk et al. (2020)	2767	2767	NA	1274/1493	62.3 ± 7.1	At enrolment (2004/2005); After 10 years (2014/2015)	Experienced well-being; Evaluative well-being; Eudaimonic well-being	Pleasure domain of the Control, Autonomy, Self-realisation, Pleasure scale (CASP-19); Dieners's life satisfaction scale; Self-realisation domain of the CASP-19 and Control/ Autonomy domain of a shortened version of the CASP-19	In the fully adjusted models, short-term engagement was not longitudinally associated with well-being, but repeated engagement with the theatre/concerts/opera and museums/ galleries/exhibitions was associated with enhanced eudaimonic well-being, and sustained engagement with these activities was associated with greater experienced, evaluative, and eudaimonic well-being.

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growth of the older population places on social security and health care systems (Nachu et al., 2023).

Arts engagement and related therapies consist an approach that supports individuals to express themselves, acquire coping skills, increase resilience, improve interpersonal skills, resolve conflicts and problems, reduce stress, manage behaviours and increase self-esteem and confidence (Shukla et al., 2022). This systematic review was designed to examine the effects of engagement with the arts on cognitive parameters, quality of life and well-being in healthy populations. With the exception of two papers, studies mainly published in the last 6 years were considered.

Our results demonstrate that cognitive decline in healthy people can be significantly slowed by a range of active and receptive artistic activities such as painting, visiting museums and galleries or going to the theatre or opera. Unlike activities such as going to the cinema or TV, receptive and active artistic activities are stimulating experiences that reduce cognitive decline while increasing well-being and quality of life. The mechanism of action for these positive outcomes of engagement with art can be attributed to three main reasons: (1) Engagement with art enables participants to experience complex and stimulating activities that improve neural structure and brain function, thus providing a protective effect against cognitive decline and neurological degeneration. (2) It reduces stress by lowering systolic blood pressure reactivity and increasing cortisol levels. (3) It provides a continuous source of stimulation for the brain in everyday life, thereby reducing the deterioration of cognitive function and improving a range of cognitive changes that counteract cognitive decline (Fancourt and Steptoe, 2018). When engagement with art is practised through active participation, the positive effects can be achieved in a short period of time (eight or 12 weeks), whereas when engagement with art is practised passively, the response process to such activities can take longer.

The same processes that reduce or at least slow down cognitive decline are also the basis for the positive effects of engagement with art on well-being and quality of life. As shown in some neuropsychological studies, pleasurable activities can trigger positive affect and increase arousal, which has a positive effect on dopamine levels in the brain (Ashby et al., 1999; Allerhand et al., 2014). The process of artistic activity on the well-being, quality of life, and cognitive decline is complex and still unclear. Participation in cultural activities, even in a receptive form, provides a mechanism to display and resolve emotions through a multisensory experience that stimulates creative processes, which, in a positive cycle, stimulates memory, releases emotions and increases activity levels (Beauchet et al., 2020). Art therapy delivered in art museums, for example, has been shown to promote social connectedness and physiological well-being, stimulating a wide range of emotions (Bennington et al., 2016). We hypothesise that this positive effect can be explained not only by exposing the brain to aesthetic stimuli, but also by participating in a group where such activities are commonly done. Sharing experiences and feelings has been considered as a kind of integral part of the process of engagement and is associated with the positive elements of evaluative, experiential and eudaemonic well-being (Bone et al., 2022).

The importance of group activity for arts engagement should be explored in depth. In the included studies, we found that active engagement in a single session, as demonstrated in the study by Thomson and Chatterjee (2016), can produce a significant and immediate increase in psychological well-being, whereas such an immediate response was not observed in receptive engagement (Tymoszuk et al., 2020), where only sustained engagement in specific arts activities (i.e., theatre, concert, opera, museums, galleries or exhibitions) was associated with a significant increase in experiential, evaluative and eudaemonic well-being.

Some questions were asked about the definition of *well-being* and *quality of life*. Although the two concepts are related and overlap accordingly, they could lead to different outcomes, especially when assessing the impact of receptive arts engagement for older adults, as well-being and quality of life in this specific population could be affected by health problems or negative experiences throughout life and may not have similar meaning to each individual (Pinto et al., 2017). Psychological well-being is a complex concept that includes hedonic and eudaemonic elements; it includes experienced well-being (which encompasses affective aspects such as positive and negative affect, i.e., feelings of happiness or depressed moods) and evaluative well-being (which concerns perceptions of quality of life, i.e., life satisfaction) (Tymoszuk et al., 2020).

From the evidence presented in this paper, it appears that the relationship between arts engagement and the outcomes considered here is well established. Nevertheless, some limitations have emerged. First, although our plan was to examine the role of the arts on some specific outcomes, the included studies focus only on the older population, as there is paucity of studies conducted on younger population that met our eligibility criteria. This means that the role of arts engagement in young and adult populations should be still established.

Secondly, the experimental studies did not take into account possible lifelong arts engagement of the participants: This means that the relationship between lifelong arts engagement and the prevention of cognitive decline and the improvement of well-being and quality of life is not established. Similarly, the role of interest in the arts aroused by the various activities proposed was not investigated, and no conclusions could be drawn about the long-term impact of the experimental activity.

Thirdly, the mediating role of group activities was not investigated in the included studies. This means that the positive effect of cultural engagement is not only a relevant factor related to the specific activity but could also be the result of social interaction, which, although not codified in this sense, could be a relevant component of the concept of cultural engagement: Interactions between individuals that lead to the sharing of information, experiences, views and common life problems could reduce the burden of negative feelings and increase the incentive to maintain a certain level of active lifestyle. Additionally, arts engagement may vary by race/ethnicity and socioeconomic factors, as well as by education level, parental education, income, social class and residence in a more urban area. With the exception of the longitudinal studies, the other included studies did not take such factors into account when evaluating responses. For example, education can increase engagement, raise awareness of activities and increase cognitive skills for engagement and influence engagement in the arts throughout the life course (Bone et al., 2021). This means that responses to arts engagement activities can vary widely across different socio-economic contexts.

Finally, qualitative studies were not included, as reported above in the method section. In future research, a sequential qualitative evidence synthesis that integrates our findings with evidence from interviews, focus groups, or case studies could help to deepen the role

of arts engagement by examining how participants experience the arts and what the reasons are that bring people to the arts and increase their engagement.

5. Conclusion

In conclusion, the current evidence shows that in healthy older people, active and receptive arts engagement plays a fundamental role in slowing cognitive decline and ensuring high levels of well-being and quality of life. However, the role of such engagement in the adult population is unclear and the potential involvement of the young and adult population in more arts activities has not been explored in depth. The arts have been shown to be an important factor in social, community and personal enrichment, but their role in developing safeguards to reduce the burden of an ageing population has not been explored. Research in this area is essential to understand not only the positive impact of the arts on quality of life, well-being and cognitive decline but also on the mechanisms underlying these positive responses in order to develop programmes that can guide individuals through life and provide both a preventive strategy and non-pharmacological treatment approach for many diseases.

Author contributions

MF conceived the study and carried it out together with MGR and MLG. MLG developed the search strategy and carried it out. MGR checked the references and the accuracy of the reported data. All authors contributed equally to the preparation of the manuscript.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The healing power of music: a promising new avenue for cardiovascular health

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Introduction

Cardiovascular diseases are commonly treated using non-pharmacological interventions, which are often the preferred first-line approach. Unfortunately, there appears to be a lack of utilization and understanding regarding the most effective non-pharmacological options available. The reasons for this knowledge gap are not entirely clear; however, the pharmaceutical industry's influence could be a contributing factor. Additionally, many non-pharmacological interventions for cardiovascular health may not be well-received by patients due to the burden they impose. For example, interventions such as smoking cessation, dietary changes, and exercise can be labor-intensive and unpleasant. A promising new non-pharmacological intervention for cardiovascular disease is the use of music.

Music has long been a source of comfort, inspiration, and entertainment for people around the world. But recent research suggests that it may have even more profound benefits, particularly when it comes to cardiovascular health. Music has been shown to impact the cardiovascular system through various mechanisms. One proposed mechanism is the effect of music on the autonomic nervous system (ANS). Studies have shown that music can modulate ANS activity, resulting in decreased heart rate and blood pressure (1). This effect may be mediated by the release of endogenous opioids, which have been shown to be involved in the modulation of ANS activity (2). Classical music with a slow beat has been shown to reduce heart rate and blood pressure, while classical music with a fast beat has been found to increase heart rate and blood pressure (3). These effects can be attributed to the ability of music to affect the release of hormones such as adrenaline and cortisol, which are associated with the sympathetic nervous system response, or oxytocin, which is associated with the parasympathetic nervous system response (4). In addition to its effects on the ANS, music has also been shown to impact the endothelial function of blood vessels. The endothelium is a layer of cells that lines the inside of blood vessels and is involved in the regulation of blood flow and vascular tone. Dysfunction of the endothelium is a hallmark of cardiovascular disease and is associated with increased risk of cardiovascular events. Studies have shown that music can improve endothelial function, possibly through the release of nitric oxide, a key regulator of vascular tone (5).

One of the most widely recognized clinical uses of music in the context of cardiovascular disease is the utilization of music therapy as part of cardiac rehabilitation. Music therapy has demonstrated efficacy in enhancing rehabilitation tolerance, elevating mood, and promoting adherence to rehabilitation exercises (6). Typically, the application of music therapy is directed towards either reducing anxiety and stress or fostering a motivational environment for rehabilitation. Randomized clinical trials have demonstrated a significant

improvement in various health-related outcomes for patients that undergo cardiac rehabilitation with music therapy compared to patients who undergo cardiac rehabilitation without music therapy (7). Additionally, music therapy in post-cardiac surgery patients may decrease pain and anxiety (8). Finally, using music to diminish pain reduces the use of analgesic medication and reduces adverse effects of opioid analgesics such as falls and delirium.

In recent years, the use of music in invasive cardiac procedures has gained prominence as an effective non-pharmacological intervention. Hospitals can be a frightening place for patients, and the thought of undergoing a cardiac procedure can be incredibly anxiety-inducing. It's no surprise that patients often feel overwhelmed and stressed when faced with this daunting experience. Researchers have demonstrated significant reductions in anxiety and pain levels among adult patients who received music interventions before, during, and after surgery (9). Additionally, various types of music have resulted in improved patient satisfaction during surgical procedures (10). The effects of music listening on patients during cardiac catheterization were investigated and music was found to have a significant relaxing and calming effect for the patients (11).

The ensuing section pertains to the exploration of music's role within the domain of heart failure management. Heart failure management requires a multidisciplinary team and clinical trials typically focus on improving survival and decreasing exacerbations. However, heart failure is associated with many comorbidities such as depression, anxiety, and poor sleep quality. Despite the recognized negative impact of these comorbidities on patients' overall well-being and treatment outcomes, they are often overlooked or under-addressed in clinical practice. From a quality-of-life point of view, listening to music has been shown to improve various aspects such as anxiety, depression and sleep quality (12). Despite the growing evidence for the benefit of music therapy in heart failure, there are still some challenges to its implementation in clinical practice. One major issue is the lack of standardized protocols for music therapy, making it difficult to compare studies and establish best practices. Additionally, there is a need for more research on the optimal timing, frequency, and duration of music therapy interventions in heart failure.

The healing power of music has emerged as a promising new avenue for improving cardiovascular health. With numerous studies pointing towards its efficacy, music has demonstrated its ability to reduce stress, anxiety and even lower blood pressure and heart rate. Furthermore, music may contribute to the improvement of endothelial function, a critical element in upholding cardiovascular health. The potential of music therapy as a complementary intervention in managing cardiovascular diseases is indeed impressive and calls for more in-depth exploration. By incorporating music as a non-pharmacological intervention in cardiovascular disease management, healthcare providers can potentially improve outcomes and enhance the quality of life for their patients. The incorporation of music into the domain of cardiovascular health has unveiled a realm of novel opportunities, holding the promise of remarkable advancements in the foreseeable future.

Author contributions

SB: Conceptualization, Data curation, Writing – original draft, Writing – review & editing.

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A practical development protocol for evidence-based digital integrative arts therapy content in public mental health services: digital transformation of mandala art therapy

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Introduction: The fundamentals of digital transformation include the conversion of the traditional method into a digital format to develop a standardized system that collects, analyzes, and processes quantitative data. This study aims to provide a comprehensive understanding of the development process and key elements of evidence-based digital integrative arts therapy.

Methods: The "Digital Mandala" service in the "Mental Health App" produced as part of a national public mental health project for personalized depression management is adopted to explain how to convert the existing mandala art therapy into digital format. A living lab approach has been applied, which can be used to address the nation's mental health challenges by promoting collaboration, innovation, and evidence-based solutions.

Results: Evidence-based digital content requires evidence that covers the structural process, the effects of existing methods, and the components and meanings of each detailed scene. In this section, we provide five stages of the development process, including preliminary research, design, development, commercialization, and advancement. Consequently, clinical elements, integrative arts therapy features, and data factors are defined as the key principles of evidence-based digital integrative arts therapy.

Discussion: Based on the data factors found in this study, it will be possible to create an evaluation dataset of digital integrative arts therapy content for managing depression. Additionally, the large-scale public data can be analyzed through artificial intelligence technology, which is expected to be used as a basis for deriving significant results in a new form, going further than the existing evaluation method. This research is significant because it establishes the foundation for digital transformation in the field of art therapy for public mental health services and investigates its potential.

KEYWORDS

digital public health, digital healthcare, evidence-based digital content, integrative arts therapy, digital transformation, digital integrative arts therapy, structured mandala coloring

1. Introduction

Innovation in the medical field is accelerating since the frontier technology that forms the foundation for the Fourth Industrial Revolution [i.e., big data, artificial intelligence, Internet of Things (IoT), Cloud] has begun to be applied to the healthcare arena (1). The new paradigm of modern healthcare services has brought forward the concepts of digital healthcare and wellness, which combine advanced medical technology and information and communication technology (ICT), while changing the disease-centered treatment into a health-centered prevention and management system (2). According to the U.S. Food and Drug Administration (3), digital health encompasses diverse concepts, including mobile health (mHealth), health information technology (IT), wearable devices, telemedicine, telehealth, and personalized medicine. Digital mental health applications are a specialized component of the rapidly expanding app market with the potential for development and testing (4). Smartphones, social networks, and internet application technology have changed how we communicate and provide innovative methods to monitor health and wellbeing, allowing us greater access to information (3).

The Digital Wellness Service (DWS), which introduced after the development of ICT, encompasses digital technologies or content for our body and mind to promote a healthy and balanced life (5). It provides a predictable and customized prevention and health management system based on big data and analyzes and reviews the generated health-related data. According to recent studies, digital interventions have increased opportunities in the mental healthcare domain (6). Arts therapy related to digital interventions is also being conducted (7–10). However, there is little evidence-based guidance despite the availability of numerous digital psychotherapeutic approaches (11). In contrast to research-based digital interventions, well-known mHealth apps that are accessible in major app stores frequently do not provide evidence on the theoretical or empirical basis of their content (12–15).

The development of DWS requires a systematic approach and not just the use of digital media. A new strategy is required to innovate based on digital technology that utilizes ICT, such as big data, artificial intelligence (AI), and cloud computing. The core of digital transformation is the conversion of the traditional operation method into a digital format to digitalize and establish a standardized system that collects, analyzes, and processes quantitative data. Digital transformation refers to quantifying unquantified areas. It can facilitate quantitative evaluation in arts therapy, which was previously qualitative in nature. Digital conversion through data factor derivation can provide quantitative analyses in qualitative fields. It meets the needs of digital individuals and can be very useful for mental health.

This study aims to identify evidence-based digital transformation methods by presenting a practical development protocol for the "Digital Mandala" service in the "Mental Health App" produced as part of a national public mental health project for personalized depression management. Living lab approaches have been applied to the development of digital integrative arts therapy. This article provides an in-depth description that details how traditional mandala art therapy was transformed into a digital form (RQ1). Additionally, it clarifies the core components of evidence-based digital integrative arts therapy by presenting the evidence supporting the elements of each scene and why the content was organized this way during the digital transformation process (RQ2). Ultimately, this study emphasizes the importance of seizing the opportunities that the digital world offers in the future and focuses on mental health.

2. Methods and tools

2.1. Digital Mandala in public Mental Health App services

The Seoul Metropolitan Government has introduced a pilot program for the "Mental Health App" service, which is being tested by 500 young individuals participating in the "Youth Mental Health Management" support project (16, 17). The development of the Mental Health App was a collaborative effort between HY Digital Healthcare Center (HY-DHC), which includes professionals such as psychiatrists and arts therapy specialists, and Vantage Digital Point (VDP Labs Inc.). The authors and participating institutions are affiliated with the same research unit. This project represents a cluster of collaborations between industry, research, government, and healthcare institutions.

The Mental Health App provides user-customized digital content to diagnose mental health and prompt recovery from depression (18, 19). As a digital public service, this software includes digital psychological tests for depression (Center for Epidemiological Studies Depression Scale: CES-D-10 and PHQ-9), anxiety (Generalized anxiety Disorder Scale: GAD-7), and sleep disorder (Insomnia Severity Index: ISI-K4). Users can review the test results based on the self-screening, and an algorithm will recommend three types of personalized digital content to manage depression. The test results for depression can be classified as mild (low depression), moderate (moderate depression), or major (high depression). The content comprises the "Physical Activity Game" to improve muscle strength and cardiorespiratory capacity, the "Finding Blue Game" as a cognitive and emotional screening service and the "Digital Mandala" as a digital integrative arts therapy. These contents are activated according to the user's depression test results.

This study focuses specifically on providing a detailed description of a practical development protocol for evidence-based digital content. In this regard, as a research tool, we selected the Digital Mandala service to examine the digital transformation method and explore the evidence-based elements of digital integrative arts therapy. Figure 1 depicts the Mental Health App's splash screen, emotion diary, and recommendation screen of the Digital Mandala.

2.2. Study design and digital transformation process

This study provides comprehensive and thorough information and explanations about the digital transformation method and content development process of mandala art therapy (RQ1) and the core elements of evidence-based digital integrative arts therapy (RQ2). In this project, we have implemented the Digital Mandala

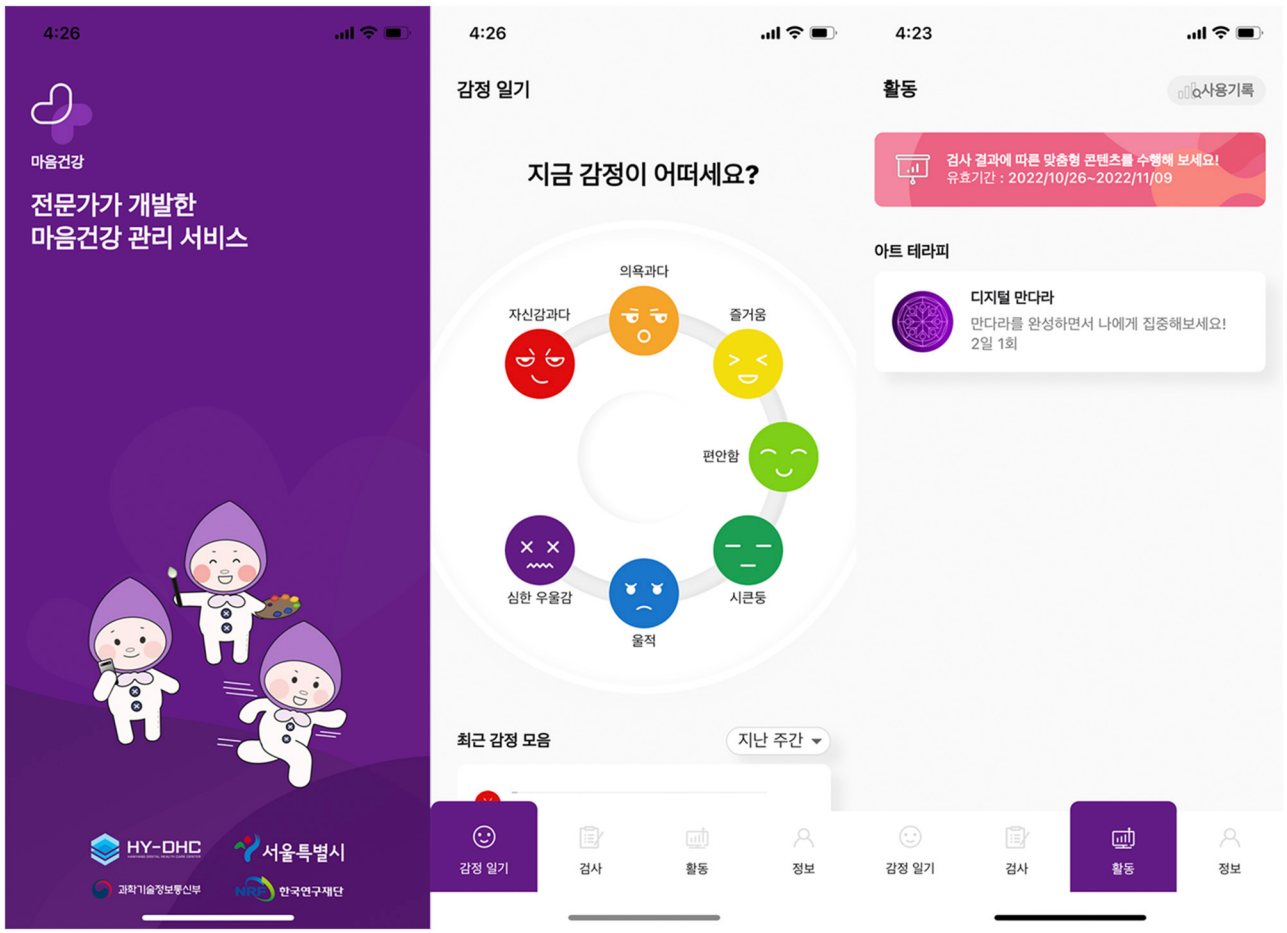

FIGURE 1
Mental Health App.

service, which converted the traditional experiential mandala art therapy technique, known as structured mandala coloring, into a digital format. The digital transformation process and content development protocol involved the following procedures: First, an analysis of the session operating structure of traditional mandala art therapy was conducted. Second, the core elements necessary for the digital transformation of mandala art therapy were analyzed and presented. Third, evidence-based digital integrative arts therapy content was designed and implemented in digital form. Table 1 provides the study design of evidence-based digital content development framework.

TABLE 1 Study design for the evidence-based digital integrative arts therapy content.

Digital transformation of mandala art therapy
Evidence-based digital integrative arts therapy content development framework
RQ1. The digital transformation method and content development process of mandala art therapy
- The structuring existing mandala art therapy - 5 stages of digital content development
RQ2. The core elements of evidence-based digital integrative arts therapy content
- Clinical factors - Integrative arts therapy factors - Data factors

3. Results

3.1. A practical development protocol for digital transformation of mandala art therapy

3.1.1. The structuring existing mandala art therapy

Mandala is a magic circle with a center that provides a journey to find one's inner balance as a principle of mental structure. A compound word of "manda", which means center and essence, and "la", which means possession and achievement, "mandala" refers to possessing the essence in the shape of a circle. Analytic psychologist Carl Jung (Jung, C.) began to use mandala as a therapeutic technique, which has since been expanded into mandala art therapy. Jung asserted that the act of drawing within the circle facilitates relaxation and the content of the mandala allows "expression of the self-healing process" (20).

TABLE 2 Digital content development process.

Phase	Contents
Preliminary research	Literature review for content development To collect and analyse the evidence for digital content
Design	Development of a complete roadmap for the multisensory digital content To make a proposal, storyboard, and screen design
Development	Digital content visualization Considering operation system and software patent registration
Commercialization	Support for continuous content usage and standard verification To create a manual and user management system
Advancement	Evaluate content and obtain feedback Supplement content through evaluation of utilized elements

A structured mandala is an artistic activity in which a pre-designed mandala pattern is colored. Coloring a mandala is an appropriate art therapy activity to investigate its effectiveness because it involves the manipulation of art materials and individual decisions about color, shape, size, and patterning, and can produce a sense of accomplishment (21). Additionally, it has been shown to be equally effective in reducing anxiety (22–24).

Digital transformation requires structuring. It is necessary to examine the format for organizing and conducting clinical sessions to digitize the current methods of arts therapy. Choi (25) conceptualized the "session operating structure" as a clinical structure theory of arts therapy comprising "whole session constructing method (clinical period, goal, and activities)" and "single session proceeding method (progress structure and clinical environment)." The present study analyzed the structure of the existing depression-related mandala art therapy by adding new categories for the evaluation method and runtime to the session operation structure theory. Consequently, the arts therapy clinical system for digital transformation was conceptualized as the composition method of a comprehensive whole session (clinical period, goal, activity, and evaluation method) and progress method of a respective single session (progress structure, runtime, and clinical environment). This concept was used as an analytical framework to extract the major elements of the Digital Mandala.

3.1.2. Five stages of digital content development process

The evidence-based digital content development process was conducted in an agile format. The Digital Mandala service was developed through preliminary research, design, development, commercialization, and advancement (Table 2).

3.1.2.1. Preliminary research

In the preliminary research phase, market analysis and fundamental information were investigated, followed by a literature review to collect evidence for content development. Evidence-based digital content requires scientific, empirical, and theoretical basis from various perspectives. Therefore, three key factors of evidence-based digital content development were identified.

First, medical advice from psychiatric clinicians and mental health specialists were used throughout this process to collect clinical evidence. Furthermore, the "Evidence-based Guideline for Depression in Primary Care" issued by the Korean Academy of Medical Sciences and the Korean Disease Control and Prevention was consulted. Second, the features of the arts therapy were examined. Theoretical data on stimulating factors such as the senses of vision, hearing, and touch and arts therapy techniques (i.e., art, music, and reflective writing) were gathered. Finally, the device, gamification, and UI/UX, as well as the data assessment criteria, were determined. In contrast to digital therapeutics, the digital wellness service does not require strict clinical evidence to validate its therapeutic effect. However, it is essential to determine the empirical and theoretical evidence and secure its reliability and validity as a mental health service. In this study, a "digital transformation factor" was identified as the data factor for evaluation. Table 3 describes the key elements of the evidence-based digital content.

TABLE 3 Key factors of the evidence-based digital content.

Key features	Contents
Clinical factors	Symptoms, characteristics of content users, treatment methods, and effects Digital transformation from clinical aspects
Integrative arts therapy factors	Integrative arts therapy features Analysis of sensory elements such as sight, hearing, and touch
Digital transformation & data factors	The structure of digital content and data factor extraction Device, gamification, and UI/UX

3.1.2.2. Design

In the design phase, it is necessary to define the type of data to be collected later by considering its therapeutic significance. Therefore, a data factor, a storyboard, and a screen design were proposed. It provided a visual presentation of the organization and development of the content. Moreover, it discussed the evaluation of use intention, possibility of continuous use, perceived usefulness, and satisfaction. Concerning the content, the Digital Mandala service was designed under four main themes (Table 4). First, art activities, including choosing a pattern, drawing lines, coloring a mandala, and rotating the direction, were planned. Second, provisions were made for participants to select their emotions and music. Third, a writing activity of the mandala note was designed, which consisted of creating a title and expressing their feelings experienced while creating the mandala. The final activity was to appreciate the mandala.

3.1.2.3. Development

During the development phase, it is necessary to choose a content developer while also establishing an operating system to be used after content development. Furthermore, content usage management and software patent registration should be considered. At this stage, a content developer was selected and the core technologies related to digital content production were investigated. Actual content creation proceeded with the UI/UX design, choice of data collection strategies, and establishment of an operating system. Since digital content is created through flexible interactions, agile responses from practitioners are required during the development phase. Consequently, we continued to collect evidence for production and achieved content creation.

TABLE 4 Digital Mandala service design.

Digital Mandala service design						
Mandala artwork		Feeling and music		Mandala note		Appreciation
a. Selecting a mandala pattern b. Drawing lines c. Mandala pattern coloring d. Rotating the mandala's direction	→	a. Choosing a present mood b. Choosing a music	→	a. Creating a title b. Reflective writing	→	a. Closing session

TABLE 5 The effects of mandala art therapy.

References	Target disease/condition	Number of participants	Results and effects	Effect sizes
Gurcan and Turan (38)	Anxiety & depression in hospitalized adolescents with cancer	60	To improve anxiety and depression	Anxiety: large ($\eta^2 = 0.24$) Depression: large ($\eta^2 = 0.24$)
Carsely and Heath (39)	Test anxiety	167	To decrease the level of test anxiety	Large (partial $\eta^2 = 0.14$)
Bi and Liu (40)	Social anxiety	72	To decrease social anxiety	Large (partial $\eta^2 = 0.34$) *Post-hoc*: mandala > free drawing, control
Pisarik and Larson (41)	Authenticity, wellbeing	68	To strength self-awareness, unbiased processing, personal growth, and self-acceptance	Awareness: large (partial $\eta^2 = 0.47$) Unbiased processing: medium (partial $\eta^2 = 0.08$) Personal growth: large (partial $\eta^2 = 0.52$) Self-acceptance: small (partial $\eta^2 = 0.05$)
Curry and Kasser (23)	Anxiety	84	To reduce the level of anxiety	Effect size is not suggested, but difference between groups is significant.
Khademi et al. (42)	Anxiety in hospitalized COVID-19 patients	70	To reduce the level of anxiety	Effect size is not suggested, but difference between groups is significant.
Lee and Ryu (43)	Emotional stability, attentiveness among	30	To increase emotionality, especially, satisfaction and self-confidence.	Effect size is not suggested, but difference between groups is significant.
Babouchkina and Robbins (44)	Negative mood	67	To reduce the level of negative affect	Effect size is not suggested, but difference between groups is significant.
Kim et al. (45)	Subjective wellbeing, resilience, hope	28	Only hope increased	Effect size is not suggested, but difference between groups is significant.

TABLE 6 Digital Mandala as an integrative arts therapy.

The stage of Digital Mandala service	Projective model	Sensory stimulus	Activity type	Ultimate achievement
Mandala artwork	Art—drawing and painting of a structured mandala	Sight, touch	Expression—closeness, immersion, and under-distance	Catharsis—finding an aesthetic distance between closeness and separation through various stimuli and activities using arts
Feeling & music	Music—to express the current mood through melody	Hearing		
Mandala note	Literature—reflective journal writing	Touch		
Appreciation	Integration for achieving balance	Multi-sensory	Appreciation—separation and over-distance	

3.1.2.4. Commercialization

In the commercialization phase, it is necessary to release the developed content, create a manual that introduces functions, and create content accounts. Furthermore, the assessment data defined in the preceding stage must be gathered in real-time and saved in the Cloud to build the framework for standard verification and improvement. As part of the Seoul Metropolitan Government's public mental health services, this pilot project was commercialized implementing the Digital Mandala service for depression management. The components and core evidence of the commercial content are presented in the results.

3.1.2.5. Advancement

In the advancement phase, it is important to supplement the contents by analyzing the acquired public data and user feedback. Standard verification and advancement work can be conducted

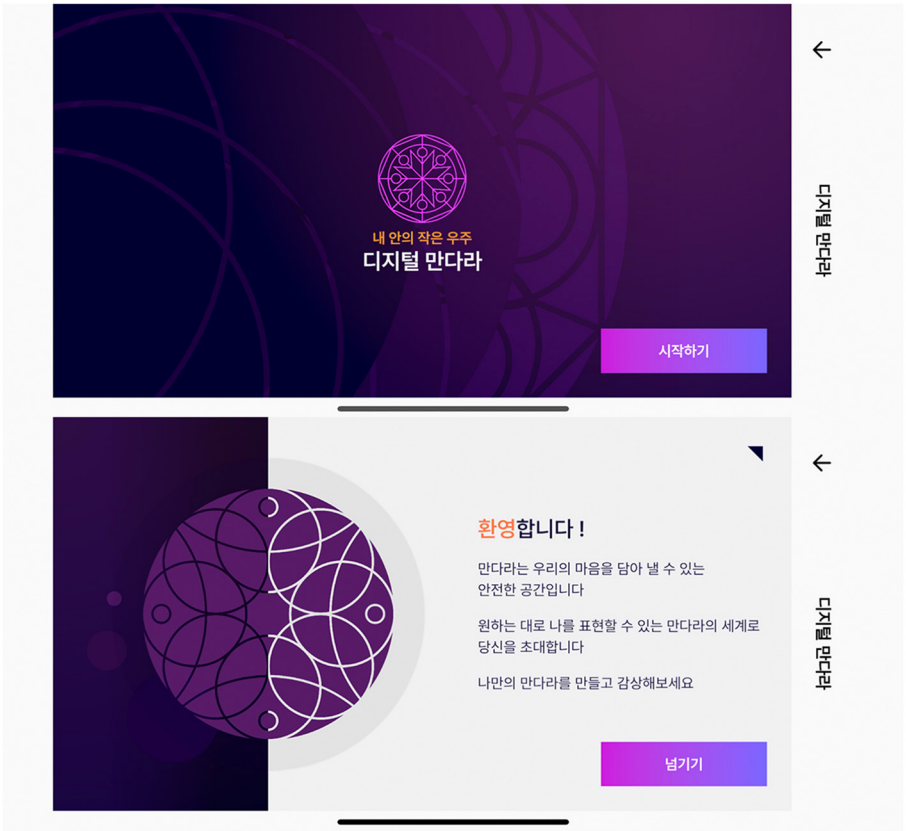

FIGURE 2
Digital Mandala service's splash screen and a tutorial.

by assessing the acquired log data and reviewing survey data on the use of the contents, which includes items such as the intention to use, continued use, and satisfaction as a public mental health service. Additionally, it requires supplementary work to function as high-quality content that may be utilized continuously, such as obtaining feedback on the UI/UX and progressing with upgrades. Throughout this process, digital content can establish a standardization system using quantitative data and secure scientific results, such as clinical efficacy and validation. The scope of this study is confined to the creation process and evidence-based element analysis; hence, it does not include the assessment of digital content usability or the evaluation of efficacy through pre- and post-inspection. Content advancement will become possible in the future using the digital transformation factors presented in this study.

3.2. The core elements of evidence-based digital integrative arts therapy

3.2.1. Clinical factors for depression

3.2.1.1. Depression management

Since an increasing number of contemporary people have been reporting depressive feelings and lethargy following the COVID-19 pandemic, the new phrase "COVID Blues" has been coined. This phenomenon can be regarded as a collective depression that arose with the advent of a contactless era of social distancing. The Korean Ministry of Health and Welfare, in an attempt to provide necessary psychological support services for Korean citizens, has been conducting the "COVID-19 National Mental Health Survey" on a quarterly basis since 2020 to comprehend the state of their citizens' mental health. According to the statistics in the second quarter of 2022, even though the index of the depression risk group improved (22.8% in March 2021 to 16.9% in June 2022) after social distancing ended, the figure still represented a high and dangerous level that was over five times higher than that of 2019 (3.2%) before the COVID-19 outbreak (26). Concurrently, the rate of suicidal ideation (12.7% in 2022) also increased to nearly three times higher than that in 2019 (4.6%). Particularly, the depression score and ratio of depression risk groups among people in their 30s were consistently higher than those in other age groups, indicating the importance of supportive mental healthcare services for young people in the post-COVID-19 era.

Major depressive disorder, commonly known as depression, is a mental health problem defined as a lethargic state accompanied by a chronically depressed mood or sad state and loss of interest or pleasure in life. It is classified as a very serious mental disease because it is associated with anxiety and sleep difficulties, deteriorates interpersonal competency and occupational ability, and can lead to suicide in extreme situations. The causes and

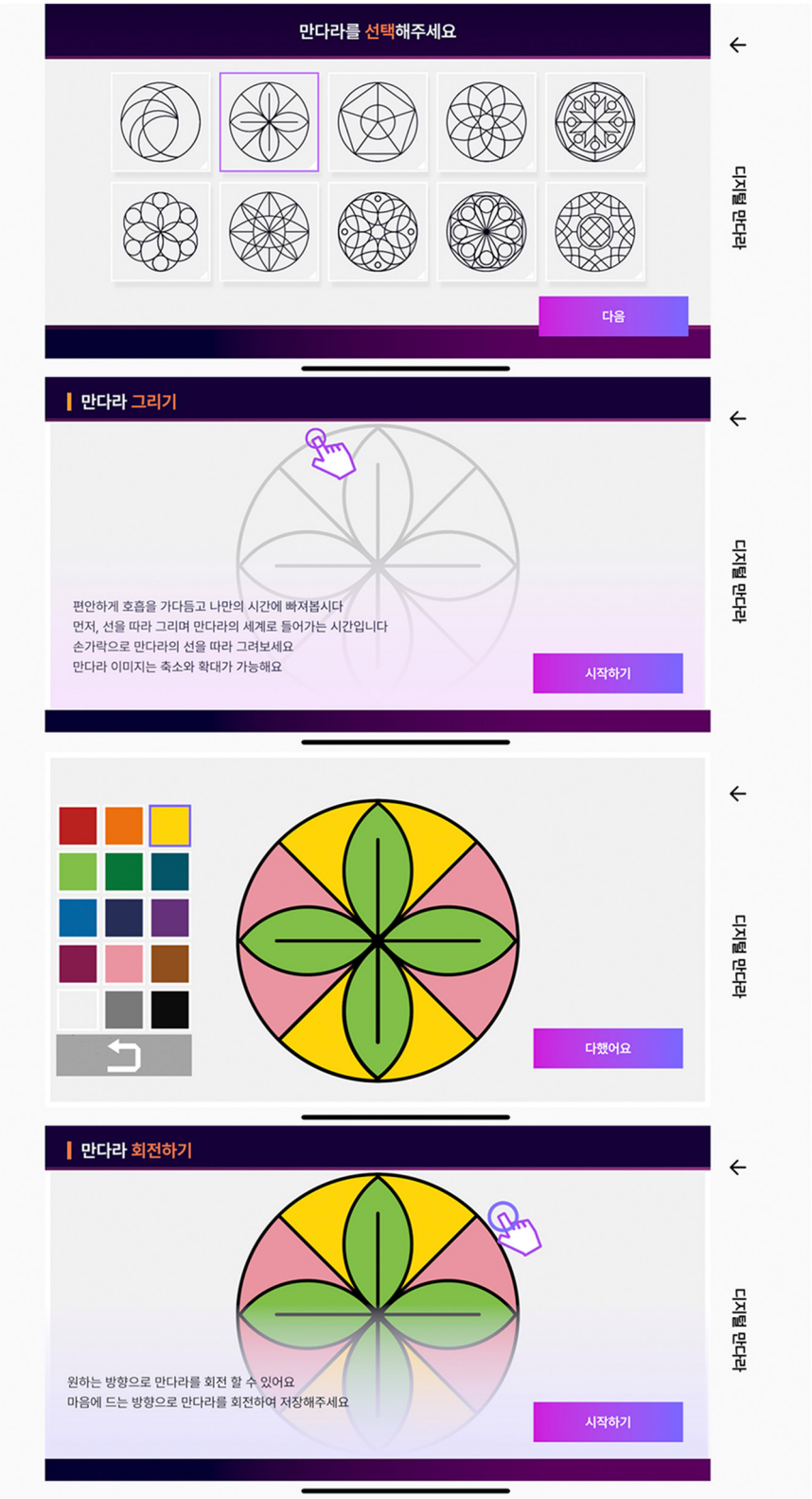

FIGURE 3
The sequential process of mandala artwork phase.

risk factors for depression differ from individual to individual; they are most typically explained by the stress vulnerability model (27). In other words, emotionally vulnerable people may suffer from depression more easily if they are exposed to stressful life events in their daily lives. The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) and the Patient

TABLE 7 Moods classified in accordance to audio features.

Mood	Intensity	Timbre	Pitch	Rhythm
Happy	Medium	Medium	Very high	Very high
Exuberance	High	Medium	High	High
Energetic	Very high	Medium	Medium	High
Frantic	High	Very high	Low	Very high
Sad	Medium	Very low	Very low	Low
Depression	Low	Low	Low	Low
Calm	Very low	Very low	Medium	Very low
Contentment	Low	Low	High	Low

Health Questionnaire (PHQ-9) were used to assess the severity of depression, and pharmacological or non-pharmacological treatments were provided (28). Psychological and psychosocial interventions, such as acceptance and commitment therapy (ACT) and cognitive behavioral therapy (CBT), are preferred for mild or moderate depression and have effects similar to pharmacological treatments (27, 29–32). Digital interventions could significantly contribute in expanding mental healthcare and reducing the considerable undersupply of mental disorders or psychological treatments worldwide (33). Previous studies have indicated that digital mental health interventions help relieve depressive symptoms (6, 34–37).

3.2.1.2. The evidence of mandala art therapy

Although large-scale studies specifically examining mandala art therapy are lacking, some studies included in Table 5 above show that structured mandala art therapy can have a positive impact on emotions such as depression, anxiety, stress reduction, and relaxation. However, it is important to recognize that the existing evidence for mandala coloring is based case reports, qualitative studies, and small exploratory studies. More high-quality studies, such as randomized controlled trials and large-scale studies, are required to establish stronger evidence for the specific therapeutic effects of structured mandala coloring. This study's digitalization of mandala art therapy will supplement the limitations of evaluating the efficacy of existing art therapy techniques. In addition, it is expected that substantial results can be obtained by analyzing detailed factors of digital integrative arts therapy, going beyond the current evaluation method that tests for pre- and post-treatment differences.

3.2.2. Integrative arts therapy features

The Digital Mandala is an integrative arts therapy content that stimulates the senses of sight, hearing, and touch through a digital experience. This content, which combines art, music, and literary interventions, aims to increase therapeutic efficacy by balancing the states of closeness and separation. Owing to the characteristics of the mobile device, tactile stimulation felt by the hand and visual stimulation of images are continuously activated during the screen-touch interaction process. Furthermore, the Digital Mandala content is accompanied by auditory stimulation via emotional music. Table 6 lists the specific features of the Digital Mandala.

3.2.2.1. Mandala artwork

The human desire to select colors occurs in the brain. The brain stimulation through colors is expressed as emotion, which is a physical instinct. Each color has its own vibration and frequency that stimulates a response in the process of being transmitted to the brain and creates emotional expression. When a specific color is transmitted to the hypothalamus through visual perception, it passes through the A10 nerve and produces the judgment of good or bad. Therefore, choosing a color can be perceived as a measurement of not only one's desire for pleasure but also as a tool to detect internal changes (46). A study on color preferences based on depression and anxiety levels showed that the group with high levels of depression preferred achromatic colors the most, while the group with high levels of both depression and anxiety had the highest preference for cold colors (47). Alternatively, the group with low depression and high anxiety preferred warm colors, whereas the group with both low depression and anxiety preferred neutral colors. Thus, colors have a deep relationship with psychological elements, and expressing one's emotions with lines and colors to experience purification represents the therapeutic properties of art.

In art therapy using the structured mandala, such tendencies of clients can be analyzed according to the direction of their coloring. In the mandala artwork, introverts unconsciously tend to color from the center to the circumference of the circle, whereas extroverts or those who currently feel nervous, powerless, exhausted, have low concentration, and high distractibility tend to color the mandala from the circumference into the center (48). Additionally, since the mandala artwork of improvisational expression is an unconscious activity in which participants' emotions are reflected in shapes or colors, artistic psychological elements, such as color symbolism and shape psychology, can function as factors that can be evaluated therapeutically. Figure 2 illustrates the Digital Mandala's splash screen and a tutorial.

In the Digital Mandala service, the mandala artwork process includes a structured mandala pattern selection, line drawing, and coloring, followed by a rotation in the appropriate direction (Figure 3). The structured mandala contains 10 patterns: simple, normal, and intricate for complex patterns. Fifteen colors were chosen based on the sRGB values provided by the Korea Industry Standard (KIS). The colors consist of 12 chromatic and three achromatic colors.

- **Chromatic colors:** red, yellow-red, yellow, red-purple, green-yellow, green-purple, pink, brown, blue-green, blue, and purple-blue
- **Achromatic colors**: white, gray, and black.

3.2.2.2. Feeling and music

Music has been used as a sensory tool to express people's mood and emotions. Dynamic experiences, such as rhythm and melody, provided in the process of integrative arts therapy stimulate individual emotions and expand conscious awareness

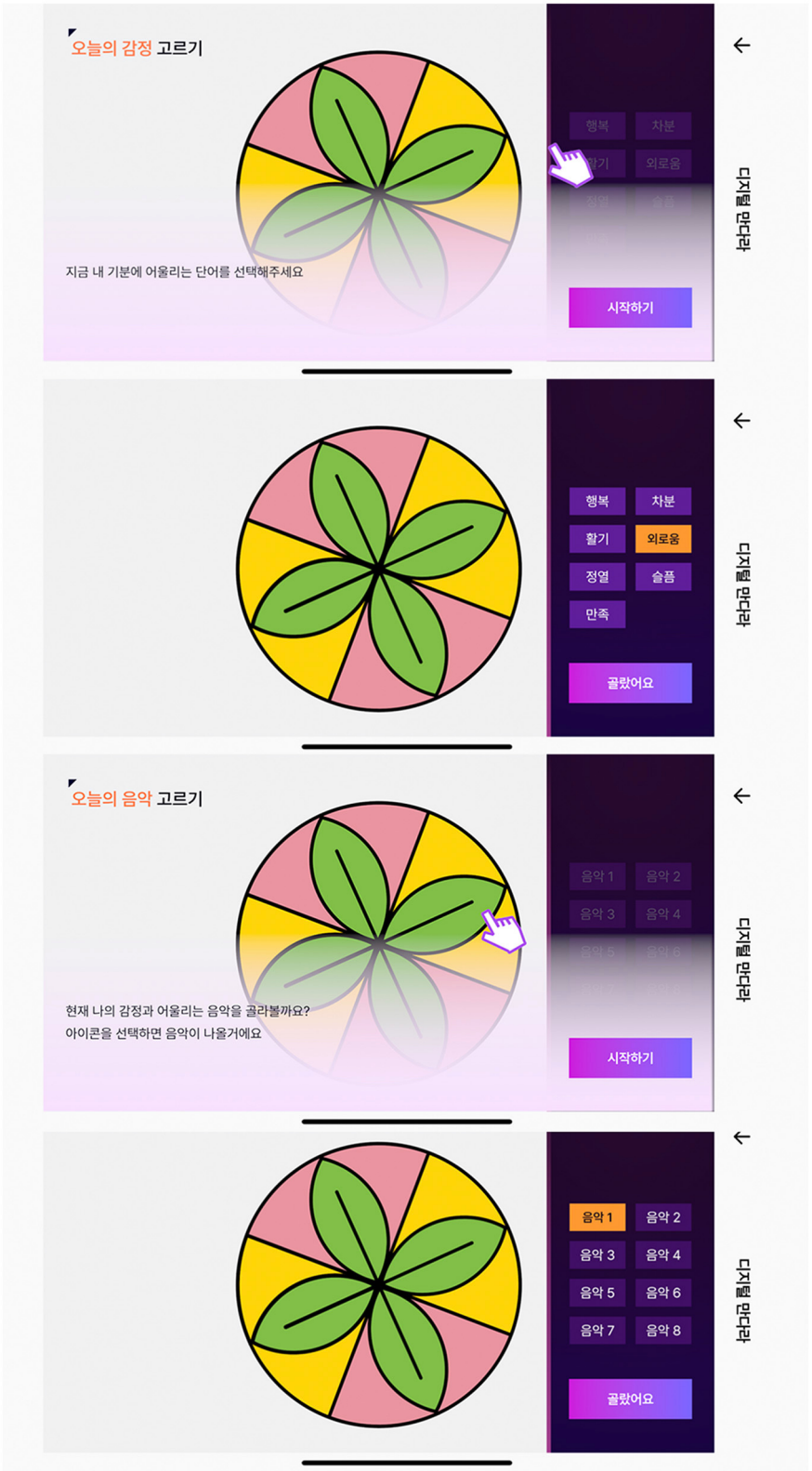

FIGURE 4
Feeling and music selection phase implementing screen.

(49). Thus far, diverse studies have investigated the recognition and classification of emotions associated with musical components. Their representative results have shown that fast tempo music produces happiness or excitement, while slow tempo music may be associated with sadness. Additionally, low tones represent dark and sad circumstances (50–55).

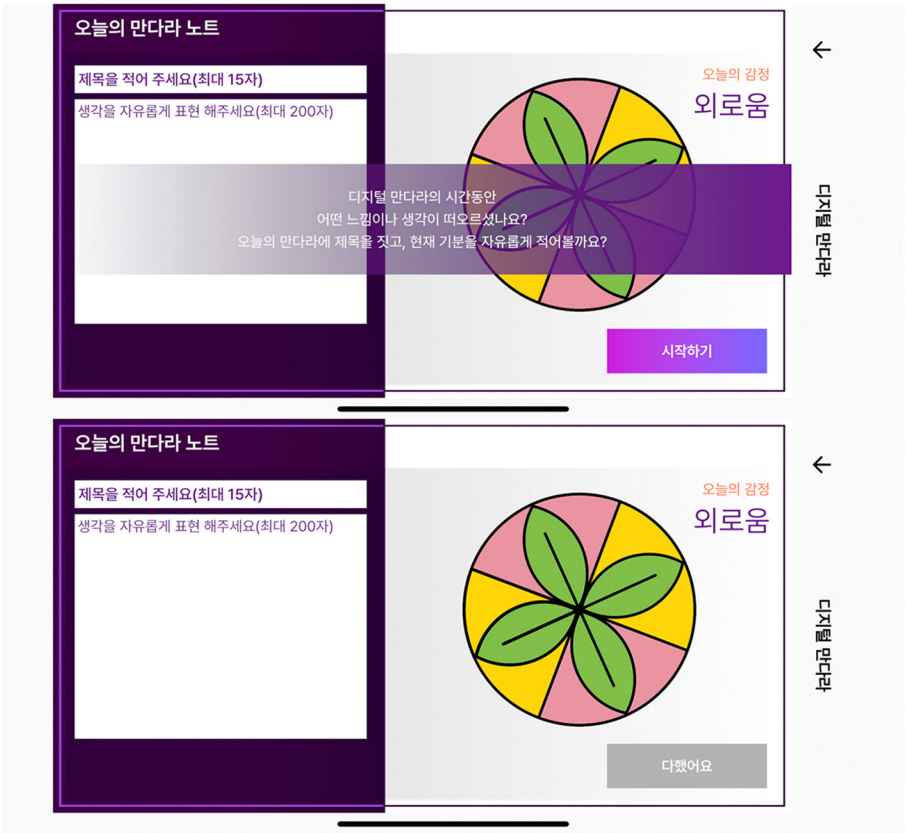

FIGURE 5
Mandala note for creating a title and reflection writing.

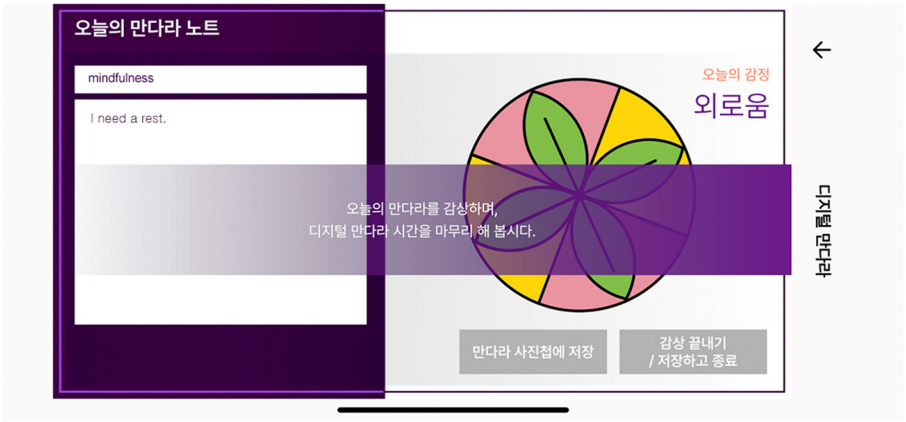

FIGURE 6
Appreciation implementing screen.

Robert Thayer (Thayer, R.), a music psychologist, defined a two-dimensional mood/atmosphere model by setting "Stress" and "Energy" categories. Here, "Stress" is the degree from "Happy" to "Anxious/Sad," while "Energy" is the degree from "Calm" to "Energetic." The mood model classifies the emotions of "Exuberant, Anxious/Frantic, Contentment, Depression" within the two axes of "Stress" and "Energy" (56). When acoustic characteristics such as intensity, timbre, pitch, and rhythm of music act as parameters, they can affect the listener's mood and emotions, which can then work as factors that create the atmosphere of music [Table 7; (50)]. In this manner, music works as a medium that affects emotions and contains a sensory function for emotional expression.

The second stage is to choose a feeling and emotional music that represents the user's current condition (Figure 4).

TABLE 8 The structure of Digital Mandala.

Session structure system			Traditional method		Digital transformation
Comprehensive whole session	Clinical period		12–16 session		Personalized
	Goal		Reduce symptoms of depression and anxiety Mindfulness practices and self-expression through art therapy activity Relaxation and mood improvement		Self-management of psychological conditions using digital content in daily life Same as the traditional method of mindfulness, relaxation, consciousness
	Clinical activity		Structured mandala coloring art therapy technique		Digital mandala coloring art therapy software
	Evaluation method	→	Quantitative evaluation via pre-post scale screening test (DSM-5, PHQ-9, CES-D-10, etc.) Qualitative evaluation via client's expression and activity analysis (color, symbolic meaning, etc.)	→	Digital self-screening test (PHQ-9, CES-D-10, GAD-7, ISI-K4) Data factor quantitative evaluation Large-scale trials available
Respective single session	Progress structure		Introduction, activity, reflection, and closure Mandala pattern choosing and coloring		4 steps (art working, music & feeling, mandala note, and appreciation)
	Runtime		60–90 min		Personalized
	Clinical environment		A safe and supportive environment		Anywhere at any time Digital wellness service (Smartphone app)

TABLE 9 Data factors of Digital Mandala.

Classification	Content component		Data factors for evaluation indicators
Art	Mandala artwork	Selecting a pattern of mandala	The type of mandala pattern (simple to complex)
		Drawing lines of mandala	Touch position data (drawing direction)
		Mandala pattern coloring	The type and number of colors (variety of colors) The frequency of colors Touch data for each cell of the pattern The number of filled squares at the end of coloring The number of revisions Run-time data of coloring (degree of immersion)
		Rotating the mandala's direction	Rotation direction (rotation angle)
Music	Feeling and music	Choosing a present mood	The type of emotion (0–6)
		Choosing an emotional music	The type of melody (0–7)
Literature	Mandala note	Creating a title	The meaning of the mandala's title
		Reflective journal writing	The content and meaning of the journal To review positive, negative, informative words, or contexts
Integration	Appreciation	Closing session	Run-time data of all contents

The purpose of this stage is to help participants recognize their state of mind at a given moment by exploring their current emotions. Their emotions can be musically expressed by selecting and appreciating music techniques within the projective model of integrative arts therapy. The seven types of emotions comprised "happy, exuberance, energetic, sad, depression, calm, and contentment". Furthermore, "depression" was added to the seven emotions listed above and eight different sound sources with distinct styles were provided as music options. However, it was provided by hiding the emotion labels.

- **Feeling:** happy, exuberance, energetic, contentment calm, loneliness, and sad
- **Emotional music:** music 1 (happy), music 2 (exuberance), music 3 (energetic), music 4 (contentment), music 5 (calm), music 6 (loneliness), music 7 (sad), and music 8 (depression).

3.2.2.3. Mandala note

The use of literary media allows the linguistic imagery of one's inner world to be expressed through symbols and metaphors. This has a therapeutic effect that encourages the reorganization of memories and psychological dissipation as a way to express thoughts and feelings (49). Reflective writing skills allowed participants to verbalize their current feelings and experiences. Introspective writing in the mandala note stage aims to allow participants to consciously write a title for the mandala on which they have worked and verbalize their current feelings and

thoughts to help them express their unconsciousness (Figure 5). This therapeutic practice is distinct from the simple mandala coloring activity.

3.2.2.4. Appreciation

Maintaining a balance between the two states of separation and closeness is referred to as "distancing" (57). According to the aesthetic distance theory, catharsis occurs at the balance point between over- and under-distance. Expressive activities are creative, which serve to emphasize the intrapsychic elements during the experience of immersion, and appreciation becomes a cognitive process that regards one's work objectively. When participants complete all the expressive activities, they are then led to the appreciation stage, which creates an emotional distance that was once closely attached to them. The purpose of the appreciation stage is to internalize the arts therapy experience by showing all outcomes in an integrated manner (Figure 6). This forms an aesthetic distance, which is the midpoint between closeness and separation. Additionally, it helps participants gain insight and self-awareness by maintaining a reasonable distance from a therapeutically immersive environment.

3.2.3. Data factors for digital transformation

3.2.3.1. The structure of the digital mandala

The Digital Mandala service was digitalized from the existing practice of immersive mandala art therapy into a mobile app. It was developed as an evidence-based digital content, including three types of evidence (i.e., clinical elements, integrative arts therapy features, and data factors for digital transformation). The session operation structure to digitize mandalas was elucidated using the theory of the arts therapy clinical system (Table 8). The structure of the Digital Mandala was divided into comprehensive whole session and respective single sessions as a concept. The former includes the clinical period, goal, clinical activities, and evaluation method, while the latter comprises the progress structure, runtime, and clinical environment.

The traditional method and digitized content share the same objectives and activities because they both attempt to induce mindfulness through the mandala coloring technique, which aims to reduce depression and anxiety. However, the Digital Mandala is distinct in that its users can access it anywhere at any time and self-manage their depression due to the nature of mobile devices. Additionally, the digital content has its own unique evaluation methods. Traditional arts therapy mainly uses qualitative evaluation (i.e., analysis of clients' expressions, changes, symbols, and metaphors), which has been criticized on its lack of clinical effectiveness and limitations in effectiveness verification. Despite continuous attempts to examine the degree of change through pre-post assessments, they have not gained sufficient support for clinical effectiveness due to small sample sizes and biased results. The limitations of traditional evaluation methods can be overcome through digital transformation. Because digital content is easy to access, large-scale pre-post assessments can be performed to validate its effectiveness. Furthermore, the data factor of mandala art therapy can serve as a criterion for quantitative evaluation.

3.2.3.2. The extraction of data factors

The extraction of data factors is fundamental for digital transformation. Data factors serve important functions throughout the content development procedure. Digital mental healthcare content is based on clinical evidence and permits quantitative data analysis with therapeutic value. Therefore, the present study established a strategy to extract data factors of the evidence-based digital content and apply them as evaluation elements to remedy the limitations inherent in traditional evaluation methods. Table 9 lists the data factors derived as key elements for digital transformation.

Regarding data extraction, the type of mandala, touch position, diversity and frequency of colors, touch data for filled spaces at the end of coloring, rotation direction, and amount of time can be collected in the mandala artwork phase. Additionally, it is possible to evaluate emotions based on depressive symptoms and the mood component of music, as well as to analyse language data obtained from the mandala-note stage. Future studies should evaluate data systematically to provide individualized services. The log data collected at each stage and survey data on usability should be analyzed to assess the service. This provides a standard for customizing and upgrading the content.

4. Limitation and future scope

This manuscript details the development of digital integrative arts therapy content for public mental health services and focuses on expanding opportunities for leveraging digital in the future of mental health care. The scope of this study is limited to providing a practical protocol that includes an evidence-based element for developing the "Digital Mandala" service. It is meaningful to describe in detail the process that shows how the conversion of structured mandala from traditional use to app was achieved, but it does not include the application results of the Digital Mandala services.

Based on the data factors found in this study, it will be possible to create an evaluation data set of digital integrative arts therapy content for managing depression. The living lab and open innovation system can also be used more by analyzing large-scale public data. The public mental health data can be analyzed through artificial intelligence technology, which is expected to be used as a basis for deriving significant results in a new form, going further than the existing evaluation method. Future studies need to be conducted to verify its efficacy, effectiveness, and efficiency through large-scale data collection and analysis of correlations between depressive symptoms and arts therapy factors. Especially the arts factors, according to the degree of depression, should be analyzed and evaluated quantitatively.

5. Discussion and conclusions

This study was conducted to lay the groundwork for digital transformation in the field of art therapy for the public mental health services and to explore its possibilities. A practicable protocol for the development of evidence-based digital integrative arts therapy was presented, which converted

the traditional structured mandala coloring technique into a mobile app called "Digital Mandala". The study findings have been summarized below.

First, digital transformation requires structuring. Digital content for integrative arts therapy can be structured based on the "session operating structure" theory (25). The clinical system of arts therapy comprises the composition method of a comprehensive whole session (clinical period, goal, activity, and evaluation method) and the progress method of a respective single session (progress structure, runtime, and clinical environment). Second, evidence-based digital content can be developed through five stages of the virtuous cycle development process that include preliminary research, design, development, commercialization, and advancement. Third, the main features of the evidence-based digital content include "clinical evidence", "arts therapy features", and "data factors", which might serve as criteria for content production and evaluation. There is a need to collect evidence that explains the effects of the existing method and the detailed scene-specific components of digital content. It is important to provide a specific justification for the composition of the content and to clarify the significance embedded within each element. Fourth, the fundamentals of digital transformation include the conversion of the traditional operation method into a digital format to develop a standardized system that collects, analyzes, and processes quantitative data. Digital conversion through data factor extraction enables the quantitative verification of the effectiveness of arts therapy and can serve as an evaluation criterion for the evidence-based digital content. Consequently, the Digital Mandala implemented based on this research has been provided as an integrating arts therapy content that encourages creative self-expression and the healing process among participants in order to prevent and manage depressive symptoms. This content is valuable as a digital service that stimulates multi-sensory and provides expression and appreciation by utilizing various media such as art, music, and literature.

The significance of this study is that it provides a development protocol for data-based customized services through the Digital Mandala, which digitally converts the existing experiential approach of art therapy into digital content. Additionally, it presents the possibility of verifying the effectiveness of art therapy in the future by deriving data factors and digitally implementing the mandala technique. The data collected through the Digital Mandala can be used to expand the range of traditional arts therapies that have lacked quantitative or scientific effectiveness verification in randomized controlled trials (RCTs). If it is evaluated quantitatively using data elements, it will not only function as digital wellness content but also as digital therapeutics. Through this study, it is expected that the specific utilization and spread of digital and arts convergence content as public mental health services will be achieved.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

Ethical approval was not required for the studies involving humans because this study aims to present a practical protocol for the development of digital mental health services. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required from the participants or the participants' legal guardians/next of kin in accordance with the national legislation and institutional requirements because this study does not present the applied results of digital services.

Author contributions

HK participated in the digital healthcare expert. YC contributed to the integrative arts therapy expert, and they conducted convergence research. HK and YC conceptualized, designed, and implemented the study. YC contributed to the original draft's writing, literature review, and analysis of the results. HK contributed to the project administration, supervision, methodology, and validation. All authors have discussed and agreed to the published version of the manuscript.

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Conflict of interest

HK was a founding member of Vantage Digital Point (VDP Labs Inc.), which is a laboratory start-up company at Hanyang University, but currently has no relationship with it.

The remaining author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Social prescribing outcomes: a mapping review of the evidence from 13 countries to identify key common outcomes

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Introduction: As a means for supporting a range of health and wellbeing goals, social prescribing programs have been implemented around the world. Reflecting a range of contexts, needs, innovation, and programing, a broad array of outcomes has been studied in relation to these programs. As interest in social prescribing grows, more targeted study of key outcomes and in turn evidence synthesis that can inform evidence-based practice, policy, and investment is needed.

Methods and Results: This mapping review identified, described, and synthesized the broad array of social prescribing outcomes that have been studied in 13 countries and maps the outcomes that have been most commonly studied. From 87 articles included in this review, a total of 347 unique outcomes were identified, including 278 unique patient outcomes and 69 unique system outcomes. The most commonly studied categories of patient outcomes were found to be mental health, lifestyle and behavior, and patient/service user experience. The most commonly studied system outcomes were healthcare/service utilization and financial/economic outcomes.

Discussion: This review highlights the value of heterogeneity and mixed methods approaches in outcomes studies for capturing nuanced experiences and outcomes in this nascent area of practice, while contributing to the advancement of evidence synthesis for social prescribing globally by quantifying and offering insight into the outcomes that have been studied to date. It also lays a foundation for the development of key common outcomes and a Core Outcomes Set for social prescribing. Additionally, it identified key outcomes that, given their relationship to critical health and social issues, warrant both broader and deeper study.

KEYWORDS

social prescribing, arts prescribing, outcomes, social prescribing outcomes, mapping review

1. Introduction

Social prescribing (SP) programs are increasingly being implemented in nations throughout the world. Social prescribing has been defined as "a means for trusted individuals in clinical and community settings to identify that a person has non-medical, health-related social needs and to subsequently connect them to non-clinical supports and services within the community by co-producing a social prescription–a non-medical prescription, to improve health and well-being and to strengthen community connections" (1). SP programs seek to address social determinants of health or underlying and systemic causes of health issues and inequities, to fill the gap between clinical and non-clinical services, and to broaden the landscape of health promotion to include local community-based resources. It recognizes that individuals have social needs related to health that can be addressed in their community.

SP programs have been implemented–at various levels of scale - in at least 17 nations, including the United Kingdom, Australia, Canada, Ireland, Japan, New Zealand, Portugal, Singapore, and the United States (2, 3). Studies of these programs examine a wide range of outcomes. While this heterogeneity reflects the wide range of innovation and practices involved in this relatively nascent arena of practice and policy, it limits evidence synthesis and leaves the depth of social prescribing's impact yet to be identified on a wide scale. As these programs proliferate at an increasing pace throughout the world today, the need for evidence synthesis to inform evidence-based practice, policy, and investment is critical. Further, as SP programs are implemented in a wider array of nations and socio-political, cultural, healthcare and economic contexts, there is increasing need for culture- or country-specific evidence synthesis that can advance culturally appropriate practice and policy in those areas.

In efforts to advance and strengthen the evidence base, several studies to date have investigated and documented outcomes studied in relation to social prescribing programs in specific regions, notably in the United Kingdom (UK). Polley et al. (4) reported on 14 papers published between 2000 and 2017, collating outcomes relating to demand for general practitioner (GP) services, accident and emergency attendance, demand for other secondary care services, value for money assessment such as cost–benefit and return on investment, and social return on investment. Polley et al. (5) subsequently built on this work by reviewing social prescribing outcomes literature published between February 2017 and March 2018. A resulting publication presented 67 unique outcomes found in the literature, up to 2018, and organized them into 6 categories–general (included wellbeing, quality of life, and social connectedness), physical, psychological, welfare, spiritual, and social (4).

This mapping review aimed to advance and expand this work undertaken in the UK by identifying, describing, and synthesizing the broad array of social prescribing outcomes that have been studied in the 13 countries cited in the World Health Organization's Social Prescribing Toolkit (2). Additionally, it sought to identify the outcomes that have most commonly been studied as a step toward developing a set of key common outcomes for social prescribing in the United States (US) and establishing an outcomes framework for advancing related research. This work recognizes that, given very different social/political structures and health systems of the US and UK, where the majority of social prescribing research has been done, specific priority outcomes should be explored and identified for the US. This work also seeks to lay groundwork for future development of a formal core outcomes set (COS) for social prescribing.

2. Materials and methods

A mapping review was selected because this methodology takes a broad approach to categorizing and contextualizing elements of existing literature on a topic (6). Mapping reviews are used to create systematic maps of evidence domains, through which quantitative analysis of evidence gaps can occur and recommendations for future research or reviews can be made (7). Mapping reviews are a subset of scoping reviews, in that they use both systematic and iterative processes to search the literature. Although the same reporting guidelines are used for both (8), mapping reviews tend to describe the research field overall versus the detailed content of specific studies, so that theoretical connections can be made and practice-relevant questions for future research or reviews can be posed more easily (9).

This review's purpose was to map the commonly studied outcomes for social prescribing in 13 countries. While the focus of this review was on quantifying the most commonly studied outcomes in relation to social prescribing in these countries, it also extracted key data points, such as geographic locations. This review did not seek to report on demographic characteristics of the populations studied, research and evaluation methods or measures, or the efficacy of social prescribing programs. However, a few methods and other details are noted in the description of studies noted as examples in the results sections below.

2.1. Definitions

In keeping with Polley et al. (5), this mapping review defines an outcome as "something that is expected to change from the result of an intervention" (5, 10); it defines social prescribing as the referring of individuals by care providers to non-clinical activities in their community to support their health and wellbeing.

2.2. Search strategy

The review builds on a previous study of social prescribing outcomes in the United Kingdom (11). With the permission of its authors, the search strategy from the United Kingdom study was adapted by a health sciences librarian for this review's research question, "What are the key outcomes reported for social prescribing interventions in Australia, Canada, Ireland, Japan, New Zealand, Portugal, Singapore, the United Kingdom, China, and the United States?" A Population, Concept, Context (PCC) conceptual framework (see below) was used to develop the search strategy and eligibility criteria for this review.

Preliminary test searching to inform the development of the search strategy took place in December 2022, using the databases PubMed and Web of Science. Following feedback from the research team on the search results, the final search strategy was created and translated into eight databases using available subject headings, truncated and phrase-searched keywords in the title and abstract fields, and language limits. The final literature search occurred on

January 20, 2023, in the following databases: CINAHL (EBSCO), PsycINFO (EBSCO), Psychology and Behavioral Sciences Collection (EBSCO), Sociological Collection (EBSCO), Embase (Elsevier), Scopus (Elsevier), Web of Science (Clarivate Analytics), and PubMed. A sample search strategy for PubMed is available as a Supplementary material. This same strategy was adapted to the different search formats of the other databases.

Handsearching of numerous resources also occurred between February 13–29, 2023, to gather any gray literature not included in the bibliographic databases. Hand searches included snowballing of the systematic and other reviews captured in the database searches, searches of web archives and databases maintained by the University of Florida Center for Arts in Medicine (including the Arts in Health Research Database), the Social Prescribing Network, and the National Academy for Social Prescribing.

2.3. Inclusion and exclusion criteria

Inclusion criteria were based on a Population, Concept, Context (PCC) conceptual framework, and also included additional criteria, as noted in Table 1.

Reviews were included in the search to provide the opportunity for discovery of other syntheses of outcomes as well as studies that–due to lack of common taxonomy and reporting guidelines on the topic of social prescribing–may not have been captured by the database search strategy. However, reviews were not included in data extraction or in the analysis. Studies were excluded if they presented practice models or discussed theory with no outcomes measured. These same inclusion and exclusion criteria were used for title and abstract screening and for full-text screening.

2.4. Screening and data extraction

The search results were imported into the screening software Covidence, where automatic de-duplication of the results occurred. Nine members of the research team screened all article titles and abstracts, followed by full-text screening of the remaining articles. Conflicts were resolved by six members of the team. Data were extracted from articles that were included in the review based on the full-text screening. The following data were extracted from each article, where possible:

- Author(s)
- Institutions involved in the work presented
- Disciplines of authors and other partners involved
- Title
- Year of publication
- Journal name
- Journal discipline
- Funding model
- Type of article (i.e., original research, literature review, report, etc.)
- Location(s)
- Study population
- Sample size
- Scope of "social prescribing" used (i.e., social prescribing or arts on prescription)
- Cross-sector partnerships engaged
- Outcomes measured or reported
- Relevant policy cited
- Key challenges noted
- Noted instances of harm or negative events

Following data extraction, outcomes were verified three times (compared against the source article) by six members of the research team, and until no errors or discrepancies were found. Care was taken to list each unique outcome as stated in the articles (reduced to key terms when necessary), even when similar to others. After quantifying both the recurring and non-recurring outcomes, like outcomes were grouped into outcome categories.

Categories were developed in two stages. First, all unique outcomes were placed in a table that categorized same but differently worded outcomes (e.g., accident and emergency visits / emergency visits, GP visits/GP attendance) together in specified columns. Anything that was unlike another outcome was compiled into a "Z" column. In this primary phase of categorization, outcomes were

TABLE 1 Inclusion criteria.

Population/ Location	Studies involving human populations (including providers and patients) in Australia, Canada, Ireland, Japan, New Zealand, Portugal, Singapore, United Kingdom (England, Scotland, Wales and Northern Ireland), China (western pacific region), or the United States.
Concept	Social prescribing as an intervention, defined as *the referring of individuals by care providers to non-clinical activities in their community to support their health and wellbeing*, and including a referral mechanism from a healthcare system or provider (i.e., a link worker, community health worker, patient navigator, care navigator or similar role or mechanism for facilitating referrals and/or prescriptions).
Context	Outcomes reported by or on behalf of participants and systems involved in social prescribing interventions.
Type of evidence	All literature types, including original research studies, evidence synthesis reviews, reports, and gray literature.
Source of evidence	Peer-review journal or other credible sources including universities, professional organizations, governmental, and global organizations (i.e., the World Health Organization).
Date range	Any year through 2023.
Outcome reported	Reported outcomes (positive, neutral, or negative) related to the impact of social prescribing.
Use of measures	Evidence of defined measures used to arrive at outcomes (qualitative, quantitative, mixed-methods, etc.).
Language	English, Chinese, Japanese, and Spanish

organized under patient outcomes and system outcomes. All members of the analysis team participated in the process. A second, and more complex, phase of categorization developed sub-categories. In this phase, and using an inductive qualitative content analysis approach (12, 13), three members of the research team worked independently and then collaboratively in an iterative process of organizing outcomes into distinct categories based on dialogue and articulation of differences in outcomes across categorical groups.

This article reports primarily on these documented outcomes, along with the geographic locations of the investigations. Subsequent articles will report on other data extraction elements.

3. Results

The bibliographic databases search produced 3,306 results. An additional 78 articles were identified using other methods (gray literature and snowballing). After 2,001 duplicates were removed from the database search results, 1,305 unique references remained. A total of 1,158 references were excluded, leaving 225 eligible studies. A total of 138 studies were excluded with reasons leaving 87 total references for full text review and data extraction (See Figure 1).

Of the 87 included articles, 60 were original research articles, 6 were research protocols, and 21 were reviews (e.g., systematic or scoping reviews). Of the systematic reviews, 4 studies were conducted in the United Kingdom, and single studies were conducted in Canada, Germany, Ireland, Portugal, and the United States. Additional reviews featured studies from Australia, Denmark, the Netherlands, Norway, Scandinavia, South Korea, Sweden, and Taiwan. Some projects began over 30 years ago, with average durations ranging from 3–24 months. Across the systematic reviews, the range of included articles was between 7 (14) and 53 (15). Collectively, the reviews underscore the need for further research, particularly to better understand individual and public health outcomes and cost-benefits. See Table 2 for review type, count, and citation.

Snowballing confirmed that all of the articles included in these review articles had also been found in the database searches. To avoid redundancy in quantifying outcomes, data extracted from the review articles were not included in outcome counts.

The majority ($n = 60$) of the articles included in this review featured research or evaluation of social prescribing programs in England. Studies of programs across the UK were presented in 28 articles. While programs in Japan, New Zealand, Singapore, and China were included in the WHO Social Prescribing Toolkit and therefore in this search, no publications reporting outcomes from those countries met criteria for inclusion in the review. See Table 3 for a country count breakdown. Also see Supplemental material for a table that shows the number of papers that presented outcomes, by category, from each country.

3.1. Outcomes reporting

A total of 347 unique outcomes were identified in the 87 articles included in the review. Table 4 presents citations for the 87 articles. A table with each of these articles and the outcomes they presented is provided as Supplementary material. Please see this table for references for the outcomes described in the narrative sections below.

3.1.1. Most frequently reported unique outcomes

Eight unique outcomes were studied or reported in 10 or more articles and were identified as the most commonly studied unique

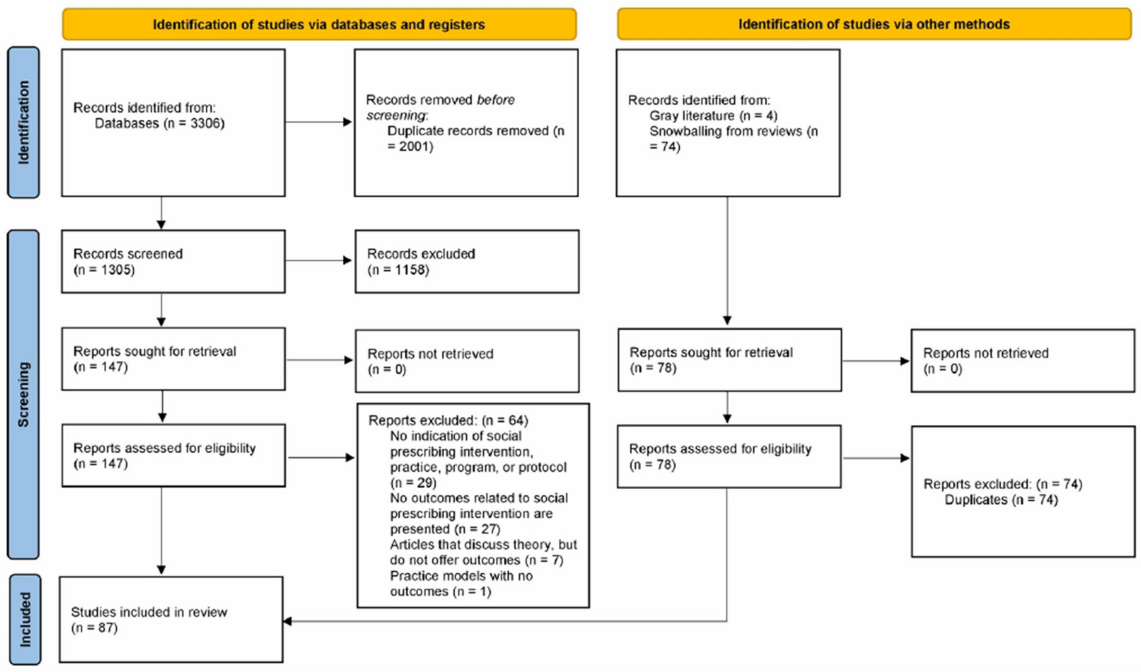

FIGURE 1
PRISMA 2020 flow diagram foe new systematic reviews which included searches of database, registers and other sources (122).

TABLE 2 Types of reviews with accompanying citation.

Review type	*N*	Citation
Systematic	9	(14–22)
Literature	3	(23–25)
Narrative	2	(26, 27)
Scoping	2	(28, 29)
Mapping	1	(5)
Qualitative meta-synthesis	1	(30)
Realist	1	(31)
Systematic scoping	1	(32)
Systematized	1	(33)

TABLE 3 Country breakdown.

Country or region	# of articles reporting outcomes from country/ region	Country or region	# of articles reporting outcomes from country/ region
Australia	7	Scandinavia	1
Canada	6	Scotland	2
Denmark	2	South Korea	1
England	60	Sweden	1
Ireland	3	Taiwan	1
Netherlands	2	United Kingdom*	28
Northern Ireland	1	United States	7
Norway	1	Wales	4
Portugal	2	Did not report	1

Note: Involved multiple countries within the UK.

outcomes (See Table 5). Also notably, weight and BMI were reported in 8 articles.

3.1.2. Most frequently reported outcome categories

Given the variation in terminologies used for outcomes across the articles, same and similar outcomes were grouped into categories to better represent outcome interests across the studies. These categories of outcomes present a more comprehensive view of the outcomes studied in the 87 articles (See Figure 2). The following sections present quantitative and qualitative descriptions of the outcomes found in each category, including how often the more common outcomes were reported, and examples of notable characteristics of some of the included studies. Figures are included for outcomes categories with numerous sub-categories.

3.1.3. Patient outcomes

The review identified a total of 278 unique patient outcomes. The highest prevalence of outcomes fell under the category of mental health, with nearly as many in the lifestyle and behavior category (Table 6).

3.1.3.1. Mental health

The mental health category encompasses 61 unique outcomes and was the largest category of outcomes. Figure 3 presents a set of 6 sub-categories that encompass these 61 mental health outcomes. Mental health outcomes were studied in 49 of the 66 original research articles and protocols included in this review. It was also reported on in all but one of the 21 review articles.

In this category, the most frequently studied unique outcomes were mental well-being in 19 articles, confidence in 16 articles, anxiety in 11 articles, loneliness in 10 articles, depression in 11 articles, and overall mental health in 8 articles. Other commonly studied unique mental health outcomes included mental health related quality of life, dimensions of mood, identity, and sense of self. Figure 3 presents a set of 6 sub-categories that encompass these 61 mental health outcomes.

In a study utilizing the UCL Museum Wellbeing Measure at pre- and post-intervention, Thomson et al. (81) studied outcomes related to mental health among patients who had engaged in a combined program of horticulture and arts-based activities. Similarly, Dayson and Bennett (41) used a mixed-methods approach including interviews and diaries to investigate mental health outcomes related to a social prescribing service over a one-year period, and Foster et al. (46) assessed the impact of a social prescribing intervention developed and delivered by the British Red Cross to decrease loneliness using the UCLA 3-item Loneliness scale and interviews to assess changes in loneliness between demographic groups.

3.1.3.2. Lifestyle and behavior

The second largest category of outcomes was lifestyle and behavior. Among the 56 outcomes presented across 33 papers, the most frequently occurring were self-management in 7 studies, patient activation in 5 studies, smoking status in 4 studies, alcohol consumption in 4 studies, independence in 4 studies, and skill development in 4 studies. This category included 9 sub-categories, as shown in Figure 4.

Self-management, the most commonly studied outcome in this category, is defined as the "tasks that individuals must undertake to live well with one or more chronic conditions" (100). Among the 7 studies that measured self-management, 3 included interviews (36, 45, 89), 1 utilized focus groups (52) and 2 performed both interviews and focus groups (36, 89). Questionnaires were also utilized in 2 studies (35, 95), and one used the Patient Activation Measure (97). It is notable that among the populations studied in relation to self-management, 2 studies reported working with community-dwelling adults with multimorbidities (44, 97).

Patient activation, which refers to the "skills and confidence a person has in managing their own health and health care" Lynch and Jones (62), was noted as relevant to social prescribing due its link to health behaviors, clinical outcomes, and cost for delivering care. Of the 5 studies that measured patient activation, all utilized pre and post questionnaires for data collection, 4 included interviews (71, 95, 96) or focus groups (96) and 4 used the Patient Activation Measure 13 (PAM13), a 13-statement questionnaire exploring patients' beliefs and confidence around the management of their individual conditions (44, 71, 95, 96). Skill development was measured in 4 studies, all of which conducted semi-structured interviews followed by thematic analysis (35, 42, 52, 67).

3.1.3.3. Patient/service user experience

The patient/service user experience category included 45 unique outcomes presented across 24 papers and organized into 6

TABLE 4 Articles included in the review.

#	Original research articles
(34)	Aggar C, Thomas T, Gordon C, Bloomfield J, Baker J. Social Prescribing for Individuals Living with Mental Illness in an Australian Community Setting: A Pilot Study. Community Mental Health J. 2021;57(1):189–95.
(35)	Bertotti M, Frostick C, Findlay G, Harden A, Netuveli G, Renton A, et al. Shine 2014 Final Report: Social Prescribing: integrating GP and Community Assets for Health: UEL Research Repository [Internet]. University of East London; 2015 [cited 2023 Jul 7] p. 1–33. Available from: https://repository.uel.ac.uk/item/8962y
(36)	Bhatti S, Rayner J, Pinto AD, Mulligan K, Cole DC. Using self-determination theory to understand the social prescribing process: a qualitative study. BJGP Open. 2021 Apr;5(2):BJGPO.2020.0153.
(37)	Brettell M, Fenton C, Foster E. Linking Leeds: A Social Prescribing Service for Children and Young People. Int J Environ Res Public Health. 2022 Jan 27;19(3):1426.
(38)	Carnes D, Sohanpal R, Frostick C, Hull S, Mathur R, Netuveli G, et al. The impact of a social prescribing service on patients in primary care: a mixed methods evaluation. BMC Health Serv Res. 2017 Dec 19;17(1):835.
(39)	Cheshire A, Richards R, Cartwright T. 'Joining a group was inspiring': a qualitative study of service users' experiences of yoga on social prescription. BMC Complementary Medicine and Therapies. 2022 Mar 14;22(1):67.
(40)	Dayson C, Bashir N. The social and economic impact of the Rotherham social prescribing pilot: Main evaluation report [Internet]. Sheffield, United Kingdom: Sheffield Hallam University; 2014 p. 1–63. Available from: https://shura.shu.ac.uk/18961/1/Dayson-SocialAndEconomicImpact-Rotherham%28VoR%29.pdf
(41)	Dayson C, Bennett E. Evaluation of Doncaster Social Prescribing Service: Understanding outcomes and impact [Internet]. Sheffield, United Kingdom: Sheffield Hallam University; 2016 [cited 2023 Jul 6] p. 1–34. Available from: https://www.shu.ac.uk/centre-regional-economic-social-research/publications/evaluation-of-doncaster-social-prescribing-service-understanding-outcomes-and-impact
(42)	Dayson C, Painter J, Bennett E. Social prescribing for patients of secondary mental health services: emotional, psychological and social well-being outcomes. Journal of Public Mental Health. 2020 Jan 1;19(4):271–9.
(43)	Efstathopoulou L, Bungay H. Mental health and resilience: Arts on Prescription for children and young people in a school setting. Public Health. 2021 Sep;198:196–9.
(44)	Elston J, Gradinger F, Asthana S, Lilley-Woolnough C, Wroe S, Harman H, et al. Does a social prescribing 'holistic' link-worker for older people with complex, multimorbidity improve well-being and frailty and reduce health and social care use and costs? A 12-month before-and-after evaluation. Prim Health Care Res Dev. 2019 Sep 24;20:e135.
(45)	Farenden C, Mitch C, Feast S, Verdenicci S. Community Navigation in Brighton & Hove Evaluation of a social prescribing pilot [Internet]. Brighton & Hove, United Kingdom: Impetus; 2015 p. 1–68. Available from: https://ihub.scot/media/1656/cn-full-evaluation-nov-2015.pdf
(46)	Foster A, Thompson J, Holding E, Ariss S, Mukuria C, Jacques R, et al. Impact of social prescribing to address loneliness: A mixed methods evaluation of a national social prescribing programme. Health Soc Care Community. 2021 Sep;29(5):1439–49.
(47)	Giebel C, Morley N, Komuravelli A. A socially prescribed community service for people living with dementia and family carers and its long-term effects on well-being. Health Soc Care Community. 2021 Nov;29(6):1852–7.
(48)	Golden TL, Maier Lokuta A, Mohanty A, Tiedemann A, Ng TWC, Mendu M, et al. Social prescription in the US: A pilot evaluation of Mass Cultural Council's "CultureRx." Frontiers in Public Health [Internet]. 2023 [cited 2023 Jul 6];10. Available from: https://www.frontiersin.org/articles/10.3389/fpubh.2022.1016136
(49)	Grant C, Goodenough T, Harvey I, Hine C. A randomised controlled trial and economic evaluation of a referrals facilitator between primary care and the voluntary sector. BMJ. 2000 Feb 12;320(7232):419–23.
(50)	Grayer J, Cape J, Orpwood L, Leibowitz J, Buszewicz M. Facilitating access to voluntary and community services for patients with psychosocial problems: a before-after evaluation. BMC Family Practice. 2008 May 7;9(1):27.
(51)	Hanlon P, Gray CM, Chng NR, Mercer SW. Does Self-Determination Theory help explain the impact of social prescribing? A qualitative analysis of patients' experiences of the Glasgow "Deep-End" Community Links Worker Intervention. Chronic Illn. 2021 Sep;17(3):173–88.
(52)	Hassan SM, Giebel C, Morasae EK, Rotheram C, Mathieson V, Ward D, et al. Social prescribing for people with mental health needs living in disadvantaged communities: the Life Rooms model. BMC Health Serv Res. 2020 Jan 6;20(1):19.
(53)	Hemingway A, Jack E. Reducing social isolation and promoting well being in older people. Quality in Ageing and Older Adults. 2013;14(1):25–35.
(54)	Holt NJ. Tracking momentary experience in the evaluation of arts-on-prescription services: using mood changes during art workshops to predict global wellbeing change. Perspect Public Health. 2020 Sep 1;140(5):270–6.
(55)	Howarth M, Griffiths A, da Silva A, Green R. Social prescribing: a "natural" community-based solution. Br J Community Nurs. 2020 Jun 2;25(6):294–8.
(56)	Jones C, Hartfiel N, Brocklehurst P, Lynch M, Edwards RT. Social Return on Investment Analysis of the Health Precinct Community Hub for Chronic Conditions. Int J Environ Res Public Health. 2020 Jul 21;17(14):5249.
(57)	Kellezi B, Wakefield JRH, Stevenson C, McNamara N, Mair E, Bowe M, et al. The social cure of social prescribing: a mixed-methods study on the benefits of social connectedness on quality and effectiveness of care provision. BMJ Open. 2019 Nov 1;9(11):e033137.
(58)	Kimberlee R. Gloucestershire clinical commissioning group's social prescribing service: Evaluation report [Internet]. Bristol, United Kingdom: University of the West of England; 2016 [cited 2023 Jul 6] p. 1–54. Available from: https://uwe-repository.worktribe.com/output/905835

(Continued)

TABLE 4 (Continued)

#	Original research articles
(59)	Kimberlee RH, Ward R, Jones M, Powell J. Measuring the economic impact of Wellspring Healthy Living Centre's Social Prescribing Wellbeing Programme for low level mental health issues encountered by GP services [Internet]. Bristol, United Kingdom: University of the West of England; 2014 p. 1–111. Available from: https://networks.sustainablehealthcare.org.uk/sites/default/files/resources/2014_kimberlee_0.pdf
(60)	Loftus AM, McCauley F, McCarron MO. Impact of social prescribing on general practice workload and polypharmacy. Public Health. 2017 Jul;148:96–101.
(61)	Longwill A. Independent Evaluation of the Hackney WellFamily Service [Internet]. London, United Kingdom: Family Action; 2014 p. 1–8. Available from: https://www.family-action.org.uk/content/uploads/2014/07/Wellfamily-Evaluation-Summary.pdf
(62)	Lynch M, Jones CR. Social prescribing for frequent attenders in primary care: An economic analysis. Frontiers in Public Health. 2022;10:902199.
(63)	Makanjuola A, Lynch M, Hartfiel N, Cuthbert A, Wheeler HT, Edwards RT. A Social Return on Investment Evaluation of the Pilot Social Prescribing EmotionMind Dynamic Coaching Programme to Improve Mental Wellbeing and Self-Confidence. Int J Environ Res Public Health. 2022 Aug 26;19(17):10658.
(64)	Maughan DL, Patel A, Parveen T, Braithwaite I, Cook J, Lillywhite R, et al. Primary-care-based social prescribing for mental health: an analysis of financial and environmental sustainability. Prim Health Care Res Dev. 2016 Mar;17(2):114–21.
(65)	Mercer SW, Fitzpatrick B, Grant L, Chng NR, McConnachie A, Bakhshi A, et al. Effectiveness of Community-Links Practitioners in Areas of High Socioeconomic Deprivation. Ann Fam Med. 2019 Nov;17(6):518–25.
(66)	Moffatt S, Steer M, Lawson S, Penn L, O'Brien N. Link Worker social prescribing to improve health and well-being for people with long-term conditions: qualitative study of service user perceptions. BMJ Open. 2017 Jul 1;7:e015203.
(67)	Moore EJ, Thew M. Exploring the perspectives of 'young adults' (18–24) who have been in formal care and their experiences of attending a socially prescribed community allotment gardening group. British Journal of Occupational Therapy. 2023 Jan 1;86(1):26–32.
(68)	Morton L, Ferguson M, Baty F. Improving wellbeing and self-efficacy by social prescription. Public Health. 2015 Mar;129(3):286–9.
(69)	Payne K, Walton E, Burton C. Steps to benefit from social prescription: a qualitative interview study. Br J Gen Pract. 2020 Jan;70(690):e36–44.
(70)	Pescheny JV, Gunn LH, Randhawa G, Pappas Y. The impact of the Luton social prescribing programme on energy expenditure: a quantitative before-and-after study. BMJ Open. 2019 Jun 1;9(6):e026862.
(71)	Polley M, Fixen A, Seers H. Evaluation of a Social Prescribing Pilot in Shropshire – implementation and impact findings. European Journal of Integrative Medicine. 2021;48:101949.
(72)	Prior F, Coffey M, Robins A, Cook P. Long-Term Health Outcomes Associated With an Exercise Referral Scheme: An Observational Longitudinal Follow-Up Study. J Phys Act Health. 2019 Apr 1;16(4):288–93.
(73)	Redmond M, Sumner RC, Crone DM, Hughes S. "Light in dark places": exploring qualitative data from a longitudinal study using creative arts as a form of social prescribing. Arts Health. 2019 Oct;11(3):232–45.
(74)	Simpson S, Smith S, Furlong M, Ireland J, Giebel C. Supporting access to activities to enhance well-being and reduce social isolation in people living with motor neurone disease. Health Soc Care Community. 2020 Nov;28(6):2282–9.
(75)	South J, Higgins TJ, Woodall J, White SM. Can social prescribing provide the missing link? PHC. 2008;9(4):310–8.
(76)	Stickley T, Eades M. Arts on prescription: a qualitative outcomes study. Public Health. 2013 Aug;127(8):727–34.
(77)	Stickley T, Hui A. Social prescribing through arts on prescription in a U.K. city: participants' perspectives (part 1). Public Health. 2012 Jul;126(7):574–9.
(78)	Sumner RC, Crone DM, Baker C, Hughes S, Loughren EA, James DVB. Factors associated with attendance, engagement and wellbeing change in an arts on prescription intervention. J Public Health (Oxf). 2020 Feb 28;42(1):e88–95.
(79)	Sumner RC, Crone DM, Hughes S, James DVB. Arts on prescription: observed changes in anxiety, depression, and well-being across referral cycles. Public Health. 2021 Mar;192:49–55.
(80)	Thomson LJ, Lockyer B, Camic PM, Chatterjee HJ. Effects of a museum-based social prescription intervention on quantitative measures of psychological wellbeing in older adults. Perspect Public Health. 2018 Jan;138(1):28–38.
(81)	Thomson LJ, Morse N, Elsden E, Chatterjee HJ. Art, nature and mental health: assessing the biopsychosocial effects of a "creative green prescription" museum programme involving horticulture, artmaking and collections. Perspect Public Health. 2020 Sep;140(5):277–85.
(82)	Vogelpoel N, Jarrold K. Social prescription and the role of participatory arts programmes for older people with sensory impairments. Journal of Integrated Care. 2014 Jan 1;22(2):39–50.
(83)	Wakefield JRH, Kellezi B, Stevenson C, McNamara N, Bowe M, Wilson I, et al. Social Prescribing as 'Social Cure': A longitudinal study of the health benefits of social connectedness within a Social Prescribing pathway. J Health Psychol. 2022 Feb 1;27(2):386–96.
(84)	White J, Kinsella K, South J. An evaluation of social prescribing health trainers in south and west Bradford. Leeds, United Kingdom: Leeds Metropolitan University; 2010 Dec p. 1–39.
(85)	Wigfield A, Kispeter E, Alden S, Turner R, Clarke T. Age UK's fit for the future project [Internet]. Leeds, United Kingdom: University of Leeds; 2015 p. 1–112. Available from: https://www.ageuk.org.uk/globalassets/age-uk/documents/reports-and-publications/evaluation-reports/fit-for-the-future-project---final-evaluation-report-july-2015.pdf

(Continued)

TABLE 4 (Continued)

#	Original research articles
(86)	Wildman J, Wildman JM. Evaluation of a Community Health Worker Social Prescribing Program Among UK Patients With Type 2 Diabetes. JAMA Netw Open. 2021 Sep 1;4(9):e2126236.
(87)	Wildman J, Wildman JM. Impact of a link worker social prescribing intervention on non-elective admitted patient care costs: A quasi-experimental study. Soc Sci Med. 2023 Jan;317:115598.
(88)	Wildman JM, Moffatt S, Steer M, Laing K, Penn L, O'Brien N. Service-users' perspectives of link worker social prescribing: a qualitative follow-up study. BMC Public Health. 2019 Jan 22;19(1):98.
(89)	Wood CJ, Polley M, Barton JL, Wicks CL. Therapeutic Community Gardening as a Green Social Prescription for Mental Ill-Health: Impact, Barriers, and Facilitators from the Perspective of Multiple Stakeholders. Int J Environ Res Public Health. 2022 Oct 20;19(20):13612.
(90)	Wood E, Ohlsen S, Weich S, Fenton SJ. Understanding Social Prescribing for People With Comorbid Mental and Physical Health Conditions. A Realist Evaluation. International Journal of Qualitative Methods. 2020;19:56.
(91)	Woodall J, Trigwell J, Bunyan AM, Raine G, Eaton V, Davis J, et al. Understanding the effectiveness and mechanisms of a social prescribing service: a mixed method analysis. BMC Health Serv Res. 2018 Aug 6;18(1):604.
(92)	Zhu E, Ahluwalia JS, Laws MB. An Evaluation of Connect for Health: A Social Referral Program in RI. R I Med J (2013). 2020 Jun 1;103(5):65–9.
(93)	Healthy Dialogues [Internet]. 2023 [cited 2023 Jul 6]. Merton Social Prescribing Programme Evaluation – Healthy Dialogues. Available from: https://healthydialogues.co.uk/case_study/social-prescribing_v2/
Protocol articles	
(94)	Dingle GA, Sharman LS, Hayes S, Chua D, Baker JR, Haslam C, et al. A controlled evaluation of the effect of social prescribing programs on loneliness for adults in Queensland, Australia (protocol). BMC Public Health. 2022 Jul 19;22(1):1384.
(95)	Halder MM, Wakefield JR, Bowe M, Kellezi B, Mair E, McNamara N, et al. Evaluation and exploration of a social prescribing initiative: Study protocol. J Health Psychol. 2021 Mar;26(3):345–56.
(96)	Hoffmeister LV, Nunes MF, Figueiredo CEM, Coelho A, Oliveira MFF, Massano P, et al. Evaluation of the Impact and Implementation of Social Prescribing in Primary Healthcare Units in Lisbon: A Mixed-Methods Study Protocol. Int J Integr Care. 2021 Jun 21;21(2):26.
(97)	Kiely B, Clyne B, Boland F, O'Donnell P, Connolly D, O'Shea E, et al. Link workers providing social prescribing and health and social care coordination for people with multimorbidity in socially deprived areas (the LinkMM trial): protocol for a pragmatic randomised controlled trial. BMJ Open. 2021 Feb 1;11(2):e041809.
(98)	Moffatt S, Wildman J, Pollard TM, Penn L, O'Brien N, Pearce MS, et al. Evaluating the impact of a community-based social prescribing intervention on people with type 2 diabetes in North East England: mixed-methods study protocol. BMJ Open. 2019 Jan 15;9(1):e026826.
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(Continued)

TABLE 4 (Continued)

#	Review articles
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TABLE 5 Most studied unique outcomes.

Most Frequently Reported Unique Outcomes (≥10)	# of Articles
Overall wellbeing	19
Confidence	16
Social isolation	16
General practitioner (GP) Visits	14
Anxiety	11
Physical activity	11
Depression	11
Loneliness	10

sub-categories (See Figure 5). Enjoyment, as a social prescribing user experience, was measured in 14 papers, and patient satisfaction was reported in 8 papers. Ten different outcomes related to relationships with the service provider were reported in six papers and two papers reported on health and social cost to patients. Four papers reported on program quality and three reported on attendance in SP activities. Additionally, there were four outcomes concerned with accessibility, including access to social, emotional, and practical support, access for people with mental health issues, and access related to mobility issues such as transport, equipment provision, and using mobility aids in a community home environment.

Simpson et al. (74) analyzed findings of a pilot service based in England using a thematic analysis after interviewing people living with motor neuron disease and link workers post-intervention. Hanlon et al. (51) also employed a thematic analysis of semi-structured interviews with 12 patients in Scotland referred to Community Links Practitioners using a Self-Determination Theory. Distinctly, Hoffmeister et al. (96) presented an evaluation protocol for the first SP program in Portugal. They embarked on a mixed-methods approach that entailed a longitudinal, prospective study with data collected via questionnaires by patients at four time-points. In addition, secondary data was collected on medical records and both interviews and focus groups were conducted with key stakeholders.

3.1.3.4. Relationships and social connections

The relationships and social connections category was organized into 4 subcategories, as shown in Figure 6. Social connection and social support were the most significant of those sub-categories. Across 36 different outcomes studied and reported on in 33 papers, the most common unique outcome studied was social isolation, which was measured in 16 studies. The next most common outcomes were social connectedness which was reported in 7 articles, and social connection which was reported in 5. Other commonly studied outcomes included social networks, which was reported on in 4 articles, social relationships in 4 articles, and group membership, also in 4 articles. Alongside these outcomes are the inclusion of reported social support in 4 articles and friendship which was reported across 5 studies. Reconnection and social engagement were also reported in two studies each.

Notably, when Moore et al. (67) explored the thoughts of young adults (18–24) in a social prescribing gardening group, they found that all participants described a sense of social connection, not only within the group itself, but also in the local community. Another qualitative

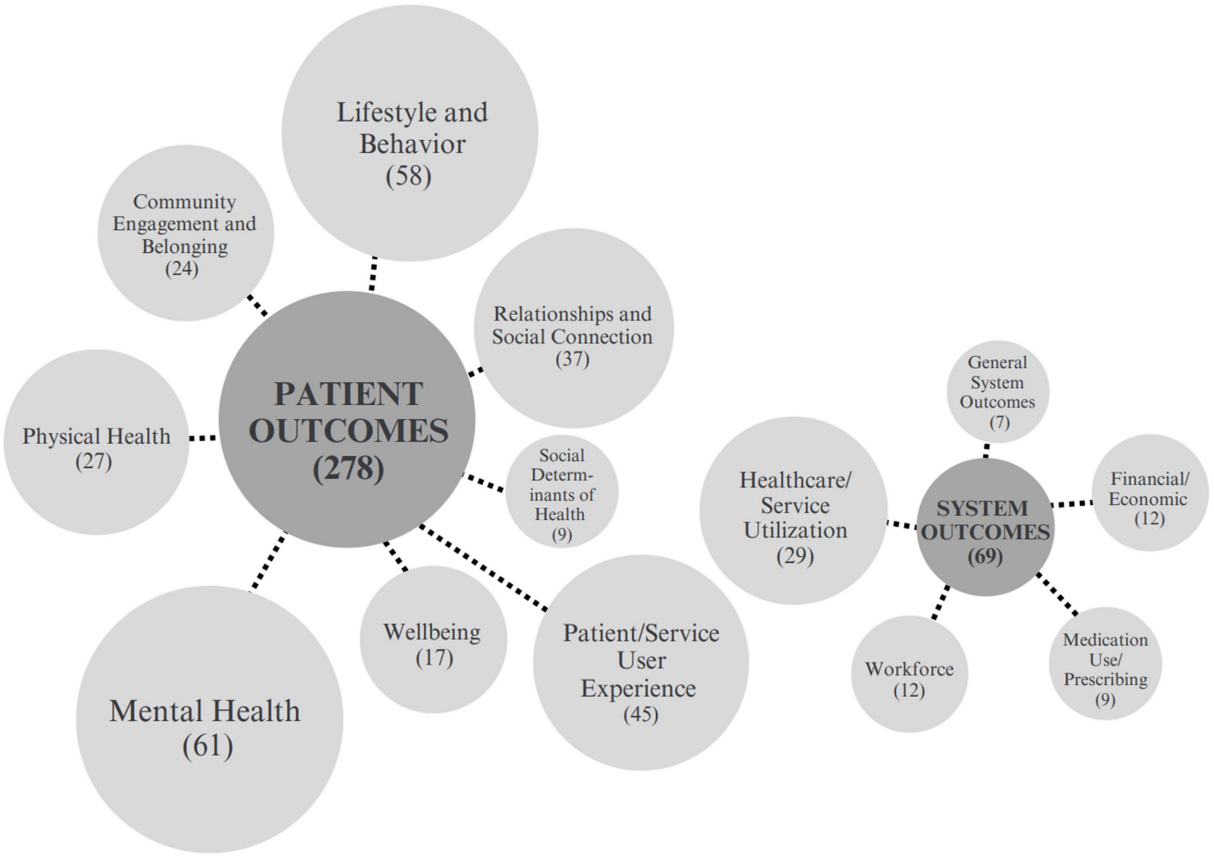

FIGURE 2
Outcome categories.

study exploring social isolation among older adults (53) reported that participants felt particularly benefited by the friendship of their peers, whether new or maintained, and being able to have a shared world view with someone.

3.1.3.5. Physical health

In the physical health category, 28 different physical outcomes were reported across 23 articles. The most common unique outcome studied was physical activity, which was measured in 11 studies. Studies that assessed physical activity among program participants tracked dimensions of activity, such as frequency (56) and intensity (85). Weight and BMI were measured in 8 studies and blood pressure was measured in 3 studies. Moffatt et al. (98) presented a quasi-experimental mixed-method study protocol for evaluating changes in glycated hemoglobin, weight, cholesterol, and smoking status using Secondary Uses Service and Quality Outcomes Framework data, and ethnographic methods, including observation, interviews and focus groups, to observe how patients engage with social prescribing. Other physical health outcomes studied included sleep, energy, pain, and mobility.

3.1.3.6. Community engagement and belonging

The community engagement and belonging category was comprised of 24 unique outcomes, including belonging, social belonging, sense of community, community identification, and community connection. Among the 24 outcomes reported across 19 articles, belonging was reported 3 times.

For example, Moore and Thew (67) reported that feeling a sense of belonging, not just within the social prescribing activity group itself but also with their local community, was one of the most important motivators for engaging in community allotment programs. Additionally, Wakefield et al. (83) documented that a sense of belonging allowed individuals to feel that social support is available from others, thereby helping them feel less lonely. Hassan et al. (52) documented how lack of community-based social care opportunities result in patients looking for social support from public health and how SP brought patients a sense of social belonging. Stickley and Eades (76) reported that the structure of the community-based program enhanced the patient's experience by providing social support. Golden et al. (48) reported on an evaluation of a state-level arts prescribing program that included 12 pilot sites. The evaluation found that enhanced community connection was a benefit for participating patients as well as for healthcare providers as they perceived it as a way to increase their care capacity.

3.1.3.7. Wellbeing

The wellbeing category is composed of 17 unique outcomes that address various aspects of wellbeing and which were reported across 44 articles. The most commonly measured outcome was mental well-being, which was reported in 19 articles. Some articles reported on

TABLE 6 Patient level outcomes.

Patient-level outcomes	Number of unique outcomes in the category
Mental health	61
Lifestyle and behavior	58
Patient/service user experience	45
Relationships and social connection	37
Physical health	27
Community engagement and belonging	24
Wellbeing	17
Social determinants of health	9
Total	278

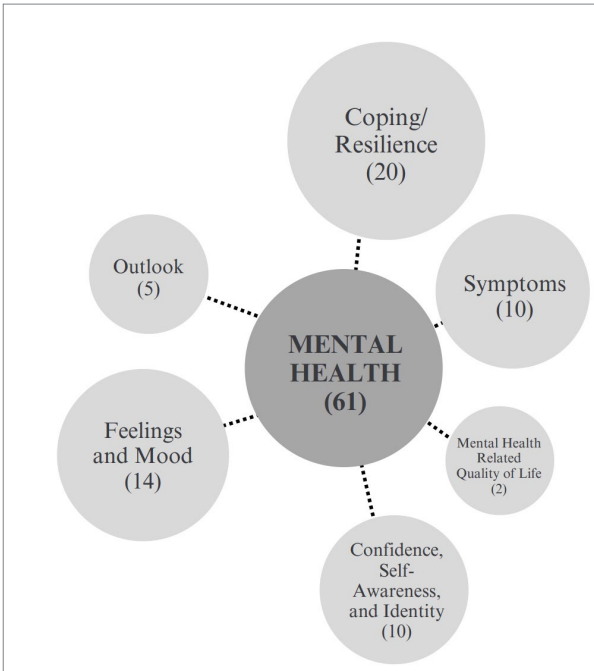

FIGURE 3
Mental health outcomes sub-categories.

other specific aspects of well-being, such as physical well-being, social well-being, emotional well-being, personal well-being, and psychological well-being.

Additional outcomes in the wellbeing category included quality of life, which was reported in 9 articles and general health, which was reported in 6 studies. Among those measuring general health, 4 conducted interviews while 6 utilized surveys and questionnaires with tools such as the Dartmouth COOP/WONCA functional health assessment chart (49) and the World Health Organization QoL tool (WHOQoL) (34). Giebel et al. (47) explored the effects of social prescribing on individuals with dementia and family caregivers in England by measuring participants' wellbeing at baseline and at three and six-month follow-up periods.

3.1.3.8. Social determinants of health

The social determinants of health (101) category included 9 different outcomes, reported in 9 articles, including housing in 2 studies, employment and support with work in 3 studies, and access to resources in 1 study. A significant area of inquiry in this category was related to welfare services, including welfare needs, awareness of welfare benefits, and access to wider welfare benefits. One study also measured access to resources and management of social determinants of health by employing interviews with patients and providers (92). In a study that tested prospective findings against published findings from a systematic search, Payne et al. (69) assessed participants' perception of their personal assets and their future.

3.1.4. System-level outcomes

The review identified a total of 69 unique system outcomes. The highest prevalence of outcomes (29) fell under the category of healthcare and service utilization. Financial and economic outcomes were also commonly measured, as were outcomes related to workforce. Other commonly studied outcomes included financial and/or economic, workforce, medication use/prescribing, and general system outcomes (Table 7).

3.1.4.1. Healthcare/service utilization

Among 29 unique outcomes identified across 26 papers and organized into 6 sub-categories, the most studied in the healthcare/service utilization category was mental health and social care utilization. This outcome was reported in 8 articles. Other unique outcomes included clinical referrals, length of stay and time spent with care providers. Visits to general or primary care practitioners and emergency service visits were also reported across 10 articles (Figure 7).

Other studies outcomes included number of hospital admissions in 2 articles, inpatient admissions and stays in 2 articles, outpatient encounters in 3 articles, and nurse visits in 2 articles. South et al. (75), considered how the social prescribing intervention extended primary care by offering a public health intervention and building health alliances. Referrals were also assessed in 3 articles. Notably, methods for measuring healthcare utilization were variability across studies, including patient self-reports and analyzes of administrator-driven patient records.

3.1.4.2. General system outcomes

The general system outcomes category captures 7 outcomes reported across 5 papers that relate more generally or holistically to the healthcare system. For example, within a comprehensive program evaluation, Farenden et al. (45) assessed health equality, integration of services, and institutional partnerships formed using patient interviews and surveys with both volunteers and general practitioners (GPs). Other articles reported general outcomes such as the expansion of care options, group based psychological resources (94) and general practitioner recognition of need for change in health services.

3.1.4.3. Medication Use and prescribing

One of the smaller categories of outcomes was medication use and prescribing. This category encompasses 9 unique outcomes reported across 10 papers, and including medication use, medication consumption, prescription for all drugs, psychotropic medication use, and anti-depressant compliance. Also included in this category were studies of the number of prescriptions dispensed, number of patients

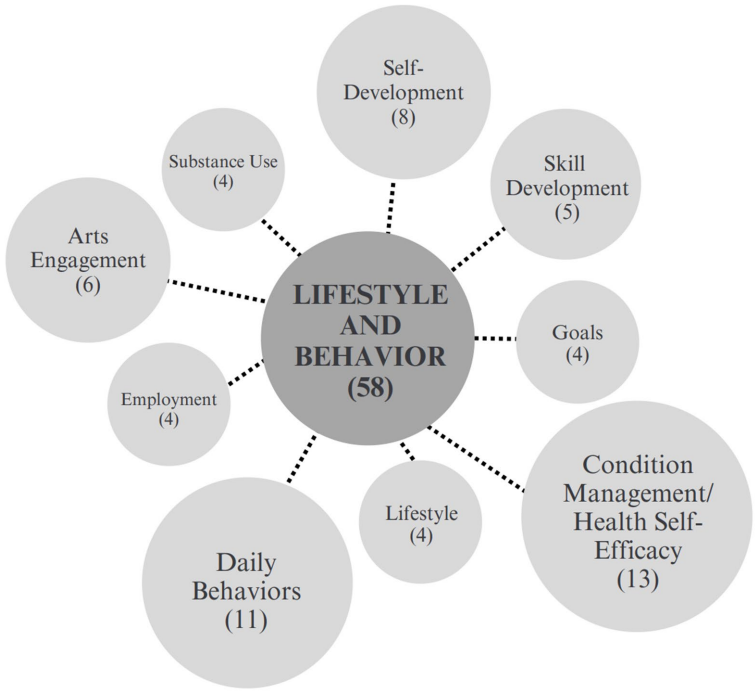

FIGURE 4
Lifestyle and behavior sub-categories.

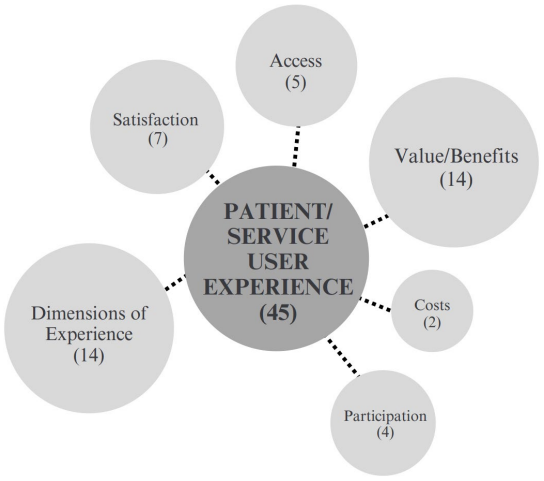

FIGURE 5
Patient and service user experience.

with no new repeat medications, number of medications, and number and type of regularly prescribed medications. For example, Kiely et al. (97) published a protocol for a pragmatic randomized controlled trial designed to assess an array of outcomes, including the number and type of regularly prescribed medications.

3.1.4.4. Financial/economic outcomes

The financial and economic outcomes category included 12 unique outcomes, which were reported in 14 articles. One of the more common outcomes in this category was Social Return on Investment (SROI), which assigns monetary value to social outcomes, and was reported in 5 articles. This category also included cost savings per participant reported in 1 study, total care costs reported in 2 studies, cost per patient in 2 studies, health cost savings in 2 studies, and the leveraging of funding from additional sources, financial savings, carbon savings, and psychotropic medication costs, which were each reported in 1 study.

For example, Maughan et al. (64) reported on how social prescribing services can reduce financial burdens and lower environmental costs of health care. Wildman and Wildman (87) studied the effect of social prescribing interventions on patients in areas of high socioeconomic deprivation. From a holistic perspective, Lynch and Jones (62) studied the economic benefits arising from changes in healthcare resources after implementing social prescribing interventions.

3.1.4.5. Workforce

The workforce category includes 13 unique outcomes reported across 9 papers, and related to workforce experiences, perceptions, and outcomes. Workforce members include caregivers, volunteers, and staff. Outcomes measured in this category include staff turnover, volunteering, volunteer well-being, caregiver well-being, and link workers' experiences. Each of these outcomes was reported in 1 study.

For example, Simpson et al. (74) studied training needs and how link workers were employed through the service of social prescribing through a co-design, while Longwill (61) measured staff turnover and knowledge of staff. Other single studies assessed prescriber well-being, prescriber work experience, and provider workload.

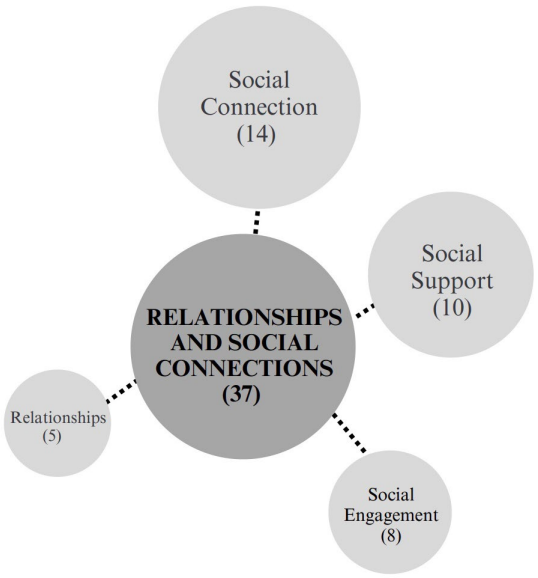

FIGURE 6
Relationships and social connections.

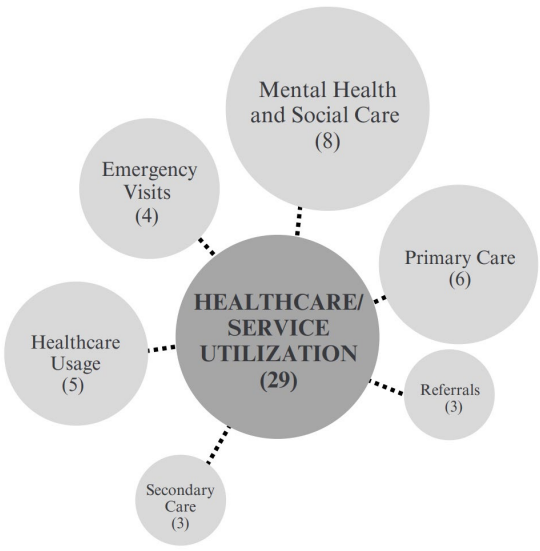

FIGURE 7
Healthcare/service utilization sub-categories.

TABLE 7 System level outcomes.

System-level outcomes	*N*
Healthcare and service utilization	29
Financial/economic	12
Workforce	12
Medication use/prescribing	9
General system outcomes	7
Total	69

4. Discussion

This mapping review identified, categorized, and described a broad array of outcomes that have been studied in relation to social prescribing programs in the 13 countries cited in the World Health Organization's Social Prescribing Toolkit (2). It identified 347 unique outcomes, including 278 patient-level outcomes (e.g., mental health, lifestyle and behavior, community engagement and belonging) and 69 systems-level outcomes (e.g., healthcare/service utilization, medication use/prescription). It identified the most frequently studied unique outcomes, as well as the most frequently studied categories of patient- and system-level outcomes. This work builds on and advances previous work undertaken in the UK that has identified and collated program outcomes studied in that nation, where social prescribing has been operating informally for over three decades but has been formally part of the National Health Service (NHS) delivery since 2019. While many of the outcomes and outcome categories identified in this mapping review align with that of the previous work undertaken by Polley et al. (4, 5), this review identified a wider range of outcomes that represent a wider geographic area of programming as well as a more recent period of time in which more programming has been implemented and more research and evaluation undertaken.

4.1. Mental health

Mental health was the most frequently studied outcome area across the articles included in this review. Strong interest in mental health outcomes aligns with the international mental health crisis which has been exacerbated by the COVID-19 pandemic (102), and with the aims of social prescribing programs to address and promote mental health across the lifespan (103, 104). The range of 61 unique mental health outcomes found in this review reflect the nascent stage of research on social prescribing, but also offer nuanced insight into how the broad range of social prescribing programs that are being implemented affect a wide range of dimensions of mental health. This heterogeneity may be positive in regard to the study of outcomes across diverse populations, whose lived experiences and priorities vary greatly, making a variety of measures necessary to addressing mental health more equitably and with the nuanced insight it both requires and deserves. However, this heterogeneity-and that represented across other outcome categories in this review - poses significant challenges to evidence synthesis, and particularly to opportunities for meta-analysis of specific outcomes that can help advance evidence-based practice and policy. To date, very few systematic reviews or meta-analyzes exist to guide practice, research, policy, or investment in social prescribing, and the evidence base is consistently referred to as lacking in quality (16). These circumstances limit advancement of promising practices, as well as investment and policy that could make the benefits of social prescribing more available to individuals and health systems.

4.2. Relevance to emerging research priorities: loneliness and social isolation

This review identified outcomes that, given their relationship to critical health and social issues, warrant both broader and deeper study. Two categories–community engagement/belonging and

relationships/social connection - are together concerned with outcomes related to loneliness and social isolation or connection. This area of study aligns with the growing understanding of the impacts that loneliness and social isolation have on health outcomes (105), and highlights the potential for social prescribing programs to play a role in addressing these critical issues. Further research that explores this potential is highly warranted.

4.3. Non-communicable diseases

Another emerging topic of research was non-communicable or chronic diseases (NCDs), which are responsible for 74% of all deaths globally and 86% of premature deaths in middle- and low-income countries (106). This review highlights numerous outcomes related to opportunities for better outcomes and management related to NCDs that could be afforded by social prescribing. Outcomes in the physical health and lifestyle and behavior categories, namely outcomes such as patient activation, self-management, social connection, support, and coping may be frequently measured due to their link to health behaviors, clinical outcomes, and cost for delivering care. Additionally, the prevalence of outcomes related to physical activity, weight, and BMI suggests potential for social prescribing programs to help address epidemics of obesity in many nations as well. NCD deaths are often linked to health behaviors and health management skills, and have also been studied in relation to environmental risk factors such as disasters (107), as well as international aid and country wealth (108). Identifying growth outcome areas such as these may embolden public and systems understanding that urgent public health issues such as chronic disease, mental health, collective trauma, racism, and social exclusion and isolation are challenges that social prescribing, and especially programs that include arts and culture, can help address (109). Additionally, social prescribing research should consider individuals living with disabilities and working toward disability justice–what writer, poet Naomi Ortiz defines as "a cross-disability (sensory, intellectual, mental health/psychiatric, neurodiversity, physical/mobility, learning, etc.) framework that values access, self-determination and an expectation of difference" (110, 111).

4.4. Health equity

Some attention is being given to how social prescribing can potentially help address and advance health equity, as well as to its potential to exacerbate health disparities (112, 113). However, in this review, very few studies addressed or examined health equity. One article presented health equality as an outcome (45), and control of health, which connects with the understanding of health equity being defined as "the attainment of the highest level of health for all people" (114) was explored in 1 study (39). Though access to services were addressed in several articles, an explicit focus on measuring equity was not clear. There has been recent debate as to the potential of social prescribing to reduce health inequalities. The aim is part of some countries' core principles in developing social prescribing schemes as part of developments in personalized care, patient empowerment, reducing healthcare pressures, and addressing key social determinants of health (115, 116). However, social prescribing only addresses some of the causes of health inequalities, which is compounded by the fact that the same social factors that affect people's health can also impact their capacity to engage with social prescribing, meaning that even well-intentioned social prescribing programs could inadvertently disproportionately benefit the healthier, widening the gap in health disparities (117). Nonetheless, there is promise from case studies of well-targeted social prescribing programs, and a greater focus on assessment of outcomes related to equity and health equity is critical.

An important aspect of examining the relationship of social prescribing to health equity is the collection of sociodemographic information. The Institute for Healthcare Improvement recommends not only collecting sociodemographic characteristics of individuals, but also calls for better calculation of stratified measures of disparities, which include opportunities to observe within-group differences in addition to between-group differences, such as Asian subpopulations (e.g., Chinese, Indian) and black subpopulations (e.g., US-born Black vs. Haitian vs. Nigerian)" (118). One of the studies in this review (45) noted that equalities monitoring data for patients is not consistently collected by primary care services and made a recommendation inclusion of specialists in equalities to be engaged in social prescribing research. Furthering this idea, future social prescribing research should scaffold the foundations of data collection with measures specific to health equity and intercultural justice. Resources such as the Health Equity Measurement Framework (119) and Health Equity Measurement Framework for Medicaid Accountability (118, 120) can inform these decisions. In the UK, indices of multiple deprivation (IMD) are frequently used to collect granular demographic information in social prescribing research. However, this approach, and even the concept of deprivation, is not common in some other nations such as the United States. As public health in some areas shifts from a focus on social determinants of health to social drivers of health, social need screenings should address these social drivers of health, namely food insecurity, housing instability, transportation problems, utility needs, and interpersonal safety. This would require cultural shifts in both programming and research practices to evolve from over-studying the experiences of predominantly White populations that fail to include or reflect the lived experience of People of the Global Majority using better typologies of health equity measures (121).

4.5. Implications for future evidence synthesis

This review identified several challenges to searching the social prescribing outcomes literature as well as in the reporting of outcomes. One challenge was that, at the time that this search was conducted, social prescribing was not consistently defined or described in the literature. Subsequently however, Muhl et al. (1) created a highly useful set of internationally accepted conceptual and working definitions for social prescribing. This work has great promise for advancing reporting on social prescribing as well as for advancing the precision of future evidence synthesis. To date, many publications have failed to report on the involvement of clinicians, link workers, and referral processes, highlighting the need for development of reporting guidelines for social prescribing outcomes research. Additionally, this review identified search terms that can be problematic in relation to social prescribing. For example, the term social referral is used in relation to social prescribing and is also a

marketing term used to describe the phenomenon by which people refer a product to someone else. Terms used in relation to primary care and general practitioner services (e.g., GP surgeries, GP attendance, primary care visits) also vary widely across countries. As healthcare service utilization is a common and important area of study, search strategies must be inclusive of a variety of terms. Lastly, many of the outcomes identified in this review, such as user experience and social relationships, are not easily measured through quantitative means. This highlights the need for mixed methods research designs that can capture both quantitative and qualitative dimensions of social prescribing and its outcomes.

4.6. Strengths and limitations

There were several strengths and limitations in this review. A primary strength was that the review was able to use and build on search strategies developed by research teams in the UK, with permission and input from the authors (4, 5). Another significant strength of the study was the wide scope of inquiry that the mapping review methodology allowed. The review was able to include protocols, reviews, and studies utilizing any research methods, as well as program evaluations and reports. The inclusion of reviews helped to ensure that the search strategy was effective and allowed consideration of how other researchers had considered, quantified, and categorized outcomes. This review was not duplicative of previous reviews, which were generally focused on different or smaller geographic areas. Additionally, the review sought to categorize unique outcomes from the literature which presents patterns and trends in an easily comprehensible manner. This review took care to document outcomes in the bespoke ways in which they were studied and to which they were referred (specific language) in the respective publications. This approach allowed for precision and inclusion of a wide array of concepts and concerns related to social prescribing outcomes across the 13 nations. It provided the opportunity for development of more granular categories of outcomes and for a wider articulation of the impacts of social prescribing interventions than have previously been published. Finally, the categorization process undertaken in this review was important, as many of the unique outcomes identified were very similar in nature, and often referred to the same concepts in different terms. As such, the categorization presented offers meaningful suggestions for outcomes that could be prioritized in future studies to advance the potential for evidence synthesis, which is critical to advancing evidence-based practice, policy, and investment in this promising area of practice.

One limitation of the review was the inconsistency in definitions used for social prescribing which posed a significant challenge when screening articles, and to a lesser extent, through the extraction process. While the topic of social prescribing is understandably nascent, general consensus includes some "prescribing" aspect in a traditionally clinical environment, meaning that even before a link worker or equivalent professional is involved, a healthcare worker of some kind is the impetus for a patient accessing a community-based activity. Several terms used in the articles were confounding, including "community referral" and "social referral." Due to the lack of consistency in terminology related to social prescribing and its component parts, the study team was left to discern what qualified as social prescribing. As a result, some relevant articles may have been excluded. Further, this review may not have captured the breadth of current work on social prescribing as a large portion of research into social prescribing goes unpublished or is documented in the restricted format of reports by a private company or health system. Finally, this mapping review did not undertake a critical appraisal process. As such, the relative quality of each study may not reflect a high level of rigor. This aligns with calls from the field for more rigorous studies and more systematic processes (16).

5. Conclusion

From a synthesis of research conducted in 13 countries, this mapping review has shown that social prescribing has relevance to over 300 health and health system outcomes, and that outcomes related to mental health, lifestyle, and behavior are most frequently studied. The review highlights the need for more complex study designs that can take account of multiple outcome measures across diverse populations. It contributes to the advancement of evidence synthesis for social prescribing globally by quantifying and offering insight into the outcomes that have been studied to date and by laying a foundation for the development of key common outcomes and a Core Outcomes Set, both of which will be critical to increasing precision and quality in social prescribing research. While breadth in outcomes research is essential to measurement and relevance across diverse health needs in different populations and parts of the world, consistency in measurement of key common outcomes is also essential to building the potential for meta-analysis and, in turn, evidence-based practice and policy.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

JS: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing, Resources, Supervision, Validation, Visualization. NM: Writing – review & editing, Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Validation. CB: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Supervision, Validation, Writing – original draft, Writing – review & editing. JM-D: Conceptualization, Investigation, Methodology, Writing – review & editing, Writing – original draft. SA: Investigation, Writing – original draft, Writing – review & editing, Data curation, Formal analysis. SM: Data curation, Formal analysis, Investigation, Writing – original draft, Methodology. OO: Data curation, Formal analysis, Investigation, Writing – original draft. GH: Data curation, Formal analysis, Investigation, Writing – original draft, Project administration, Supervision. GM: Data curation, Formal analysis, Investigation, Writing – original draft. GD: Data curation, Formal analysis, Investigation, Writing – original draft, Methodology, Validation. AR: Data curation, Formal analysis, Investigation, Methodology, Writing – original draft, Conceptualization, Project

administration, Writing – review & editing. SB: Validation, Writing – original draft, Writing – review & editing. AC: Validation, Writing – original draft, Writing – review & editing. VP: Supervision, Validation, Writing – original draft, Writing – review & editing. DF: Writing – review & editing, Validation.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fmed.2023.1266429/full#supplementary-material

SUPPLEMENTARY TABLE 1
Citations by patient outcomes.

SUPPLEMENTARY TABLE 2
Search strategy.

SUPPLEMENTARY FIGURE 1
Systems-level outcomes reported by country.

SUPPLEMENTARY FIGURE 2
Patient-level outcomes reported from each country.

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Ethical questioning in arts and health-based research: propositions and reflections

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Ethical questioning is a framework for considering the ethical implications and practices in research and is used as a tool for thinking about the connections between art and health. It enables researchers and practitioners to gain a deeper understanding of the emotional dimensions in the field of art and health. In this paper, we propose that ethical questioning, grounded in the principles of ethics of care, can foster a more reflexive and holistic approach to understanding the concept of well-being. We also propose that adopting ethical questioning as a methodology, which requires intentional self-reflection and recognition of positionality, can expose and challenge conventional knowledge hierarchies, resulting in more ethical research outcomes and relationships between researchers and participants. Ultimately, our hypothesis proposes that ethical questioning holds the potential to offer an actionable practice that demonstrates ethics of care.

KEYWORDS

ethical questioning, art and health, reflection, social justice, ethics of care

Introduction: ethical questioning in art, health, and well-being research

Ethical questioning is "the process of asking practice-oriented and critical questions that have ethical implications in order to better understand or challenge the system one is working in" (Afolabi, 2021a, p. 353). EQ takes on the canons of reflexivity, praxis, and social justice. These values anchor EQ in order to turn ethics into a political act (Afolabi, 2021b). EQ's framework has three stages: reflection *before-action*, *in-action*, and *on-action* (Afolabi, 2021b). Based on the framework, EQ provokes the act of questioning through a series of questions (Afolabi, 2021b). One of the Feminist founders of ethics of care theory, Virginia Held, posits that ethics of care is both a value and a practice, but ultimately it is premised on a heightened attention to the needs of others that uses an epistemological process that continuously questions what moral choice is best while embraces the influence of emotion instead of rejecting it (Held, 2006, p. 10). Noddings (1982), another founder of ethics of care, argues that a caring relationship is the core of human existence and consciousness (Sander-Staudt, 2023). Ethics of care offers an alternative framework to Kantian deontology or Utilitarianism and is often compared to virtue ethics, but some theorists like Sander-Staudt maintain that ethics of care is unique because it prioritizes care as a way to address injustices (Sander-Staudt, 2006). Rather than considering ethics of care as an abstract concept, EQ offers a tangible and pragmatic entry point "…to better understand or challenge the system one is working in"

(Afolabi, 2021b, p. 353). By engaging in intentional reflection 'before-in-and-on action' and asking questions from intersectional perspectives (such as environmental, political, and social), EQ fosters a relational and inquiry-based process (Afolabi and Llewellyn, 2022). This intentional approach is in contrast with transactional or result-driven mindsets, encouraging stakeholders to reflect on their assumptions and biases (Hankivsky, 2004). The interconnections between art and health have been of interest to researchers who have studied it using both quantitative and qualitative research methods (Stuckey and Nobel, 2010; Leavy, 2023). Fraser and Al Sayah (2011) pinpoint a particular rise of interest in the relationship between art and Western medicine that can be traced back to the emergence of health-promoting posters after World War II, positioning it as a theme within historical contexts. The arts challenge dominant knowledge creation and dissemination, offering alternate ways of thinking and understanding its impact on health (Capous-Desyllas and Morgaine, 2018, as cited in Leavy, 2009; Barone and Eisner, 2012). Although art can be both therapeutic and empowering, art in health-related contexts requires intentional reflexivity to consider the emotional welfare of others and other ethical implications (Lankston et al., 2010; Boydell et al., 2012). This paper argues that adopting ethical questioning as a framework enables practical engagement with the ethics of care, addressing the need for reflexive practice (Aluwihare-Samaranayake, 2012).

We engage with the ethical questioning (EQ) framework in our different disciplines and spaces; applied theatre, medical humanities, and visual art. Structurally, the article starts with (§1) the authors' positionality to centre the ways our diverse experiences, exposures and expertise have informed our choices and the development of an inquiry-based process, followed by a reflection on why self-reflection and positionality can play such a key role within this space. Next, (§2) an overview of existing scholarship in arts and health-based research and introduces the idea of how ethics and care and ethical questioning in art-based research can offer new perspectives, elaborating on the role that arts-based approaches (when supported by an ethics of care approach) can play in disrupting knowledge hierarchies. Finally, (§3), through a series of case studies, the authors explore the ways in which ethical questioning guides research on art, health and well-being to consider how ethical questioning and the principles of ethics of care, can (re)shape health-based research and the crucial role that positionality and ethical questioning can play within the field of art and health. The paper concludes with key points of convergence and divergences.

Positionality as an approach to ethical questioning

Built on reflectivity, EQ takes the practice of positioning seriously. Positionality has the potential for deep reflection, context building and value checks. Starting with oneself rather than the other is essential. Self-positionality, the socio-political, cultural, economic and geographical context, creates one's identity and the ways one's identity influences and informs one's biases, perceptions and outlook on the world. EQ starts with social identity mapping (that is, identifying features that makeup one's context and worldview) (Jacobson and Nida, 2019). Social identity mapping requires asking self-revealing questions that reveal the position one may hold, the values attached to one's identity and emotional connections to the details of one's social identity. The culture and practice of questioning to identify ethical realities is the concern of ethical questioning (Afolabi, 2021b; Afolabi and Llewellyn, 2022).

Lokugamage et al. (2022) argue that art has the opportunity to disrupt 'historically biased, epistemically rigid, hierarchical thinking'. Art can sit in a liminal space and reveal to us areas that have previously been overlooked. Like ethical questioning, art is able to increase our understanding of, or pose a challenge to, the system one is working in. At this stage, it is worthwhile to reflect on positionality. With the goal of adopting a critical stance or attitude towards our own health-based research practice with the goal of engaging in a process of continuous adaptation and learning, it is valuable to reflect on why art can be perceived to occupy this liminal space.

Public health education, naturally, takes as its starting point lessons and thinking patterns from modern medicine. To examine the positionality of the researcher within this space, it is valuable to examine the cultural and contextual inputs to a medical worldview that prizes objectivity. Daston and Galison (2007) argue that the scientific visual representations which are used (and have historically been used) in medical tuition are indicative of a three-stage process, from 'truth-to-nature,' to mechanical objectivity, to trained judgement. In the first, scientists standardised the variability of nature. In the second, there was a belief that nature could be depicted without human intervention, such that research processes and outcomes could be seen as truly objective. In the third, graphs and stylised illustrations are used to capture specific dimensions of certain entities/biomedical occurrences. In the latter, the subjectivity of the scientist is not absent. Rather, the expert's eye is required in order to decipher the meaning of schematic representations.

Nevertheless, asking practice-oriented and critical questions in order to better understand the values we bring to the table indicates how fully the normative value ascribed to 'objectivity' in research is embedded in our worldview. This, at times, can lead to an instrumentalization of art within the sphere of public health; whereby art's involvement in public health education or messaging is as knowledge translation or awareness raising. This is an artefact of the idea that 'objectivity' takes precedence, and the 'subjective' nature of art is such that it may be useful secondarily; to translate or make accessible the research results gained through 'objective' measures. Combining reflection on the value of art as a way of bridging the 'hidden third' with ethical questioning works within the framework of reflecting on an action within the triad cycle of 'reflection-before-in-and-on action' (Afolabi and Llewellyn, 2022). More specifically, ethical questioning operates as a framework because it depends on a continual process of reasoning, writing, and conducting ethical research, through self-reflection and awareness, which aims to humanise research by acknowledging limitations (Afolabi, 2021b). It is, therefore, valuable to reflect on the way that art can be used to tackle rigid knowledge hierarchies which can begin to unravel and problematise the epistemo-ethics (Teo, 2019) of research and tuition.

Taiwo

As a Nigerian who had initial training and exposure to theatre within the context of development, my first experience of health-based research was a bittersweet one. This is because a "developing" country

like Nigeria means there are many development projects that come to us from the international communities without necessarily our input. For instance, different international development agencies champion public health-related initiatives on topics such as HIV/AIDs, breastfeeding, and toilet hygiene in the country. This also means the agenda has been preset. Projects are tied to development-related initiatives such as Millennium Development Goals (MDGs), later turned into Sustainable Development Goals (SGDs). I had my own share. I was part of a community theatre project, *Skul Konekt*. This project was already determined by the funding partners, where, the theatre artists that participated in the project were called upon to use the instrument of theatre to create awareness about HIV/AIDS (Afolabi, 2018). Hence, as participants in such projects, we did not have a say in the thematic direction, processes and methods. Although international organisations turned to local experts (mostly scholars and academics), this does not necessarily mean this kind of local expertise has all the knowledge. The political realities of the selection process and the over-centralization of the academy (educational institutions) in such projects continue to have ripple effects on the project design, execution and evaluation.

In addition, in the bid to involve the community (that is the subject of the project), many partners always look for ways to engage the community, hence the use of art and theatre as tools for community engagement and developing communication, among others. The over-instrumentalization of art did not necessarily create the opportunity for researchers, organisations and agencies to consider art an essential part of designing the project itself but rather only as a tool to disseminate the result (or the already made agenda). While the power of storytelling for educating the people (mostly top-down approach) and, in the process, foster participation, art offers affect-driven and sensorial impact that cannot be quantified.

Fast forward to my applied theatre work in a "developed" country like Canada, the principles are still the same even though there are nuances to these issues depending on the community involved, partners and the thematic directions, among others. I engage in art-based methodologies to explore certain social issues, such as care (as in the example below). Ethical questioning and arts-based methods are central to these community explorations.

Luba

Canadian-born but of proud Ukrainian heritage, I am a scholar who specialises in early modern British art and culture, a combination that makes me keenly aware of how my positionality is influenced by multicultural perspectives. Secondly, I am an animal liberation activist, painfully aware of how my being a homosapien positions me in a role of power and privilege over those with different voices, but also instils a sense of moral responsibility to disrupt hegemonic narratives and care for others. Thirdly, as a researcher, I frequently navigate the tension between the expectations of being an impartial analyst and a knowledge creator guided by my individual experiences and perspectives.

I perceive art and health as complementary and historically interconnected concepts. My interest in health is rooted in my personal experience with the public health system through my father, who underwent a life-saving kidney transplant. He also spent a lengthy stay in the hospital after contracting COVID-19, which caused him to suffer from temporary memory loss. I witnessed how this affected his mental health, and while he cannot accurately recall much during this traumatic time, he can say with certainty that he remembers seeing the artwork on the walls of the hospital corridors. As a result of my father's lifelong health struggles, I have spent significant time in hospitals and around medical professionals, where a picture of a mountainous landscape or an abstract contemporary artwork has always been in my peripheral vision. Were these images intended for visitors, patients, or the medical staff? Are there more nuances to the story of art in medical spaces? My family history has also inspired me to think about the correlations between art and health, based on my grandfather's passion for both medicine and music. He worked as a radiologic technologist in the mid-20th century Ukraine, which was then part of the Soviet Union but found a sense of community and an artistic outlet through singing in a professional choir, where many of his doctor colleagues also sang.

Academically, I gained a foundational knowledge of art and health from a university graduate course titled "Mapping Illness," taught by Dr. Randal Rogers at the University of Regina. The course explored how the field of medicine was understood and represented in art history. From an art historical perspective, I learned that art can serve a dual purpose of documenting and expressing health-related issues where it serves as a material manifestation of individual experiences. However, ethical considerations are necessary when interpreting the representation of medicine in historical artworks and thinking critically about what they can teach us about health in contemporary contexts. Professionally, I collaborated with two doctors by assisting them with thematically curating clinical rooms with artworks on loan from the Regina Hospital Art Organization, which I will talk about subsequently.[1] This opportunity allowed me to partake in an interdisciplinary partnership where art was enthusiastically embraced into the medical space and allowed me to observe the way the doctors engaged in the creative process of curating and visual story-telling, similar to the way the caregivers are included in the Project Care. Improving the experience of patients was the principal reason behind the curatorial project, yet patients did not have input and the doctors based aesthetic decisions on their own tastes. What would a more collaborative approach in the curation of the rooms, between doctors, patients, artists and/or art professionals look like? What ethical questions were not considered in this case?

Calum

I grew up in a rural area of the UK and was educated in a state school before studying in Bristol, Cambridge and Oxford. I moved, somewhat unexpectedly, from studying philosophy to studying and working in public health. In studying a course called 'Death, Dying and Disease' as an undergraduate I was introduced to the role that art, poetry, and film can have in helping us understand and unpack health and illness. The mutual relationship between art and health has been a key part of my work since.

1 [Luba] Regrettably, due to the substantial time that has passed since the project, the names of the doctors involved and their respective contact information have slipped from my memory.

I was driven to study public health, amongst other things, as a result of an incident in which a family member had a drug overdose. It made me (apologies for the language) adopt a 'I just want to do shit' mindset, the view that some stuff is not fair, and my social and health environment (within the UK) is set up in a way that does not really have all the solutions. A clumsy activist's approach to public health policy analysis. But the more I've studied in this space, the more I've realised how the spaces where I've worked and learned have shaped the way I approach health policy research, and the role that art can play within that. Not just in terms of approach, but in terms of what good research should look like. In a way, that's probably quite predictable. Within public health, and within academia more generally, 'rational objectivity' holds a valuable, if complicated, position. At times, the championing of some sort of 'rational objectivity' (with 'objectivity' being the place of 'rationality' and 'subjectivity' being the place of 'emotion') can obfuscate the invaluable role that art (and expressions of the 'personal' more generally) can have in increasing knowledge. For instance, within public health, as within philosophy and ethics, we are often taught that the best research is the research that exists on a higher plane than the researcher. The idea is that whether it is me, you, or anyone else in the world, 'objective' observation and methodological rigour are such that the results will (with any luck) look the same. The research subjects or research subject matter are the focus, completely, and the researcher develops their skills over a number of degrees, courses, application rejections, and so on, in such a way that their own personal 'bias' is removed from (a) the observations that lead to the results and (b) the analysis of the results. Even qualitative research at times may hold at its core a valued belief in the transparency of, and 'non-interference' by, the researcher.

Furthermore, 'Objective' and 'Subjective' (though as concepts both highly problematised within the academic sphere) seem to fall on either side of the line – objective research is replicable, informative, and unbiased, unlike subjective research. This implies, of course, that the ideal researcher is one who is able to remove all subjectivity from their research. This positivist perspective has been discussed extensively by many others (Schrag, 1992; Bunniss and Kelly, 2010; Park et al., 2020). The trend towards idealising extraction of traces of the personal forms the backbone of my interests here. The trend may mean that a personal connection to the field is as hampering to the research as a financial conflict of interest. My MPhil thesis contained 30,000 words on the history of drug policy and of family narratives of those campaigning to decriminalise drugs, without once mentioning that my 16-year-old cousin overdosed on MDMA a couple of months before I started the degree. The sense was that my personal conviction and emotional response to this was less reliable or convincing as evidence than, for example, statistics (though of course, they often work in partnership – emotional weight 'opening the door' for policy change and statistics showing the need for policy change that can help at a population-level).

How is this all related to arts and health? Arts and health is a burgeoning field, with the potential to problematize this binarity. 'Art' seems to fall within the subjective, and research into 'health' may fall into 'objective'. A heart is a heart, though an artwork done 'with a heart' varies depending on who the perceiver is. As such, if we go along with this logic, and if we are being fully reductive, 'art and health' and 'art in health' can fall into difficult categories. Art can help health literacy, engage populations with complex research, and help present the world within which research exists. But this separation of 'art' and 'health' into distinct categories (which seems very pervasive in the environments I work in) is surely false – and potentially a hangover of the same 'subjective/objective' divide. And if that divide is all-pervasive, and is brought into arts and health research, that is potentially worrying.

Ethics of care and ethical questioning in art-based research: ethical approaches and collaborative methods

There is a growing interest in employing art as a research method, but its adoption in health research is more recent, which leaves room for new approaches (Fraser and Al Sayah, 2011). Although Fancourt (2017) attempts to offer valuable insights into the particular role of arts within health specialties, Vickhoff (2023) argues that the specific role of the arts in health remains undetermined. There is also a preference for quantitative evidence in art-based research in health, which may be driven by the heterogeneity of qualitative methods (Daykin et al., 2016; Daykin, 2019). Broderick (2015) advocates for a shift away from an evidence-based practice model towards a trajectory that emphasises historical and socio-cultural values in the transformative and connective aspects of art engagement in healthcare. Art-based research holds the potential to offer revolutionary insights into human behaviour within the health sciences (Gerber et al., 2020). Yet despite its benefits, qualitative research faces ethical challenges for researchers and participants, such as emotional risks associated with researching personal experiences. However, Aluwihare-Samaranayake (2012) proposes reflexive questioning as a solution for more ethical approaches.

Ethical or reflexive questioning is rooted in ethics of care theory because it encourages introspection about the impact of one's choices on the needs of others, with the ultimate aim of creating a more equitable framework. Care is a normative orientation and in healthcare specifically, is a set of relational actions that improve or restore well-being (Krause and Boldt, 2018). The notion of relationality in care involves attentiveness, responsiveness, and respect in order to foster ethical relationships (Engster, 2005). Art can be used as a tool for dialogue and building caring relationships. For instance, in Frank's book, *The Wounded Storyteller* (Frank, 1997), he compiles medical stories that exemplify generosity as an integral part of storytelling, including health-related experiences. This act of generosity through the art of storytelling can spark dialogue between practitioners, researchers and other stakeholders which can build caring relationships. However, these relationships require careful ethical consideration. Learning to see the perspectives and needs of others, rather than gaining a capacity to care, is what matters (Gilligan, 2014). Reflective practice using ethical questioning can help facilitate this process.

Ethics of care extends beyond its original definition as a moral theory, first introduced by Carol Gilligan (Gilligan, 1992/1993; Lawrence and Maitlis, 2012), and has gained interest across disciplines (Hamington and Sander-Staudt, 2011; Urban and Ward, 2020; Mathewson, 2022). Ethics of care can help explain what it actually means to care, or what Pettersen (2011) calls a "conceptualization of care" to address empirical challenges and conflicts of interest. However, the practical implementation of ethics of care lacks direction, which reflectional questioning can assist with. Branch

(2000) suggests empathy, compassion, and reciprocity as approaches in care, but overlooks the reflective process involved. Brannelly (2018) outlines the steps needed to integrate ethics of care into participatory research as (1) surfacing marginalised experiences and (2) combining theory with action by embracing the qualities of attentiveness, responsibility, competence, responsiveness, and solidarity that are attributed to caring.

Care in various settings requires a grasp of the intricate nature of relational, social, and temporal dimensions that will allow for care ethics to engage in a transformative practice (Barnes et al., 2015). Engaging in EQ can enable researchers to position themselves within the intricate and multifaceted structure of these dimensions through inward reflection, allowing them to assess the distinctive nature of each situation. In doing so, applying EQ through the values of ethics of care to participatory research methods (case studies 2a and 2b), and in the interpretation of an artwork (case study 2c), demonstrates EQ's potential to transform social disconnects, as well as ethically reshape research designs and the dynamics between researchers, participants, and community.

An ethics of care framework prioritises the needs of others and influences art-based research designs through reflective contemplations before, during, and after action (Fancourt, 2017). EQ thus goes beyond self-interest to recognize individual experiences and perspectives, while also maintaining connections between people as a result of caring for others; in other words, it values difference but does not operate as a dichotomy. For instance, Vickhoff (2023) suggests that aesthetic empathy connects people through shared mental states, but as Aluwihare-Samaranayake (2012) critiques, this assumption disregards individualised experiences and differing viewpoints by presuming that critical consciousness aligns with similar subjective experience. In another instance, the establishment of the artist-researcher as a strategy in health destabilises power structures and contributes to social activism and epistemological changes (Capous-Desyllas and Morgaine, 2018; Gerber et al., 2020).

Genuine collaboration among diverse researchers, practitioners and the community can bring new perspectives to arts-based methods in healthcare and curatorial practices. Creating collaborative teams comprised of researchers and artists is one approach, although debates exist regarding who should engage in art-based research (Capous-Desyllas and Morgaine, 2018). Daykin et al. (2016) support the idea of co-production through consultation and collaboration between stakeholders in the art and health sectors as an effective strategy for overcoming evaluation challenges and improving participant experiences. Daykin et al. (2016) therefore, argues that co-production repositions the researcher from the role of an expert to a partner, creating a more equitable relationship. Furthermore, including researchers in the creation of artwork or its curation allows for the integration of qualitative research data, as well as ongoing reflection (Archibald and Blines, 2021). An ethics of care framework complements this inclusive approach because it not only values the health and well-being of others but also encourages looking inward to consider the importance of self-care and the existential safety of researchers (Groot et al., 2019). In addition to thinking about the collaborative partnerships between researchers and practitioners, EQ can also place importance on participant input, which is not always the case in traditional art-based research, as Ryu (2018) critiques: "Participants' perspectives on ethical issues in this co-constructive and collaborative approach are absent."

Objectivity, knowledge hierarchies, and art as a 'bridge'

The integrative nature of the role of art in health, and the ability for art to provide participants with perspectives on key interrelated health and ethical issues, points to the ability of art to disrupt knowledge hierarchies within public health research. Steelman et al. (2019) make strong points for the ability of art to be able to cross what they call the 'hidden third' (borrowing from conceptualization by Nicolescu (2010)). They argue that art can bridge 'objective' and 'subjective' worldviews, aligning the head and the heart. Their work looked at changing engagement practices to enhance sustainability, rather than focusing on improving scientific techniques (through working on long-term socio-ecological change with Indigenous peoples from three inland delta regions in Canada).

Lokugamage et al. (2022) argue that 'historically biased, epistemically rigid, hierarchical thinking' has led to environmental collapse and a biomedical paradigm that urgently needs to be rethought due to the damaging impacts of a non-reciprocal relationship with nature. They argue that art, along with qualitative research and storytelling, ought to be put on an equal footing with RCTs. Art can disrupt knowledge hierarchies and, they argue (Verhagen, 2009, quoting Bourriaud, 2009), can usher in a helpful 'Altermodernism' in which the artist encourages disorientation through tracing lines in different directions of time and space, with the artist becoming a cultural nomad.

One such ramification is the separation of 'art' from 'medicine'. That singing, dance, or theatre somehow exists in a different medical toolkit from prescriptions and medicines. Steelman et al. (2019) argue that art can bridge the 'hidden third' between objectivity and subjectivity. Maybe, in bridging this hidden third, art can also be brought more centrally into tuition about what effective healthcare can look like. This is already done in many places globally, and we are cognizant of the fact that our positionality and education are such that we see a separation between 'art' and 'healthcare' into separate disciplines in ways that others do not.

Objectivity and subjectivity are key concepts within health research, as well as social research (Letherby et al., 2012). As Daston and Galison (2007) argue, 'objectivity' is itself a social artefact; a concept that emerged in the nineteenth-century sciences. The claim that the individual ought to 'be objective' is itself a normative claim, and highlights the links between ethics and epistemology, or 'epistemo-ethics' (Teo, 2019). Through this linkage, Teo (2019) argues, epistemic values become personal virtues. 'Objectivity', then, is itself informed by, championed by, and perpetuated by specific historical contingencies. Its promulgation as an ideal to be aimed for within research methodology is, to use the same language, a cultural artefact.

Increasingly, research has examined how epistemology and knowledge production have historically had a significantly narrow scope as a result of Western/colonial orientation. Darder (2019) explores the extent to which Western political and economic interests distort perceptions of (and lead to the absorption or disruption of) knowledge outside the Western purview. Similarly, within research spaces, Galvez and Muñoz (2020) argue, as academics and students may be in some places conducting their research within educational institutions with colonial histories, the codes of research governing practice are bound by (and inherit) specific, contingent ways of working and producing knowledge. Go (2020) analysed racialized

exclusions within the discipline of sociology, and found that through its deep epistemic structures, the subject itself perpetuates epistemic exclusion on grounds linked to an empire. Sociology, Harris (2020) argues, adopts a traditional positivist approach rooted in a world built from a colonial perspective. Undervaluing the role of connections to communities being valuable to scientific data, and the use of qualitative methods within scientific study, that it follows is a direct corollary of a research methodology emphasising the value of objectivity. A dominant colonialist perspective can perpetuate a "spectacle of otherness" felt by minorities in academia, who need to legitimise their voices within this colonial space (Jamjoom, 2020). Jamjoom's auto-ethnographical article exposes some of the "colonialist frameworks" that are still rooted and embedded in academia (Jamjoom, 2020, p. 261).

Within medicine and medical research, the epistemo-ethics (the link between epistemology and ethics) of Western knowledge production lead to intersectoral, sociohistorical and intergenerational inequities that are emblematic of the discipline's inheritance of colonial thought (Naidu, 2021). Indeed, as Marya and Patel (2021) argue in 'Inflamed: Deep Medicine and the Anatomy of Injustice', "colonial medicine cannot admit to a diagnosis for which colonialism is responsible." The threads woven into the social artefact of 'objectivity' as a research methodology have unseen ramifications. Loss of interconnection, cultural sensitivity, planetary damage and environmental degradation are all linked to a positivist framing of knowledge production that, at times, suffers from a lack of awareness of the essential benefits of the inclusion of a pluriverse of voices. Knowledge production and public health issues are both inherently complex, and both would benefit by adopting a research methodology that lets more than a deified 'objectivity' into the arena (Denzin and Lincoln, 2018).

Caught up in the adoption of a positivist research methodology are, potentially, two interrelated issues. First, the separation of 'mind' from 'body', 'us' from 'them', and 'human' from 'nature' (Lokugamage et al., 2022). Second, and much covered in the literature, is the assumption that 'objectivity' is a positivist research framing due to the exclusion of emotion, personal bias, and so on. This perspective reinforces the idea that research based on personal experience, recognition of emotion, and reference to positionality, is less 'rigorous' or useful within academia, including the medical sciences. The perfect 'objective' research, it could be argued, leaves the researcher invisible. This, it follows, has knock-on effects on the inclusion of art as a research methodology. As a discipline, art and art production are inherently emotional. The artist is essentially visible in the work they produce, and (modern questions about AI-art production aside), the individual humanity of the artist is an essential part of the process itself. This, it follows, sits in direct opposition to the invisibility of the 'objective' researcher.

Critical works have been conducted by researchers in an attempt to disrupt rigid knowledge hierarchies (Santos, 2015; Smith, 2021). Bilgen and Schöneberg (2020) argue for reflexivity in research processes as a tool to help dismantle embedded power hierarchies. Their analysis of non-reflexive research methodologies is worth quoting in full: "We give birth to a baby created of data. We cut its umbilical cord from its mother, the context, and slowly baptise it with the holy waters of theoretical knowledge and sanctify it in a specific technical and/or disciplinary language." Martinez-Vargas (2020) also stresses the importance of a pluriverse; of diverse knowledge systems.

In total, it is valuable to recognise the importance of art as inherently valuable, as a contributor to good health and wellbeing, and as an effective gateway to, an example of, and study of the application of an ethics of care approach to public health and medicine. The inherent ability of art-based approaches to health care and public health research to incorporate the personal, and the important self-reflexive work required in order to understand both what we bring to the table, and our role within the system we work within.

Discussion, reflection and case studies

Discussion one: 'project care'

Context and content

Project Care focused on senior citizens and was held at one of the senior homes in British Columbia. Project Care (henceforth PC) was a reminiscence theatre that involved creating a performance for senior citizens who had dementia, physical disability and their caregivers. The project was inspired by the idea of institutionalised care and the price placed on care. As an artist-researcher of African descent, I was fascinated and conflicted at the same time with the idea of institutionalised care when I first arrived in Canada. It was interesting to see a congregate living environment designed to meet seniors' functional, medical, personal, social and housing needs. I was interested in unsettling the discourse around ageing, care and health, and the role of funds in accessing such levels of care. Through the use of music and devised performance, participants (senior citizens, their caregivers and the research group) created space for participation and fun. According to one of the caregivers, the opportunity for senior citizens to participate in storytelling, reminisce about their past experiences etc., was invaluable. The caregivers were fascinated because that was the first-time caregivers were involved in an arts-based project.

Reflection

Reflecting-on-action, one of the stages of EQ, Project Care, was an initiative to provide an opportunity for the "developed" society to develop new thinking around institutionalised care. I wanted to offer a new perspective, one that is cultural and different but rooted in the epistemology of my heritage as a person of African descent. For instance, senior citizens shared stories of their families, love and knowledge that would not be passed on to the next generation due to the disconnect between them and their families, but that was no longer possible. Many of them would have loved to share these memories with their loved ones, but that's not necessarily possible due to the fact that many of them have been "dumped" in care homes. Some of the participants (senior citizens) recanted their memories before they arrived in the home care, and the arts gave them the opportunity to socialise and connect with others in the facility. Apart from the space to create and be nourished, it was an opportunity for them to speak to students, caregivers and community members on pertinent issues. For me, that is one of the ways I use my art to unsettle centres of power and perhaps challenge the status quo by asking critical and thought-provoking questions that will create opportunities for participants (both artists and community members) to think amidst the creative process.

Also, Project Care celebrated seniors and the untiring endeavour of caregivers, which resulted in the creation of stories that served as a

way for seniors to share memories. However, it also provided participants with the opportunity to think about caregiving and institutionalised care within the Canadian and North American context. I remember during an interview with one of the caregivers; she was so particular about how institutionalised care has changed family dynamics and familial relationships. Some senior citizens have gained new relationships, while some would have preferred to be with their children or at least grandchildren, especially in this critical period of their lives.

Discussion two: 'Co-curating Regina Centre Crossing Family Medicine Unit'

Context and content

In the Spring of 2015, I worked as an independent researcher with the Regina Hospital Art Foundation (RHAF), an organisation that depended on public artwork donations that were loaned to medical centres without a designated art department or collection. While working with the RHAF, I was invited to join a curatorial project initiated by two doctors undertaking their residencies at the Regina Centre Crossing Family Medicine Unit (RCCFMU) in Regina. The doctors asked to borrow artworks to display in their clinical rooms, which they hypothesized would positively impact patient emotional experiences. I cannot confirm that the initiative was approved by an ethics board with certainty, but they expressed genuine care for their patients, which made the request compelling. Together, the doctors and I considered the artworks available for loan in the RHAF storage and later met at the RCCFMU clinic to assess the space. The doctors seemed to have a personal appreciation for art and were genuinely excited to be part of the image selection process, so our selection process mainly relied on personal preferences centred on taste, colours, and themes. The doctors had a predetermined vision for how they envisioned the rooms and actively engaged in the decision-making process. Despite my knowledge of formal curatorial practices and standards of aesthetic principles, I realised that the doctors had a strong desire to exert their own influence over the selection and placement of artworks, rather than solely relying on my perceived 'expert' opinion. Although I had the qualifications as an art professional to insist on the selection and display of certain artworks, I understood that this project gave the doctors an opportunity to express themselves through art, which was emotionally important for them.

Reflection

Reflecting on my experience as part of an interdisciplinary team curating clinical rooms for the Regina Centre Crossing Family Medicine Unit, I recognize the potential EQ could have had on improving the curatorial process and fostering a more inclusive environment. Although the initiative was motivated by the element of care, an ethics of care framework was not formally applied, which would have enabled for deeper reflection and action. In this discussion, I critically examine how EQ could have influenced the project, including aspects like the decision-making process for selecting artworks and the negotiation of their display. I argue that applying EQ as a method could have had a significant impact on the collaborative process while shedding light on the need for patient involvement, which would have influenced the research design and curatorial process as well. As a result, patients would have been empowered as co-curators, ensuring diverse viewpoints and sensitivity to their needs. Ultimately, I believe that EQ would have fostered an equitable and respectful collaborative process, creating a truly inclusive environment for all stakeholders.

Magner (2005) argues that contemporary debates about medicine prioritise healthcare costs and access rather than the art and science of medicine. Although Magner (2005) investigates the idea of 'art' through more scientifically thematic and methodological advancements in medicine rather than visual representations of medicine, she asserts that the notions of art and health are closely connected. Indeed, a recognition of the link between art and health was the motivating force behind the curatorial project at the Regina Centre Crossing Family Medicine Unit (RCCFMU) in 2015 with the goal of enhancing patient experiences. The interconnection between arts and health sectors, as Davies et al. (2016) write, involves the placement of art forms (such as paintings) into a setting with the aim of enhancing the health environment. Although most larger hospitals have dedicated art departments and display protocols, I will focus on my experience as an independent researcher/curator for the RCCFMU, reflecting on how EQ could have influenced the collaborative partnership, research design, and outcomes. Afolabi writes, "Ethical questioning is an art in itself that must be learnt. It requires recognising one's power and privileges–its strengths and limits" (Afolabi, 2021a, p. 354). Furthermore, Hajar (2018) argues that art helps medical students sharpen their observational skills and be more empathetic, which makes them better communicators. Therefore, not only was the curatorial process an emotionally positive experience for the doctors, but it was also beneficial to their training.

Held (2006) posits that ethics of care go beyond the mere idea of what it means to care because it recognizes the value of emotions and relational capabilities that allow morally concerned individuals to understand what is best in interpersonal contexts. Reflecting on this realisation through the lens of ethics of care, I am aware of how caring for the needs of the doctors' emotional well-being above my own desire to professionally engage in the curatorial process required an ethical line of questioning on my part. After all, Persohn (2021) writes, "The word curator comes from the Latin root curare, meaning 'to take care of'."

A relational approach to ethics of care involves other virtues that have a stabilising effect on relationships, such as forgiveness and trust (Maoi, 2018). While the curatorial process could have been more inclusive of my professional input, I opted to prioritise relationship-building and the common objective of benefiting patients. To achieve this, I placed my trust in the doctors' enthusiasm for art and allowed them to experiment with its implementation by thinking about their needs over my own, believing it would lead to a positive outcome. However, had the doctors embraced EQ as part of their methodology for this project, it would have led to a more equitable and inclusive experience. Daykin et al. (2016) stress that a collaborative approach between stakeholders in art and health sectors shifts the role of the researcher from an expert to a respectful partner, fostering a collaborative space where minds can meet and ideas can be exchanged. Thus, this case underscores the practical application of an ethics of care framework through the utilisation of EQ.

Building on the idea of collaborative approaches in art-based research, Daykin et al. (2016) argue in favour of co-production that can enhance participant experiences. An important aspect that was overlooked in the RCCFMU curatorial project was a lack of patient input and collaboration. For instance, art in hospitals

is generally well-received by patients and staff, but certain artworks impact individual psychological responses (Cusack et al., 2010; Lankston et al., 2010). Although the doctors and I had the best of intentions to care about the emotional health of patients, these individuals were not consulted. Using an ethics of care framework to ethically question the *doing* of ethics (Afolabi, 2021a) in this curatorial project would have highlighted how necessary it was to include the perspectives of all stakeholders. An ethics of care approach would also explain, as Held (2006) argues, the reason why we are obligated to care for others, which is based on feelings of empathy for unfamiliar people through sympathetic relatability. And for the doctors, using an EQ framework would have added a practical dimension to their obligation to care for others with whom it was their moral duty to build professional relationships with to best serve them as medical practitioners.

Fancourt (2017) makes a strong case for the importance of collaborating with community members in arts and health research in order to develop partnerships and secure funding. For instance, in their article "Take a walk in someone else's shoes," Gillibrand et al. (2023) draw on co-produced participatory arts-based projects as a way to demonstrate the benefits of participatory arts for health research development. One of the examples they provide is based on a series of audio podcasts called "Hidden" that brought together community members and both art and science professionals as a way to enhance the art of storytelling on the topic of COVID-19 vaccination experiences. While the authors of this article do not explicitly engage with ethics of care theory, the researchers' reflective approach in this project aligns with a form of EQ, which could have been enriched by integrating an ethics of care framework. As Aluwihare-Samaranayake (2012) suggests, a critical consciousness lens could bridge the gap between researchers and participants through reflective thinking and transparency.

Discussion three: Rembrandt's *The Anatomy Lesson of Dr Nicolaes Tulp*

Context and content

Death and life; teachers and pupils; academicians and criminals; Rembrandt Van Rijn's *The Anatomy Lesson of Dr Nicolaes Tulp* (Rijn, 1632) is filled with visual juxtapositions that the technique of chiaroscuro further emphasises. The renowned surgeon Dr. Nicolaes Tulp (1593–1674) commissioned Rembrandt van Rijn (1606–1669) to paint the group portrait *The Anatomy Lesson of Dr Nicolaes Tulp* (Ploeg and Buvelot, 2005). The painting portrays the physician and praelector Dr. Tulp teaching an anatomy lesson to a group of doctors who were members of the Amsterdam Guild of Surgeons (IJpma IJpma et al., 2006). In the artwork, Dr. Tulp demonstrates the intricacies of the human body by lifting a tendon on the forearm of a cadaver with the use of forceps. The cadaver is positioned on a table at the centre of the composition, sharing the focal point with the image of Dr. Tulp. Anatomy demonstrations were performed as a popular public event in the seventeenth century and in this case, the cadaver has been identified as Adriaen Adriaensz, also known as Aris Kindt, who was a recently hanged criminal convicted of robbery (Ploeg and Buvelot, 2005). Drawing on Rembrandt's *The Anatomy Lesson of Dr Nicolaes Tulp* as a case study, I illustrate how EQ, guided by principles of ethics of care, can influence interpretations of Western health and medicine in art.

Reflection

I have selected Rembrandt's *The Anatomy Lesson of Dr Nicolaes Tulp* as a case study because it provides unique insights on health and social relations within medicine that are relevant to those issues with which ethics of care is concerned and impact ethical modes of questioning by researchers, practitioners, and viewers. The painting can be understood to depict broader social issues, including hierarchies, class disparities, and perceptions of self-image, as well as serve as a model of medical pedagogy. Applying EQ, guided by ethics of care, to the reading of such art historical works can unveil the transformative potential of art to offer empowering narratives for marginalised figures by drawing on the concepts of empathy and compassion as it relates to social justice. As I will demonstrate, *The Anatomy Lesson* teaches us about the importance of justice and the need for compassionate care towards others through an acknowledgement of social power dynamics.

Upon learning that the body of the cadaver in the painting is that of the criminal, Aris Kindt, we as the contemporary spectator, are confronted with an ethical dilemma: is it justified to (mis)use his body for medical purposes without his consent due to his lower social status? Held (2006) argues that a caring person does not care for the sake of it being a virtuous quality, but because they are moral subjects and take responsibility. Additionally, Slote (2007) links empathy, or "empathetic care ethics," with social justice and caring for the unfamiliar or impoverished. EQ compels us to consider Kindt's potential circumstances and reasons, such as poverty, that could have driven him to commit the crime (Di Matteo et al., 2016). Guided by the principles of ethics of care, this kind of EQ encourages us to express more empathy towards others, challenging our perception of Kindt not solely as a criminal, but recognising his ostracised status within his community. Carrabine (2012) asserts that the ethics of representation revolves around interpersonal connections and an acknowledgement of difference. In this transformative moment of EQ, we as spectators adopt a compassionate and sympathetic response to the figure of the cadaver, whose marginalised status becomes 'surfaced' (Brannelly, 2018). The recognition of Kindt's identity as more than a criminal or anonymous cadaver can be understood as a mode of restorative justice by ethically reestablishing his existence in history. This approach also establishes an imagined relationship that crosses time boundaries, made possible through an ethics of care framework and its connection to social justice (Held, 2006).

The Anatomy Lesson also emphasises the tensions between the concepts of spectacle and education. On the one hand, the painting depicts an anatomy lesson being taught, which implies a positive learning opportunity. On the other hand, zooming in on the particular part of the painting that portrays the dissection of the cadaver's body can be understood as a gruesome spectacle of entertainment for both the viewers outside of the canvas as well as for the other figures in the painting, judging by their different facial expressions and gestures. The ethical implications of balancing the educational value with moral considerations in the painting therefore present us, the spectators, with another ethical dilemma about the spectacle of visually representing violence and suffering, despite the educational intent. Carrabine (2012) refers to this concept as the 'power of images', which highlights the importance of sociological understanding of the relationship between aesthetics, ethics, and justice present.

Rembrandt's *The Anatomy Lesson* depicts power structures, made evident by Dr. Tulp's stoic central pose, suggestive of his authoritative and distinguished status that dictates our understanding of medical education based on power dynamics

between educators and students. On the topic of teaching and learning methods relating to operating theatres, Lyon (2004) suggests that the attitudes and demeanour of surgeons and students affect teaching and learning outcomes. EQ draws attention to the social structures of power and privilege (Afolabi, 2021a), and by reading the painting through this lens, we can consider how Dr. Tulp's position influences teaching and learning experiences. Are discriminatory attitudes towards others, especially those from different social classes, a consequence of social hierarchies within the medical field? Do pupils have the ability to incorporate their own techniques or different approaches to patient/doctor relationships (Colgan, 2010), or do they model their behaviour and mimic what/how they are taught, without striving for improvement? These lines of questioning can prompt a re-evaluation of learning environments and offer a different kind of teaching model that acknowledges power relations.

The painting can also be understood in terms of moral suffering, defined as being witness to or directly engaging in situations that result in negative moral outcomes (Rushton, 2018). Assessing the moral message connected to the spectacle of suffering in *The Anatomy Lesson* involves EQ, which is informed by compassion and empathy within an ethics of care framework. Are the exposed muscles on Kindt observed with selfish curiosity or as a site where the spectator can experience emotions like compassion and empathy in order to establish a relationship? EQ is centred on respect, a key aspect of ethics of care, which allows us to explore these themes in contemporary contexts (Engster, 2005).

Thinking about representations of health, well-being, and medicine in art historical contexts has significant contemporary relevance and can contribute valuable insights. I see an interconnection between art and health, where historical art can be reinterpreted to offer fresh, empathetic perspectives that reshape contemporary perceptions of health and morality within a broader social context. For instance, we may ask why Rembrandt's masterpiece, *The Anatomy Lesson*, continues to resonate with modern viewers, despite the fact that we have socially embraced patient confidentiality and a shift away from public displays of dissection like the one exhibited in the painting. Additionally, the way individuals who donate their bodies to science are honoured and glorified further complicates our relationship with the figure in the painting based on the criminal status of the cadaver who did not necessarily consent to being publicly dissected. Does viewing the painting through an ethics of care framework call us to action by highlighting the different dynamics of relationality, therefore reflecting a desire to connect with others in medical contexts, whether it be with practitioners as teachers or cadavers as life-saving donors? Put into practice, since ethics of care prioritises the needs of others, it can help guide us in traversing difficult ethical questions that bring to the forefront the importance of considering social dynamics, building relationships, and implementing policies that are motivated by compassion and emotion, as opposed to simply pursuing biased interests or scientific curiosity (Hankivsky, 2014).

Conclusion

The paper focuses on some critical issues of ethics and health-based research. From authors' positionality to variegated thematic exploration which emanated from our experiences, we centre reflexivity, challenge some dogma and offer ways to promote wellness and care in our practice. To promote comprehensive wellness beyond hospital settings, Stuckey and Nobel (2010) suggest community leaders collaborate with researchers to create better healthcare agendas. Care involves imagination and humility (Bourgault and Pulcini, 2018). Embracing collaborative approaches fosters humility through reflective practice, challenging power hierarchies between researchers, practitioners, and the community. Co-production and collaboration in art and health initiatives emphasise the importance of arts in social and emotional well-being by fostering a sense of belonging, improving communication, and encouraging respect through the goal of positive shared experiences (Davies et al., 2016). Finally, art promotes co-habitational thinking and caring, highlighting interconnectedness that encourages a collective and compassionate approach to address existential risks, including those affecting health and well-being. Adopting a reflective approach, a critical framework for ethical questioning, guided by the principles of ethics of care, can foster a fair and respectful collaborative process among stakeholders. This approach has the potential to enhance research design methods and yield more inclusive and comprehensive data results.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding authors.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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A qualitative examination on the implementation of participatory "A"rt-based activity on "Health" of older community-dwellers: what worked for the Singapore A-Health Intervention?

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Introduction: Art and museum-based interventions are gaining increasing recognition for their potential as low-risk activities for older adults, offering numerous physical, cognitive, and emotional benefits. However, there remains a dearth of knowledge regarding the science of implementation as well as the factors and processes that contribute to their effectiveness from the perspectives of intervention participants.

Methods: The current research draws on the qualitative evaluation data obtained from a larger mixed-method randomized control trial that evaluated a standardized Participatory "A"rt-Based Activity On "Health" of Older Community-Dwellers—the Singapore A-Health Intervention. Adopting a participatory action research approach, the primary objective is to critically examine the lived experiences and health impact of the Singapore A-Health Intervention with a secondary objective to uncover strategies for optimized implementation outcomes. All 56 participants who completed the intervention filled out a program evaluation survey and a nested sample of 30 participants completed a series of acceptability focus groups.

Results: Descriptive analyses of the program evaluation survey data revealed that 96.2% of participants were satisfied with the overall experience of the Singapore A-Health intervention (M = 9.00, SD = 1.76), reported that the intervention positively impacted their quality of life (M = 8.90, SD = 1.43), and social wellbeing (M = 8.92, SD = 1.43). Thematic analysis with a grounded theory approach on the qualitative focus group data revealed three interrelated themes detailing how the Singapore A-Health Intervention contributed to positive health and wellbeing outcomes (1. A-Health Experience, 2. Wellbeing Outcomes, 3. Enabling Factors)

and nine subthemes (1a. Intellectual Stimulation, 1b. Positive Stress, 1c. Peer Interaction, 2a. Interpersonal Bonds, 2b. Personal Growth, 2c. Mindful Living, 3a. Integrated Support, 3b. Session Design, 3c. Mode of Engagement).

Discussion: This investigation provides important insights to the Singapore A-Health intervention's effectiveness for enhancing wellbeing among older adults, as well as the factors that enable successful program implementation. These findings offer a culturally unique perspective on the benefits of art and museum interventions, while underscoring the imperative need for strong partnership and collaborations among community stakeholders in supporting the health and wellbeing of ageing populations.

KEYWORDS

participatory arts, museum, social prescribing, wellbeing, older adults, implementation science, qualitative inquiry a-health experience, Singapore

1 Introduction

1.1 Background

The global population is ageing at an unprecedented rate and it is associated with declining physical, cognitive, social, and psychological health (1). As the ageing population continues to grow, there will be an inevitable increase in the demand for healthcare services. Consequently, there is an urgent need to devise innovative approaches to alleviate the burden on the healthcare system. The field of art and health has gained increasing recognition for its potential to promote holistic health across the lifespan and it has been found to be a safe activity for older adults, offering numerous physical, cognitive, and emotional benefits (2–5). Participation in art programs also provide opportunities for social interaction and connectedness, which are crucial for combating social isolation among older adults (6). Although there is a growing amount of evidence supporting the health promoting benefits of art engagement for older adults, most studies have predominantly focused on Western populations, with limited exploration of the experiences of older adults from diverse ethnic backgrounds.

Moreover, many studies investigate the abundant benefits of art participation, but there remains a dearth of knowledge regarding the factors that contribute to their effectiveness from the perspectives of the participants and service providers. An implementation science approach could significantly enrich the investigation of arts programs by providing a comprehensive framework to investigate effective program delivery and outcomes (7). This approach was adopted in various fields to improve patient care quality and service delivery (8–10), and is particularly useful for the evaluation of art-based interventions where the context varies across settings and is greatly shaped by cultural influences. An implementation science approach could also aid the development of guidelines and recommendations for the continued delivery of art programs beyond the research study (11). By examining factors that influence successful program implementation, the gap between research evidence and practice could be bridged with this approach (12).

In 2015, a 12-week art and museum-based intervention for health (i.e., A-Health) was developed through a collaborative effort between the Centre of Excellence on Longevity of McGill University Canada, together with the Montreal Museum of Fine Arts. The preliminary findings supported the effectiveness of the 12-week program in improving mental and physical health (13, 14) which led to the empirical expansion of the A-Health study through an international Randomized Control Trial (RCT). The original 12-week A-Health framework was adapted for the Singaporean context (i.e., Singapore A-Health Intervention) with culturally specific modification informed by a participatory action research approach (15). It was developed in partnership between the Action Research for Community Health (ARCH) Laboratory at Nanyang Technological University (NTU), Lab4Living at Sheffield Hallam University, and the National Gallery Singapore (the Gallery), a renowned visual arts institution with the largest public collection of Singapore and Southeast Asian modern art. Results from the mixed-methods randomized control trial (RCT) of the Singapore A-Health Intervention (reported elsewhere in this journal) (See doi: 10.3389/fmed.2023.1238562) provided further evidence to support the efficacy of standardized art and museum-based interventions for improving the physical and mental health of community-dwelling older adults. Drawing on the qualitative evaluation data of the mixed-methods RCT and adopting a participatory action research approach, this study aims to critically examine the lived experiences and health impact of the Singapore A-Health Intervention on participants who have completed the program, with a secondary objective of uncovering strategies for optimized implementation outcomes.

2 Methodology

2.1 Research design

Qualitative methods were utilized to address the research goals due to its ability to address complex questions and uncover intricate dynamics in the implementation processes (16). This research was

shaped by a constructivist paradigm (17, 18), guided by a relativist ontological stance and a constructionist epistemological stance (19) to understand experiences of the Singapore A-Health Intervention through the perspective of the research participants.

2.2 Sampling

Participants recruited for the RCT were community dwelling older adults above the age of 60, fluent in English, and had internet access to complete online questionnaires. Individuals who were unable to provide informed consent or formally diagnosed with mental health conditions such as cognitive impairments or major depressive disorders were excluded from the study. Participants were recruited through the gallery, social media platforms, and partnering eldercare agencies in Singapore. For the qualitative evaluation, eligible participants were those assigned to the intervention group and attended at least 80% of the sessions.

2.3 Study procedures

The study was implemented in two phases: a pilot study to refine the intervention protocol in March 2021, and a full study to evaluate the refined intervention protocol in September 2021. Participants referred by the eldercare centers or who registered their interest in the study online form were contacted by a member of the research team via audio or video call. During the call, participants were given the opportunity to ask questions about the study before completing the informed consent form. Thereafter, they were sent a personalized link to an online baseline assessment and allocation outcomes were then revealed to participants upon successful completion of the baseline assessment. Intervention group participants were assigned to the 12-week A-Health Singapore intervention held at the gallery while the control group were not offered any art or museum-based activities. During the intervention period, participants were invited to complete four standardized physical and psychological health assessments and received SGD$80 for completing all four self-administered questionnaires. The quantitative findings are reported elsewhere in this journal.

Four acceptability focus group discussions and a program evaluation survey were conducted with intervention group participants after the 12-week program to evaluate program and implementation effectiveness. The aim of the focus group was to gather in-depth insights and perceptions of the participants regarding their experiences of the A-Health Singapore program. A semi-structured topic guide was developed, covering topics such as the (a) overall experiences of the 12-week A-Health Singapore program, (b) perceived health and psychological impact of the program, (c) motivating and inhibiting factors of engaging in the program, and (d) an evaluation of the intervention framework and implementation processes. The focus groups were conducted online via Zoom by a research staff and a trained co-facilitator, and the duration of the discussions were between 60 and 90 min. The discussions were audio-recorded and transcribed using intelligent verbatim transcription for data analysis. The evaluation survey assessed various areas of study implementation including recruitment, facilitation, session content, and perceived impact of the intervention. Participants were invited to rate their agreement on a series of statements using a Likert scale (e.g., I am satisfied with the overall experience of the A-Health Singapore research study, where 1 = strongly disagree and 10 = strongly agree). An open-ended section was included at the end of the survey for participants to express their opinions on topics not covered in the Likert scales. Confidentiality of the participants was ensured by assigning participants with a unique ID and the omission of all identifying information in the transcripts. Ethnographic notes of *ad hoc* group discussions with gallery docents and intervention facilitators were also documented to illuminate the interventionist and developer perspectives; these notes served to inform data analysis and data interpretation.

2.4 Pandemic-influenced procedures

Due to the COVID-19 pandemic, the implementation of the study was impacted by nationwide health and safety regulations to prevent the spread of the virus. Firstly, group sizes were reduced, and participants were grouped into sub-groups of three to eight during the intervention. They were also required to maintain a physical distance of at least one meter and were not allowed to interact with participants from other subgroups. Secondly, some sessions were run online due to the lockdowns implemented in Singapore (20). Specifically, online sessions were conducted on the twelfth week of the pilot study, and fourth to eighth week of the full study. Thirdly, the enforcement of vaccination differentiated measures restricted access to the gallery for those who were unvaccinated (21). This resulted in the implementation of a hybrid format where vaccinated individuals attended the onsite sessions, while unvaccinated individuals engaged in the program online. The hybrid sessions were conducted on the ninth to twelfth week of the sessions in the full study.

In response to the challenges posed by the COVID-19 pandemic, a comprehensive online contingency plan was developed to ensure a seamless transition from onsite to online programming. The program adapted the curriculum to suit the online format, incorporating interactive elements such as live-streamed gallery tours, online art demonstrations, and facilitated discussions via a secured video-conferencing platform, Zoom. Several measures have been put in place to ensure smooth transition and maintain the quality of the intervention. Firstly, the research team provided step-by-step guidance through the creation of user manuals and video tutorials to help participants navigate the online platform and access the virtual sessions comfortably. Secondly, regular communication channels through a dedicated WhatsApp group have been established to address participants' questions promptly. Thirdly, the facilitators ensured that the online sessions were conducted at a manageable pace that allows participants to grasp new art techniques and engage in meaningful discussion in an interactive virtual learning environment. This was achieved by including breakout groups for personalized feedback by the artist and co-facilitators, and to encourage interaction among participants.

A hybrid version was developed to accommodate the vaccination differentiated measures and ensure inclusivity in the

program. Vaccinated individuals attended the sessions onsite, while those who were unvaccinated attended the sessions online. Measures were taken to effectively engage all participants. The artist provided in-person guidance for the onsite participants, and simultaneously ensured that online participants were actively involved by providing instructions and offering feedback on their artwork. To ensure that online participants received the same level of attention and support as their onsite counterparts, a dedicated research team member was assigned to facilitate the video call and promptly address any queries or technical issues raised by online participants. For the final session of the program in a hybrid format where participants showcased their final artworks and engaged in group sharing, the artist created a collaborative environment where both onsite and online participants could interact. The dedicated research team member projected the video conference onsite for online participants to present their artworks and express their inspiration. The artist then invited onsite participants to ask questions to their peers and online participants were also provided with the opportunity to share their thoughts on the onsite exhibitions, encouraging discussion across platforms.

2.5 Intervention design

The Singapore A-Health Intervention spanned 12 weeks, with each weekly session lasting for 2 h. The structure of the program adhered to the original A-Health framework, and the topic and activities were jointly developed with the gallery staff, docents, artists, and research participants using a participatory action research approach (15) for cultural specificity. The primary goal of the program was to provide participants with fundamental art appreciation skills and art techniques through active engagement with the museum collection. The program was structured around three thematic domains of the past, present, and future. In each thematic domain consisting of 4 weeks, participants explored the themes and learnt relevant art techniques such as mixed media relief printing or cardboard sculpturing. Participants were tasked with creating an artwork related to the theme and incorporating the learned techniques. The structure of each thematic domain followed the same structure: the first week involved a 45-min docent-led gallery tour on three selected pieces of artworks, followed by a 75-min artist-led brainstorming session where participants were introduced to the techniques and discuss ideas on the artwork to be created. The subsequent three sessions involved further guidance from the artist and a scaffolded delivery of art techniques for participants to incorporate their learning to their artwork. At the end of each domain, there was a showcase where participants presented their artwork, shared their artistic journey, and engaged in meaningful conversations about the themes explored. The intervention outline and sample artworks can be found in **Figure 1**.

2.6 Data analysis

The responses collected from the program evaluation survey was analyzed using descriptive statistics. The focus group discussions were analyzed using thematic analysis with a grounded theory approach (22) to provide insights to the participant's experience and impact of the Singapore A-Health Intervention. Data familiarization followed by line-by-line coding of all verbatim responses from the focus group discussions were first conducted. Codes were then clustered into themes and subthemes, and axial coding was subsequently performed to develop conceptual theme categories. Selective coding was then utilized to illuminate the relationship between theme categories. Emergent themes and subthemes were refined by multiple reviews with appointed members of the research team and were presented to the larger research team for refinement and revision. Major theme categories and themes were defined, operationalized, and mapped into a proposed conceptual framework. Research rigor was maintained via a multi-pronged strategy including documentation in an audit trail, prolonged engagement with the research data, regular team meetings and peer debriefing. Moreover, the analysis was enriched with data triangulation from the ethnographic notes of *ad hoc* docent and facilitator group discussions, as well as investigator and theory triangulation.

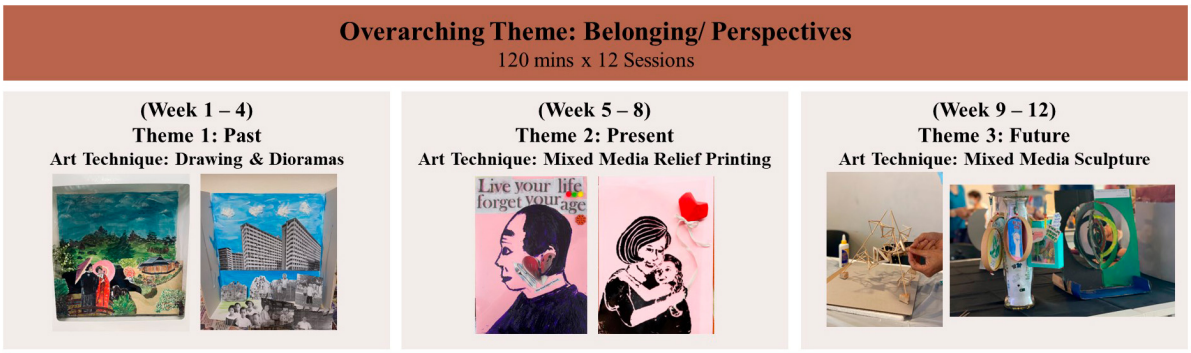
3 Results

3.1 Participant demographics

A total of 56 participants were randomized into the intervention group and 2 participants dropped out during the program due to ill health and work commitments. Intervention group participants were between the age of 60 and 80 years (M = 65.8, SD = 3.40), with a female majority (73.2%) and of Chinese ethnicity (96.4%). Participants attended an average of 11 out of 12 sessions. For the focus group discussions, a nested sample of 30 participants from the intervention group were invited to participate. The average age of this group was 66.2 years (SD = 2.93), majority were females (70%) and of Chinese ethnicity (96.7%). They were mostly retirees (70%) and had a bachelor's degree (36.7%). These participants were also physically healthy (60%) and physically active (100%). For more information on the participant's demographics, please refer to **Table 1**.

3.2 Program evaluation survey findings

A total of 53 participants completed the post-intervention participant satisfaction survey. Descriptive analyses revealed that 96.2% (M = 9.00, SD = 1.76) were satisfied with the overall experience of the Singapore A-Health Intervention. A total of 96.2% of the participants agreed that engaging in the activities positively impacted their quality of life (M = 8.90, SD = 1.43) and social wellbeing (M = 8.92, SD = 1.43). A total of 98.1% (M = 9.06, SD = 1.36) agreed that their physical health was positively influenced by the program. In terms of program implementation, 96.2% were satisfied with the overall gallery tours (M = 8.58, SD = 1.73) and the art making workshops (M = 9.20, SD = 1.40), and 98.1% were satisfied with the support and guidance received by the facilitators (M = 9.30, SD = 1.20).



Program Structure (4 Sessions per Theme)

Session 1		Session 2 & Session 3		Session 4	
Art Walk & Talk	45 mins	Let's Create!	90 mins	Finishing Touches	60 mins
Let's Create!	60 mins	Let's Share!	30 mins	Tea & Share	60 mins
Let's Share!	15 mins				

Notes on intervention design:
- The intervention structure was co-developed with the gallery team to curate artworks with the activity structure
- Artist and docent training sessions were conducted before the commencement of the program

FIGURE 1
Singapore A-health intervention structure.

3.3 Acceptability focus group discussion findings

Four groups were conducted with 30 participants from the first and second phases of the study. Thematic analyses with a grounded theory approach revealed three interconnected themes and nine subthemes (see Figure 2). The first theme illustrated the *A-Health Singapore Experience* which included the subthemes of *intellectual stimulation, positive stress*, and *peer interaction*. The second theme demonstrated the perceived *wellbeing outcomes* stemming from the participant's engagement in the 12-week program which include the subthemes of *personal growth*, *mindful living*, and *interpersonal bonds*. The final theme illuminates the *enabling factors* which appeared to moderate the relationship between the A-Health Singapore experience and wellbeing outcomes. The subthemes include *integrated support*, *mode of engagement* and the *session design*.

3.3.1 Theme 1: A-Health Singapore experience (*n* = 24; shared by 24 out of 30 participants)

The participants recounted their experience of the 12-week program and described how they were intellectually stimulated by the unique program contents. They found the session contents and project deliverables challenging, which elicited positive stress. Participants shared various strategies to cope with the stress including seeking support from their peers and self-learning after the weekly sessions. While some participants were empowered by the peer interaction, others felt internally pressured due to personal comparisons with their peer's progress which further contributed to their stress levels. Although participants reported feeling stressed during the program, they concurred that it was a fulfilling experience to complete the program.

3.3.1.1 Subtheme 1a: intellectual stimulation (*n* = 16)

The Singapore A-Health Intervention were deemed to be educational, and it challenged participants to think creatively and explore various perspectives on art. A participant shared that "*it challenges my mind to think outside the box. Most of the time I think that art is just drawing, painting, or coloring within the boundaries but this project gave me a better perspective on art, viewing art from different angles, different way of looking at things, and then broadening my mind (AHS081, 65-year-old, female).*" These challenges were also perceived as an avenue for problem-solving which motivated participants to learn outside of the sessions. As explained by a participant, "*because it was my first time working on the three projects, I had to do a lot of research. . . I was on YouTube all the time. . . with every little thing [referring to the information found], I expanded my search (AHS061, 65-year-old, female).*" Their motivation to learn was also noticed by a docent where she learnt that the participants "*stayed up late into the night to do google searches or watch YouTube to come up with ideas and complete their artworks (Docent, NGS01).*" Furthermore, the process of conceptualizing the art pieces was engaging and stimulating for the participants, as mentioned by this participant, "*[the project] keeps my mind wondering whether I should change [my original plan for the art piece]. I changed my ideas along the way, but stuck to my original plan. . . I now understand that there is a conceptualization process behind the art. I have learnt a lot and I'm happy about it (AHS101, 64-year-old, female).*"

3.3.1.2 Subtheme 1b: positive stress (*n* = 7)

Many participants entered the program with a belief that they had no artistic talents, and this was a source of stress during the process. A participant revealed that "*it was a love-hate relationship [with the program]. I loved it, but I felt so stressed. . . because I was not good at art. But after going through all the sessions, I felt*

TABLE 1 Baseline demographic information.

	Intervention (n = 56)	Focus group (n = 31)
Age (year, mean ± SD)	65.8 (3.40)	66.2 (2.93)
Sex (n, %)		
Male	15 (26.8)	9 (30.0)
Female	41 (73.2)	21 (70.0)
Marital status (n, %)		
Single	12 (21.4)	7 (23.3)
Married	37 (66.1)	22 (73.3)
Divorced/separated	4 (7.1)	
Widowed	3 (5.4)	1 (3.3)
Highest education attained (n, %)		
GCE "N," "O" level, GCE "A" level or ITE/higher Nitec and below	16 (28.6)	9 (30.0)
Polytechnic diploma or professional certificate	9 (16.0)	6 (20.0)
Bachelor's degree	24 (42.9)	11 (36.7)
Postgraduate degree	7 (12.5)	4 (13.3)
Ethnicity (n, %)		
Chinese	54 (96.4)	29 (96.7)
Indian	1 (1.8)	-
Other: Biracial	1 (1.8)	1 (3.3)
Employment status (n, %)		
Full-time employed	6 (10.7)	2 (6.7)
Part-time employed	14 (25)	7 (23.3)
Unemployed/retired	36 (64.3)	21 (70.0)
Presence of chronic illness (n, %)		
Yes	25 (44.6)	12 (40.0)
No	31 (55.4)	18 (60.0)
Practice of physical activity (n, %)[a]		
Yes	56 (100)	30 (100)
No	–	–
Number of A-health sessions attended (Mean ± SD)	11.3 (1.73)	11.6 (0.62)

[a]Regular physical activity (walking, bicycle, etc.) at least 1 h per week in the past month.

amazing that I went through it. I recalled my son telling me… that he had never seen me work so hard, dismantling the sculpture and trying again. This made me feel amazing as I was able to sit down and complete all three art projects (AHS056, 71-year-old, female)." Another source of stress was the uncertainty stemming from the art process where they were tasked to create an art piece related to the themes and skills taught but were not provided with a reference piece. This participant explained that "*I was initially quite excited, but I felt stressed because I believed that there was a certain expectation of us to have some background [in the arts]… it felt pressurizing to do something that I did not know. Although it seemed like an easy topic of creating a sculpture of anything I liked, it was hard to think of how I could use cardboard to create the sculptures (AHS023, 65-year-old, female).*" In addition, although the facilitators reminded participants that the intent of the program was to explore and have fun, many participants were still highly competitive and motivated to excel which exacerbated the stress. One participant narrated that "*I felt lost at the second piece [mixed media relief printing] and went to the sink to rinse and redo my art piece multiple times. It got worse and at last, I stopped. I was not satisfied with my work, but the facilitator assured me that the artwork did not have to be perfect, and as long as the work comes from the heart, it was good enough (AHS044, 71-year-old, female).*" A facilitator of the program also reflected that "*some participants were unsure of themselves or lack confidence… [while others] embraced the attitude to try their best and encourage their fellow teammates (Researcher and co-facilitator, FAC01).*"

3.3.1.3 Subtheme 1c: peer interaction (n = 13)

The Singapore A-Health Intervention was a platform to meet others with similar interests, where "*having a group like that gives seniors a chance to interact and enjoy some form of socializing and to learn what others do (AHS023, 65-year-old, female).*" This was also supported by an observation made by a gallery docent where she found that some of her participants "*were lonely and they wanted in-person interaction and meet other people through the program… and the program was a positive way for them to come out and meet other people, to learn something new, and have a creative output (Docent, NGS05).*" A supportive culture jointly created by the facilitators and participants of the program nurtured inspiration and promoted healthy competition potentially alleviating the stress the participants experienced. A participant illustrated how his classmates were both a source of stress and support to him as "*I was most stressed by all the top students in my team. Overall, I enjoyed the teamwork in this program. It was a very nice thing to mix around with people and get inspired to do the best I could where we built on one another's strengths (AHS090, 63-year-old, male).*" Furthermore, the shared experience of navigating through the stress and challenge of the program also encouraged interaction as illustrated by this participant, "*by articulating my frustration to a friend and then finding out that she shared the same frustration helped a lot as we talked and gave each other the courage to try something. It was good to have somebody with me in a situation where we were doing new things (AHS020, 67-year-old, female).*"

3.3.2 Theme 2: wellbeing outcomes (n = 22)

Although quality of life was not statistically significant in the quantitative findings, the participants provided rich and descriptive narratives of experiencing positive outcomes in several domains of wellbeing including interpersonal bonds, personal growth, and mindful living.

3.3.2.1 Subtheme 2a: interpersonal bonds (n = 10)

The 12-week Singapore A-Health Intervention offered opportunities for interaction and relationship building which resulted in social connectedness with fellow attendees. For example, a participant shared that "*the part that surprised me was how well we could get along because we didn't know each other [prior to the start of the program]. As the 12 weeks went by, everyone got more and more friendly, and that meant a lot to me (AHS038, 69-year-old, female).*" Another participant reflected that even though 12-weeks was a short period of time, the relationships

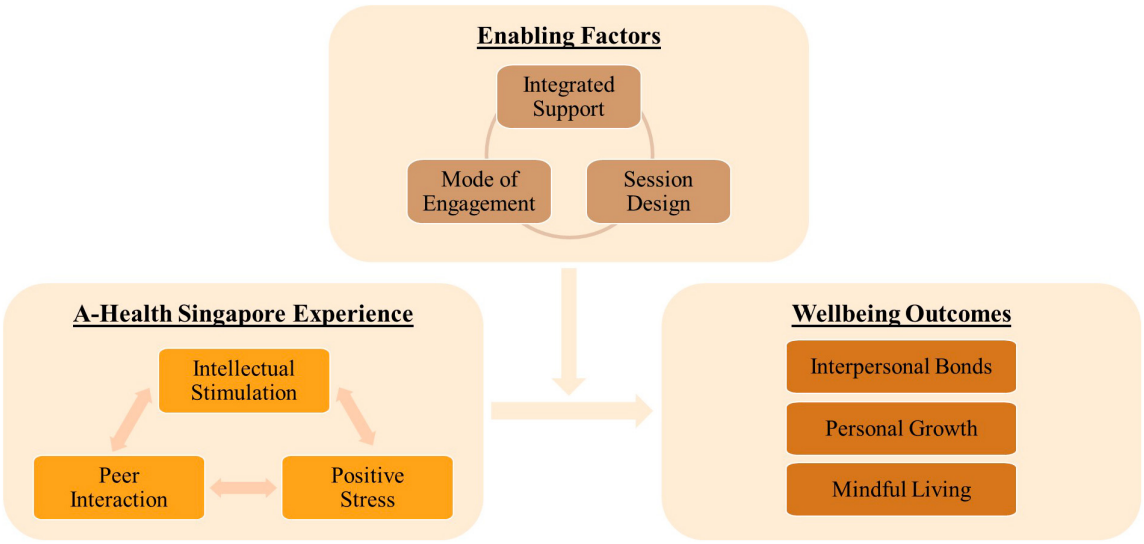


FIGURE 2
Qualitative findings of the Singapore A-health intervention study.

formed were akin to longtime friends, "*for this short-term project, I would not have expected that we could so nicely bond with each other. I was so happy and comfortable that I could just joke. I felt like we had known each other for a long time. . . it was not just the physical artwork, but the people in the group that mattered a lot more for me to fully benefit from this research project thoroughly and in a wholesome way (AHS003, 63-year-old, female).*" Participants also shared their experiences with their family and friends, and this strengthened their interpersonal relationships with others outside of the program. For example, a participant who did not usually appreciate art raised the topic at home and "*it was funny, and everyone had a good laugh. The experience was quite good as the whole session lifted the atmosphere and added harmony to family gatherings. Sharing my experience with my friends was quite fun too (AHS127, 66-year-old, male).*" Facilitators of the program also observed a sense of camaraderie among participants where "*the artmaking process helped them form bonds and develop a sense of social involvement and belonging to a group. From the ideation to the creative process, there were much brainstorming through discussions, opinions, sharing ideas, and getting help. . . these interactions may create a new sense of identity for them to feel meaningful. . . which can contribute to better wellbeing (Researcher and co-facilitator, FAC05).*"

3.3.2.2 Subtheme 2b: personal growth (*n* = 12)

Participants reported learning new skills and experience a sense of satisfaction from completing the Singapore A-Health Intervention. A participant "*thought it was quite nice to do something different and learn something new. It's in this course that I challenged myself to learn new things, and it was a wonderful experience (AHS023, 65-year-old, female).*" The complexity of the program may have elicited stress among the attendees, but it was an opportunity for growth where this participant likened the experience to the joys of childbirth, "*I thought that the challenge was good because I discovered that I was averse to doing anything new. . .and because [creating the art pieces as deliverables] was built into the workshop, I had to do something [despite her resistance to trying something new]. I agonized over weeks, days, and nights, and at the end of it," "gave birth" to something [referring to her artwork]. It was like labor pains, or a crescendo to a piece of work. When I "birthed" the artwork, I felt so happy. I felt fulfilled that I managed to do something different, managed to go beyond what I would normally would do, something different from my normal ability (AHS020, 67-year-old, female).* Participants also gained a perspective change regarding their views of their ability. A participant initially felt that "*I couldn't do the art pieces but made up my mind to try with the encouragement from the session facilitators.*" She later had a realization that by being open to experiences, she will "*know how far I can go; and if I did not try, I will forever feel that I cannot do it.*" As a result of her openness of mind and resilience, she "*saw the results and really enjoyed the course (AHS056, 71-year-old, female).*" Program facilitators also witnessed many participants being more open to experience as the program progressed and explained that "*the sense of achievement that they get from creating their art piece and compliments from others also surmounts personal barriers because a lot of participants come in and voice their fears of not being good at art or were confused with the themes. But to be able to materialize something, see that they can create something, and have the physical representation of their achievement makes them very proud. It's a reminder of what they can achieve despite their doubts (Researcher and co-facilitator, FAC05).*"

3.3.2.3 Subtheme 2c: mindful living (*n* = 10)

The Singapore A-Health Intervention inspired some participants to be more mindful in their everyday lives and curious of their surroundings. A participant described that the program "*increased my observation of my surroundings. When I went to Gardens by the Bay (a nature park in Singapore) and stopped to look at some of sculptures, I tried to see it from a different point of view. So, (the A-Health Singapore intervention) gave me a better sense of perspective of my surroundings (AHS081, 65-year-old, female).*" Moreover, another workshop attendee added that "*I*

started to notice that the trees have many different shades of green, and how the colors of the tree leaves have changed, which I never really noticed before. I also became more aware of nature and think that I'm starting to appreciate art (AHS079, 68-year-old, female)." Another facet of mindful living is the awareness of an individual's thoughts and emotions. The program created opportunities for reflection and self-expression which brought solace during the COVID-19 pandemic. This participant disclosed that "*I was very impacted [by the pandemic] in so many ways and I just couldn't run away from it when I'm doing the art pieces. . . The abstract art activity gave me an opportunity to convey the things that have been impacting my life.*" Eventually, "*I couldn't imagine that I was able to use something like that to articulate and express what I was feeling inside. That peace gave me the most satisfaction (AHS020, 67-year-old, female).*" Facilitators also witnessed the participants reveling in the present moment by "*getting into a state of flow where they really lose track of time when they are doing their art pieces. . . it is a beautiful thing to see the participants giving their all and being very serious about this. The benefits of this flow are heightened concentration and all sorts of things associated with flow (Researcher and Co-facilitator, FAC05).*"

3.3.3 Theme 3: enabling factors (*n* = 28)

This theme covers useful elements to optimize the running of the Singapore A-Health Intervention. Respondents highlighted the importance of having effective communication from the session facilitators, a clear and structured curriculum, as well as the pros and cons of the in-person, hybrid, and online sessions during the pandemic. This discussion was corroborated with inputs from the session facilitators. Taken together, these factors influenced the overall experience of the program and supported positive wellbeing outcomes.

3.3.3.1 Subtheme 3a: integrated support (*n* = 20)

Implementation of the Singapore A-Health Intervention involved multiple facilitators: a docent for the guided tours, an artist for the art activities, and a research officer who co-facilitated the sessions and liaised with the participants. Each facilitator played a unique role in shaping the participant's experience, while contributing to the same goal of improving the participant's wellbeing through the program. For instance, the docents helped participants learn "*how to appreciate the different perspectives. . . and helped made sense of the painting as I was not familiar with some of the artists, so giving a background of the artist's frame and perspectives adds understanding to what was being drawn (AHS109, 64-year-old, female).*" The facilitator and researchers assisted the participant as they navigated the themes and program content, where their "*frame of mind was framed by the artist's input, and it actually helped a lot. Many would have attended the session without thinking in-depth about what the art pieces were about and what we were supposed to do (AHS127, 66-year-old, male).*" With different facilitators in the program, it was important for facilitators to provide cohesive instructions to avoid confusion. A participant shared that "*a number of them did not come from an art background, so the terms and concepts were quite new. The tours could be more explicit to inform participants about the concept of their artworks. . . and how the museum tours were linked (AHS076, 70-year-old, male).*" Participants also expressed the need for clear and empathetic communication to engage the group and manage program expectations.

This was also echoed in the *ad hoc* group discussions with the Singapore A-Health Intervention facilitators, where they concurred that facilitation skills such as active listening, the use of probing questions, and the ability to moderate discussions with diverse viewpoints were useful for facilitating interactive art and museum program such as the Singapore A-Health Intervention tours. As this facilitator succinctly put, "*there is the art of questioning, the art of listening, the art of validation, and quick thinking on your feet to draw and tie everything together so that everybody feels validated and contributed to the conversation (Docent, NGS06).*" In terms of program execution, a strong collaboration between stakeholders was key to effective implementation. For example, the enforcement of lockdowns in Singapore required swift transition from an onsite to online program which required many changes, the program organizer shared that, "*if I had to do this by myself, this whole thing would definitely crash and burn, but the team is great and there has been a lot of communication between the parties running the study because everyone was very open to any last minute changes, and they were very accepting which was definitely very helpful (Researcher and co-facilitator, FAC01).*" Moreover, a supportive network of facilitators was essential for successful sessions. The docents were forthcoming with sharing resources and ideas with each other to enhance the participant's experiences of the tour, while the artists and co-facilitators met before sessions to discuss session plans. This strong support system motivated facilitators to provide quality sessions to the participants and improve service delivery collectively.

3.3.3.2 Subtheme 3b: session design (*n* = 19)

The Singapore A-Health Intervention consisted of museum tours and artmaking activities that explored the themes of the past, the present, and the future. For each theme, participants used different techniques taught by the artist to create an art piece. Participants appreciated the activities and found the session flow appropriate. This participant explained the link between activities, "*the tour and artmaking activities were interlinked. If I were given the tour only, then I would be touring and going back [home]. There was nothing to take back. But now with the tour and art activity, I was made to think and create (an art piece) and have something that comes out of that (The tours and art activities) must go hand-in-hand (AHS061, 65-year-old, female).*" This point was also highlighted by the facilitators, who observed that the scaffolding incorporated into the framework allowed easy entry for participants with little experience with art. Despite this, some participants had difficulties realizing the theme in their artworks due to challenges connecting the themes. The fixation on themes stifled their creativity and was a source of stress for some participants. For example, one participant "*was locked into thinking that the first project should be about the past*" but wondered "*how far in the past was considered as the past and had a lot of liberty looking into it*" and suggested that "*it didn't need to be (related to) the past, present or future. I thought that the project should give more freedom to me (AHS090, 63-year-old, male).*" Other participants opined that the structure is necessary to kickstart the creative process, "*if there weren't the themes of past, present, and future, it would then be free for everybody and too unrestricted. In the first tour about the past of Singapore, many participants talked about their past experiences and this inspired me*

to create the old market scene in my diorama (AHS130, 67-year-old, male)." This finding suggests that while the flow and art activities were appropriate, the intervention protocol was not a one-size-fit-all solution and adjustments could be made to the delivery of the program to cater to the unique learning needs of the older adults.

A standardized intervention design also provided structure and alignment across facilitators, which was important for a program involving multiple facilitators. The lead artist highlighted that "*the structure provided easier communication among all who were involved (Artist-facilitator, FAC04)*," at the same time allowing flexibility for the facilitators to "*bring their own passion, own ways to share something, and their enthusiasm (Docent, NGS05)*" which in turn positively influenced the sessions. Additionally, having a protocol enabled better resource allocation from a logistical standpoint and more bandwidth on the facilitator's end to focus on improving participant experiences. For example, the research coordinator of the study explained that "*execution was easy because there was a clear plan of action. . . and it was very easy to know what to look out for and how to support the program in terms of the tour, the artmaking, and the preparation for the participants. During the setup, I knew exactly what materials to prepare and how to make things easy for the participants (Researcher and co-facilitator, FAC02).*"

3.3.3.3 Subtheme 3c: mode of engagement (*n* = 23)

This subtheme addresses the pros and cons of various logistical elements, such as the group size and platform of engagement in impacting the overall experience of the participants. Changes in government policies due to the COVID-19 pandemic required participants to attend the program online or a hybrid version of the program. This provided a unique opportunity to understand the participant's experience. When asked for their preference for an online or onsite experience after experiencing both, their responses were mixed. Some participants "*preferred the sessions to be onsite. For the tours, we could have a 360-degree view and could even whisper or share suggestions with our fellow group members. . . . Being onsite, it felt like we were in a class interacting with teachers and the group which gave us more inspiration and ambition to help others, and sometimes steal ideas (AHS081, 65-year-old, female).*" Others felt that "*there was no difference because it has been 2 years since the COVID-19 pandemic [at the time of the interview], and we have been doing everything online. The visits to the museum would be better held in-person, whereas doing the rest of the work at home gave us more time. We can have a coffee, lie down, and rest (AHS100, 68-year-old, male).*" Program facilitators noticed a difference in the behavior and level of engagement between the online and onsite program where participants "*were more open in the gallery space and. . . the value-add of the onsite experience for them was not only through the museum tours but being together in the gallery space so that they can share their opinions. Doing the artmaking together as a group was much more positive and enriching for them than doing the artwork at home individually (Docent, NGS02).*"

Participants then suggested a different hybrid approach which included having an onsite museum tour and online artmaking sessions. Overall, their responses suggested that engaging in the program online was convenient and comfortable, however, it lacked the opportunities for organic interactions and guidance from the facilitator which was easily accessible in the onsite experience as explained by this participant, "*the interactions were quite dynamic and interesting, because I could hear a few voices at the same time. Unlike zoom, [where the interactions were] one [voice] in [and] one [voice] out. Listening to a lot of voices sometimes helped me to understand what the other guy was thinking or others' work in progress. . . it made me realize that it was possible to see things from another angle which was not possible when I was on zoom (AHS076, 70-year-old, male).*" This might be a better alternative as the facilitators suggested that the current hybrid sessions were not sustainable for them because the sessions required them to "*mentally juggle and see participants both on zoom and in-person (Researcher and co-facilitator, FAC01)*" and their "*energy was completed zapped because they could not focus on both the in-person or the online session. . . despite the co-facilitator's help with the online session participants (Artist-facilitator, FAC03).*"

4 Discussion

The objective of this study was to understand the lived experience and impact of the Singapore A-Health Intervention on the health and wellbeing of community dwelling older adults. A qualitative approach was adopted to address the research objectives by eliciting lived experiences from the intervention group participants and triangulated with inputs from the session facilitators. The program evaluation survey and acceptability focus groups revealed that participants were overall satisfied with the program implementation. The analysis identified interrelated themes on the intervention design, wellbeing outcomes, and enabling factors which supported the successful execution of the Singapore A-Health intervention. The outcomes of improved interpersonal bonds, personal growth, and mindful living were consistent with the literature on art and museum-based interventions for older adults (23, 24). Population based studies showed the positive associations of active participation in arts and cultural activities with life satisfaction, perceived health, quality of life, spiritual wellbeing, and reduction in depressive symptoms (25–27). As observed by one of the facilitators, the experience of a flow state during the intervention which is the complete absorption and enjoyment in an activity could explain the sense of mastery, satisfaction, and fulfilment reported by the participants (28). Furthermore, the participant's reports of personal growth, autonomy, and self-acceptance were documented dimensions of Ryff's six-dimensional model of psychological wellbeing (29). The social element of the program through group discussions and weekly dialog with the facilitators fostered a sense of belonging and support among participants, thereby strengthening social wellbeing. This newly formed group membership could also shape an individual's self-concept which has a positive impact on self-esteem, as explained by the social identity theory (30, 31). Guided engagement with the artworks also encouraged participants to be present in the moment and fully immerse themselves in the creative process (32) which is beneficial to multiple areas of the older adults' lives (33). These elements of immersion, socialization, and reflectiveness integral to the Singapore A-Health intervention experience were also key mechanisms posited in Tay and colleague's conceptual framework for the role of arts and humanities in human flourishing (34). These positive outcomes are known factors that influence resilience and motivation among older adults,

which was associated with increased medical adherence and health behaviors (35).

In addition to the impact of the program, this investigation revealed the complexities apart from the art modality that could influence the overall experience and the outcome of the intervention which is rarely documented in the literature. For instance, it was found that the intervention was intellectually stimulating and elicited positive stress among participants as well as the motivation to seek peer support. Yet, the same peer interaction during the program could be both a source of stressor and strength among the participants. There is a risk of psychological harm if these complexities are not adequately managed, and the current findings suggested possible enabling factors for successful implementation of art-based activities for health in the museum space. One key enabler is through facilitation, which comprised of communication, empathy, and flexibility. Clear and timely communication was essential, starting from the recruitment process where information to participants were clearly disseminated and concerns adequately addressed. During the program, the docents created a welcoming space at the museum while setting the context for the art facilitator to establish program structure and deliver the art program. Therefore, for multi-facilitator programs such the Singapore A-Health Intervention, it is of great importance for facilitators to have a strong understanding of the program (e.g., program aims, intended outcomes, session design). Moreover, the importance of exercising attentiveness (36) and empathetic communication by the facilitators creates a safe space for growth and learning (37, 38). This sets a supportive, non-judgmental culture for healthy competition and collaboration amongst participants. The findings from the focus groups also showcased diverse views from the participants regarding the intervention and support provisions, underscoring that a one-size-fit-all program is simply a mirage. This highlights the challenges of implementing art programs to a group with diverse preferences which may require more flexibility and adaptation on the facilitators' end. For future practice, facilitators could adopt the person-centered art practice with communities framework to attend to the social, personal, cognitive and cultural dimensions of the participants in program implementation (39).

Another key enabler is the program design, where a culturally appropriate and structured curriculum is crucial. While the A-Health framework was based on rich empirical evidence, the 12-week Singapore A-Health Intervention activities were co-created with the NTU research team together with the Gallery's community access team to curate artworks that were accessible to the older population in Singapore. These activities were further refined by the participants' input for a better fit between the program and the target population. In practice, designing art-based programs with a participatory action research approach (15) aids in successful implementation and minimizes attrition rates in the community. Moreover, this study supports the use of a structured curriculum with deliverables and achievable milestones. The milestones enabled participants to evaluate their progress, and achieving these goals with a tangible indicator (i.e., art pieces) was rewarding for the participants. When communicated clearly to participants, this structure was particularly helpful for those who joined the program with little to no knowledge of art. In addition, the inclusion of monthly themes created further constraints which has been proven to facilitate the creative process (40). Taken together, insights from this study suggested that a structured and well-facilitated creative intervention could play a role in the enhancement of health and wellbeing at old age.

4.1 Limitations and future directions

While the study yielded valuable insights into the overall experience and impact of the Singapore A-Health Intervention, there are several limitations that should be considered. Regarding the sample composition, majority of the participants were female, of Chinese ethnicity, possessed a college degree, were retirees. Based on the recruitment criteria, only participants who were fluent in English and had access to the internet were included. This study therefore has moderatum generalizability to similar profiles of older adults. Future studies could translate the Singapore A-Health Intervention into Malay, Tamil, and Mandarin Chinese to increase access and test its applicability to other populations of older adults in Singapore. Moreover, participation in the focus group for this study was on an opt-in basis, which may result in a group self-selected profile of participants that is highly motivated and biased toward the program. Potential bias has been mitigated in this study through the careful crafting of the semi-structured topic guide (e.g., neutrally worded open-ended questions), neutral facilitation (e.g., encouraging open dialog among participants and encourage diversity in views), member checking (e.g., discussing preliminary insights with participants and allowing them to provide clarification on their experiences), and triangulation. As the qualitative responses of the participants are equally important as the quantitative data in providing a holistic understanding the impact of art and museum-based intervention, future research could consider incorporating the qualitative evaluation as an integral part of the investigation to include a wider range of participants. Participants could voluntarily opt-out of the focus group and withdraw their participation at any time instead of an opt-in basis. Finally, the synergy and collaboration among stakeholders in driving successful implementation were highlighted in the findings and warrants further investigation to inform practice and sustainability in the field.

5 Conclusion

The qualitative investigation of the Singapore A-Health intervention provided deeper insights to the improvements in wellbeing among older adults in Singapore, complementing the quantitative findings. Furthermore, enabling factors and complexities which drive successful implementation were uncovered. These findings provide a culturally unique perspective on the benefits of art and museum interventions and showcases the strengths of cross-industry collaborations in supporting the health and wellbeing of the ageing population.

Data availability statement

The datasets presented in this article are not readily available because the original contributions presented in the study are included in the article/supplementary material, further inquiries

can be directed to the corresponding author. Requests to access the datasets should be directed to AH, andyhyho@ntu.edu.sg.

Ethics statement

The studies involving humans were approved by NTU Institutional Review Board (NTU-IRB). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

AH and OB designed the study and obtained funding. MT designed the art and museum engagement activities. SM, SG, GY, AT, YY, and KG involved in the implementation of the research study. AH, MT, and SM conducted the analysis. All authors contributed to data interpretation, as well as the writing and revision of the manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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Implementing a singing-based intervention for postpartum depression in Denmark and Romania: a brief research report

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Background: There is a burgeoning evidence-base that demonstrates the positive impact of the arts on our health, wellbeing, and health behaviors. However, very few studies have focused on how to optimize the implementation of these activities for different sociocultural contexts. Due to the increasing interest in scaling effective arts interventions as part of public health strategies, and in line with global goals of achieving health equity, this is an essential focus.

Aim: Using the case study of a singing for post-partum depression (PPD) intervention with empirically-demonstrated clinical effects, this brief research report explores implementation of an arts and health intervention that has been successful in the United Kingdom ("Music and Motherhood") for the new contexts of Silkeborg (Denmark) and Cluj-Napoca (Romania).

Methods: Data was collected from participants at all levels of the implementation structure including at local and management levels. The study draws on qualitative implementation data to explore participant experiences, including one-to-one interviews, written testimonies, meeting minutes, ethnographic researcher reflections and focus groups, including data from 46 participants in total.

Results and conclusion: We explore implementation and adaptation across five key themes: (1) acceptability and feasibility; (2) practical and structural barriers and enablers; (3) adoption and sustainability; (4) broader contextual factors affecting implementation and sustainability; and (5) project structure and processes. Taken together, the themes demonstrate that arts interventions need to be adapted in culturally sensitive ways by stakeholders who have local knowledge of their environments. This research serves as an informative foundation for use by other researchers that aim to expand the reach and impact of arts-based interventions.

KEYWORDS

art and health, culture and health, postpartum depression, implementation, feasibility

Introduction

As the evidence on the role of the arts in improving health and wellbeing and promoting health behaviors has grown (1–4) so too has the interest from policymakers, and health and social care commissioners regarding how to improve access to the arts as a form of public health provision (e.g., social prescribing initiatives) (5, 6). Global policies demonstrate increasing commitment to providing infrastructures that enable the growth of arts interventions to support public health challenges (5), and the World Health Organization (WHO) has acknowledged the importance of the arts to achieving global development goals (7). The growing momentum in this area has also spurred the creation of several key national and international bodies (4). Yet, despite the increased attention given to the structures surrounding the delivery of arts and health interventions within policy and practice, very little research has focused on how to optimize and evaluate implementation or how certain evidence-based interventions may need to be adapted for new contexts. The latter is particularly important in view of the growing recognition of the need to scale-up effective health interventions to improve access, rather than focusing solely on new innovations that may never be implemented in real-world settings (8). Whilst it is indeed still a priority to improve the quality of the evidence in arts and health (9, 10) and to explore a range of different epistemological perspectives that can better acknowledge the complexity of the arts as culturally-embedded, relational activities (11), there is a clear gap to explore the feasibility of scaling well-evidenced interventions.

The few studies that do exist exploring implementation of arts interventions include a scoping review exploring implementation of online singing groups for people living with dementia (12), a randomized controlled trial exploring the feasibility and acceptability of music therapy in managing delirium (13) and a study that developed an implementation plan in the context of depressive symptoms in young adults (14). A selection of implementation guides are also available documenting how to replicate music therapies within similar settings (15–17). Few of these guides, however, consider the role of cultural context in implementation. This is important in view of the "complex" nature of the arts (18), health, and health behaviors (19), whereby socioeconomic, cultural and political factors can be viewed as moderating the relationship between the arts and health (20). Work by Belgrave and Kim (21) provides music therapists with the tools to integrate understanding of different cultural and social identities, such as heritage, age, and health beliefs, into their practice, but broader organizational and socioenvironmental factors are left unexplored. Although these guides provide specific support for music therapists, research is required in order to develop implementation guidance for community arts practitioners (i.e., not therapists), and to explore the organizational structures surrounding delivery and implementation of interventions in different sociocultural contexts.

Using the case study of a singing for post-partum depression (PPD) intervention, this study explored how an arts and health intervention that has been successful in the United Kingdom ["Music and Motherhood" (22)] was adapted to new contexts in Silkeborg (Denmark) and Cluj-Napoca (Romania), with a view to providing support and guidance on future implementation and scale-up of arts interventions.

Materials and methods

Context

Music and Motherhood

A singing for PPD intervention known as "Music and Motherhood" was selected to be implemented in Denmark and Romania following a roundtable discussion of evidence-based arts and health interventions amongst the study team including the behavioral and cultural insights (BCI) Unit at WHO Regional Office for Europe, arts, third-sector and health organizational representatives and researchers (n = 17). The original Music and Motherhood randomized controlled trial compared the effects of a 10-week singing and play intervention on symptoms of PPD for new mothers, with results showing that the intervention reduced PPD symptoms by 38% and led to faster recovery in mothers with moderate–severe symptoms when compared to usual care (2, 23). It was selected based on evidence that shows singing-based interventions to be beneficial for PPD, alongside the challenges of there being no complete treatment solution (24, 25).

This single-arm feasibility study drew on the original protocol for Music and Motherhood (22). We sought to have a dual focus to explore the feasibility of implementation and to evaluate the perceived impact of the intervention. The intervention consisted of two 10-week singing interventions in Denmark and Romania, with the groups in Romania consisting of one Romanian-speaking group and one Hungarian-speaking group, as both languages are spoken within the region.[1]

In order to support the localization of the intervention, patient and public involvement (PPI) groups were organized in each of the locations. These groups were comprised of mothers with lived experience of PPD, musicians, researchers, and health specialists. The PPI groups met up to three times during the preparatory phase, advising on issues such as location, timing, music choices, and safeguarding.

Participants

Data was collected from participants at all levels of the implementation structure including at local (e.g., new mothers with symptoms of PPD, singing leads, in-country project managers, healthcare staff, referrers) and management (e.g., WHO, University College London) levels (see **Table 1**).

Recruitment of partner organizations who led on in-country implementation was facilitated by the BCI Unit at the WHO Regional Office for Europe and drew on pre-existing arts and health networks. Organizations were approached based on their previous successful delivery of community-based interventions (Romania) or arts and health projects (Denmark). The Social Biobehavioural Research Group at UCL joined as a partner, building on their status

1 Hungarian-language speakers are the largest minority group in Romania.

TABLE 1 Number of participants per data collection method*.

	Mothers Denmark	Local staff Denmark*	Mothers Romania	Local staff Romania**	Core study management (see Table 2)
One-to-one interviews	$N = 3$		$N = 4$	$N = 5$	$N = 1$
Written testimonies	$N = 2$		$N = 3$	$N = 4$	
Focus groups	$N = 7$ (2 groups)	$N = 4$ (1 group)	$N = 12$ (2 groups)		$N = 9$ (1 group)

*Please note that some participants engaged in multiple data collection methods. The total number of participants included was 46 (Denmark $n = 17$, Romania $n = 19$, Study management $n = 10$).
**Local staff includes singing leads, healthcare staff, referrers, venue managers and project management.

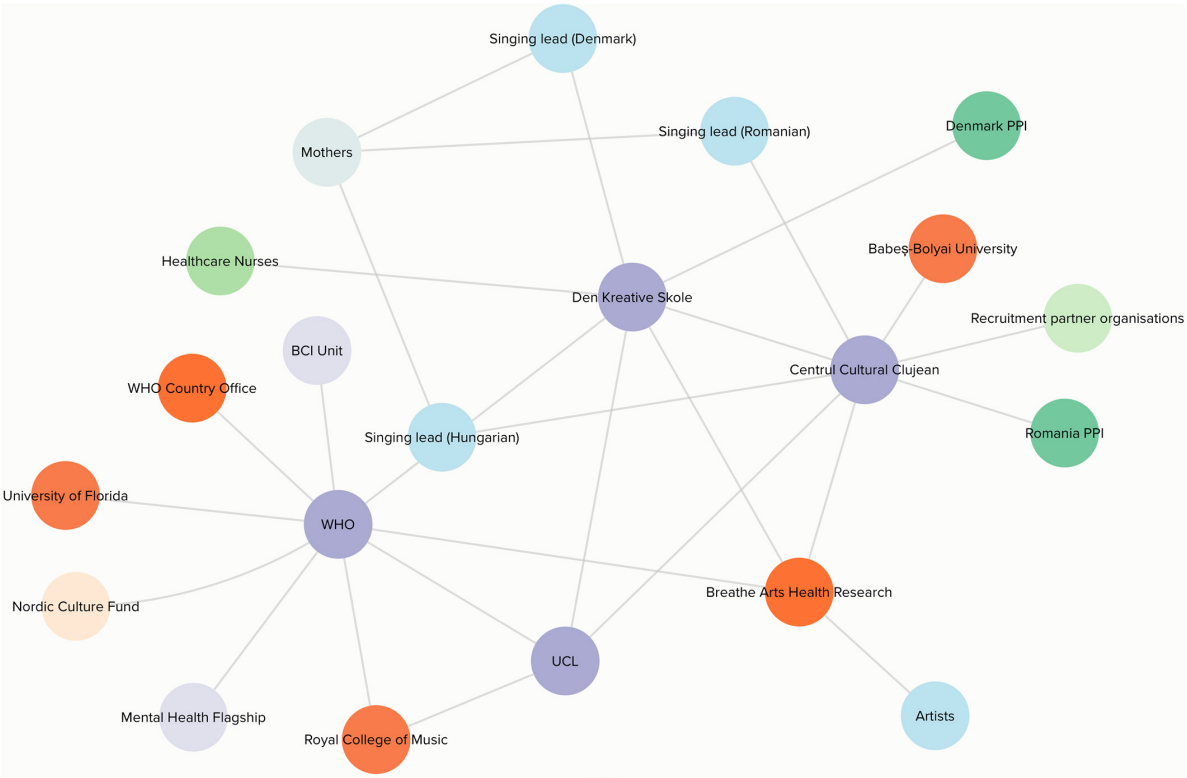

FIGURE 1
Stakeholder map. Circular nodes in this map represent individuals and/or organizations, and lines connecting these nodes represent collaborative working relationships/knowledge sharing, or project input. Nodes in purple represent project management organizations, nodes in orange represent research/session support and input, nodes in light blue represent artistic input, nodes in mint green represent recruitment, nodes in darker green represent PPI, nodes in lilac represent internal institutional support, the node in grey represents mothers who sang in our singing groups, and the node in light orange represents the funder.

as a WHO Collaborating Centre for Arts and Health. Based on these initial partners, recruitment happened organically, as illustrated in Figure 1. In Denmark, recruitment of mothers for the singing groups happened through referral from the healthcare system (e.g., via health nurses). In Romania, recruitment involved working with multiple cultural, community and health organizational partners.

Methodology and methods

This study is part of a broader mixed-methods project exploring implementation and effectiveness of singing groups in different cultural contexts (26). For this article, we report findings from our analysis so far, drawing on qualitative implementation data to explore participant experiences. This included one-to-one interviews, written testimonies, meeting minutes, ethnographic researcher reflections and focus groups (see Table 1).

All mothers were invited to participate in focus groups at the end of the study and to provide additional feedback in the form of a written testimony. Based on availability, some mothers only provided written feedback. A smaller selection of mothers ($n = 3$–4 per country, the first who volunteered) were additionally invited to participate in a one-to-one interview to further explore feasibility of implementation. All members of the management structure were invited to participate in a focus group or an interview (based on availability), and singing leads were invited to participate in a one-to-one interview. Participant numbers are included in Table 1.

Interviews or focus groups with local staff were conducted by HU in Romania and NL in Denmark. Focus groups with mothers were conducted by OB and a mental health specialist in Romania

and by LC in Denmark. Written testimonies were collected via email. Meeting minutes from bi-weekly online study team meetings (see Table 2) were created by CS. Ethnographic reflections were created by KW at analysis meetings, and the management focus group was conducted by AB, as someone not directly involved with implementation (see Supplementary Appendix example Topic Guide). Given the importance of our team structure to explaining our implementation processes, CS used Kumu (software) to create a stakeholder map (see Figure 1).

TABLE 2 Role in the project of those participating in the core study management who were part of a focus group or interview about implementation*.

Category**	Number of participants
Local Denmark management team	2
Central management team–Denmark	1
Central team	3
Local Romania management team	3
Central management team–Romania	1

*One participant was unable to participate in the focus group so a one-to-one interview was conducted. We have not highlighted who this was to preserve anonymity.
**Local teams are those on-the-ground who were part of in-country implementation. Central teams are those who were involved with strategic decisions and management, but who were not part of logistical delivery in-countries. Further details are not provided to preserve anonymity.

Analysis

Data was collected in Danish, English, Hungarian or Romanian. Discussions were transcribed using transcription agencies, software or by hand and analyzed using Framework Method (27) by OB (Romania), NL (Denmark), and KW (United Kingdom—management data). NL conducted analysis by hand, and OB and KW used NVivo 12. The framework used to guide analysis drew on theories from implementation science (28–31) (see Supplementary Appendix). Although a deductive approach to analysis was taken, this was supplemented with open, inductive coding to account for unexpected findings. Once coding was complete, codes were translated into English and discussed between KW, OB, and NL at a series of analysis meetings. Themes were constructed out of codes by KW in view of group discussions and through searching for patterns across the translated data from all countries. The discussions also included reflection on researcher positionality and the sociocultural contexts of data collection. Themes were constructed out of codes by KW in view of group discussions and through searching for patterns across the translated data from all countries (see Table 3 for an overview of themes, sub-themes and descriptions).

Results

Theme 1: Acceptability and feasibility of the singing intervention

The suitability of the content and structure of the singing intervention (subtheme 1.1) was important to acceptability and feasibility. In Romania, mothers enjoyed the songs that "varied in style, energies and cultural backgrounds" and the "body movement and voice exercises" (Mother Romanian Group ID2). However, one participant remarked that "it would have been easier if the lyrics were sent after each session" (Mother Danish Group ID4). The suitability of the content was also expressed in Denmark. One mother noted that the "songs make you reflect and think" (ID4) and referrers described "being together in song" as "a great idea" (Denmark Local Staff ID1), with "the fact that they can bring their child" noted as "significant" because "they don't have to think about childcare" (Denmark Local Staff ID1). Across both countries, the importance of the intervention as "a group" was voiced. The group created "an atmosphere of acceptance" (Mother Romanian Group ID5), "companionship with others" (Denmark Local Staff ID1), "a feeling of belonging" (Mother Danish Group ID5), and a "space" where mothers could "meet around something you already know is vulnerable" (Mother Danish Group ID2). The classes also provided a routine and consistent support. One mother noted "it's something I have had a countdown on" (Mother Danish Group ID6) in relation to counting down the days between the sessions, with referrers also noting there was "something predictable about it" which was "especially important" for participants (Denmark Local Staff ID1). The value of consistency and "the group" have also been highlighted in previous research exploring singing for PPD (32), and additionally align with broader theories spotlighting the importance of group-level factors to health and wellbeing. Notably, the social cure approach (which combines social identity theory and self-categorization theory) suggests that meaningful identification with a group provides psychological resources that support health (33), and this too can be applied to the context of singing (34).

Another key aspect was the suitability of the project team (subtheme 1.2). One mother in the Romanian group noted that the success of the intervention "was primarily down to the people" with the project manager and singing leader "open" and "supportive" (Mother Romanian Group ID2). This participant also described how these project team members shared "their own experiences as mothers" (Mother Romanian Group ID2) which contributed to the classes being perceived as "authentic," suggesting that sharing experiences across mothers and staff created an inclusive group environment. Across both countries, the singing leaders were described as important to the acceptability of the intervention. The singing leader "established an open and welcoming space" (Mother Danish Group ID1), went "above and beyond expectations" (Mother Danish Group ID1), was a "fabulous teacher... because she is so... human... she also shares herself" (Mother Danish Group ID7) and expressed an "interest in one's child" (Mother Danish Group ID8). This highlights the importance of the soft skills of the singing lead (e.g., relationship-building) as crucial to the success of the intervention, alongside musical and leadership abilities, as has been documented elsewhere (29, 35).

The final sub-theme here explores the suitability of the singing intervention for supporting symptoms of postpartum depression (subtheme 1.3). Participants found the classes to be "useful and beneficial for their mental health" (Romania), they helped to "hold on to things that bring joy and wellbeing" (Mother Danish Group ID1), "reconnect with my body" (Mother Danish Group ID6), and address difficult emotions through feelings being "mirrored and held" (Mother Danish Group ID2) as well as supporting mothers

TABLE 3 Themes constructed from the analysis procedure showing processes for adapting and implementing the Music and Motherhood intervention.

Theme	Sub-theme	Description
1. Acceptability and feasibility of the singing intervention	1.1. Suitability of content and structure	The choice of songs and structure of the classes were appropriate, especially in view of including babies and constructing "a group" that provided consistent support.
	1.2. Suitability of project team	The people organizing the intervention were important to its success, with particular emphasis placed on the singing lead as playing a crucial supporting role.
	1.3. Suitability for supporting PPD symptoms	The intervention was perceived to support the mental health of mothers with PPD, but additional psychological supports could be considered alongside the classes.
2. Barriers and enablers	2.1. To mothers' participation in the intervention	There were some structural challenges to attending for mothers, but these didn't prevent attendance. One factor in this could be that our participants enjoyed singing.
	2.2. To implementing the intervention	Implementation barriers/enablers existed at (1) on-the-ground and (2) strategic management levels, including in relation to staff training and flexible economics.
	2.3. To conducting the research	It was perceived that the research burden for participating in the study was high, but there were mixed views from health nurses in relation to the ease of the process.
3. Adoption and sustainability of the singing programme	3.1. Potential changes to the intervention	Overall, the intervention design was perceived as appropriate but there were suggestions of having more time for socializing and making it longer in the future.
	3.2. Need to build infrastructure	Resources, time and new referral pathways were expressed as being needed to ensure the longer-term sustainability and scalability of the intervention.
4. Broader contextual factors affecting implementation	4.1. Cultural and social factors	Cultural constructions of "PPD," "healthcare," and "research" differed between Romania and Denmark which affected the interventions' delivery and sustainability, alongside the societal uncertainty and restrictions of the COVID-19 pandemic.
	4.2. Systemic issues	Referral and recruitment challenges were experienced due to systemic issues, with ethical approval systems also impacting the timeline of intervention delivery.
5. Project structure and processes	5.1. Unique organizational collaborations and responsive structures	The structure of the project team comprised of multiple levels of management, including on-the-ground partners, intersectoral collaborations and cross-country strategic management that operated as "a whole kind of machinery."
	5.2. Delivery of the training programme	Training provided by Breathe supported with practical implementation and provided energy and enthusiasm. Research training from UCL was also valuable.

to "function better in daily life" (Mother Hungarian Group ID8). One mother also noted that the WhatsApp group created for those participating had "a good impact on my mental state" (Mother Romanian Group ID2). However, one mother expressed that she "expected some direct method to improve mood," saying that the singing group alone was "not enough" and therefore choosing to see "a support specialist" too (Mother Hungarian Group ID8). Whilst this could be considered for future adaptations, "some participants may be hesitant to join [the classes] due to the fear of being open about their mental health struggles" (Romania Local Staff ID2), suggesting that a greater emphasis on mental health could create barriers. In Denmark, it was recommended that future interventions "include mothers with less severe symptoms" which may help the intervention to play a "preventative" role (Denmark Local Staff ID1). Given that the mother who expressed wanting more "direct" help also sought additional support, one option for future adaptation of the programme could be to further expand complementary psychological support options available.

Theme 2: Practical and structural barriers and enablers

There were specific practical and structural barriers and enablers to mothers' participating in the classes (subtheme 2.1). The practicalities of attending the classes were viewed as barriers, such as the time of the classes which involved changing the sleep schedule of babies ("my son didn't sleep, it was exhausting to go," Mother Hungarian Group ID8) and transportation ("It's the logistics that's a challenge. . . the bus and stuff. . . it's a frustration" Mother Danish Group ID1; "difficult to find parking. . . almost gave up" Mother Danish Group ID4). However, mothers also noted that these factors didn't prevent them from coming, with

minimizing disruption to "daily routines" taken into consideration when "scheduling the sessions" (Romania Singing Lead ID1). Referrers in Denmark perceived that "the fact that they can bring their child is significant" in enabling participation because "they don't have to think about childcare," which was also supported by "the fact that it has been free" (Denmark Local Staff ID1). Another key enabling factor was the enjoyment that mothers and their babies derived from singing and their willingness to attend, with one noting that the reason they joined was because they "love to sing" (Mother Danish Group ID1) and another that the sessions are also "enjoyable for one's child" (Mother Danish Group ID4). However, the singing lead for the Hungarian group also felt that there were "language barriers" to having a Hungarian-only speaking group, as Romanian-speaking mothers could not join (Romania Singing Lead ID2).

Practical and structural barriers and enablers to implementing the intervention (subtheme 2.2), operated at two levels: (1) in-country implementation and (2) strategic project management. In relation to the former, this included "the lack of communication with the public health sector and the absence of recommendations from healthcare providers" (Romania Singing Lead ID1) and "a lack of structured referral pathways" (Romania Local Staff ID1). In Denmark, whilst there were formal referral pathways, barriers were seen in relation to healthcare staff training and not having enough experience of what the intervention would entail. Participants reflected that there should have been a "trial run [of singing] at the staff meeting" (Denmark Local Staff ID1) because it is "important to have experienced it [singing] to be able to sell it to mothers" (Denmark Local Staff ID1). In Romania, enablers to implementation included "involvement of a PPI group" to ensure suitability, as well as "a well-designed communication strategy, including the use of sensitive and conscious language" for recruitment (Romania Local Staff ID1). At the strategic level, it was noted that "being able to move around money has been important" (Study management ID2), with the profile of WHO also viewed as an important enabler ("an institution where doors open once you show your badge," Study management ID4), giving the project "real credibility" (Study management ID3).

Practical and structural barriers and enablers to conducting the research (subtheme 2.3) also intersected with these implementation factors. At the strategic level, it was suggested that the research burden for the project was quite high, notably affecting mothers joining the project ("research activities were preventing someone from actually joining the intervention," Study management ID2; "I know they [mothers] were worried about the scales," Study management ID8), and a participant from the Romanian group stated that the "long text [study description] was very discouraging" (Mother Romanian Group ID5). Nonetheless, there were mixed views of the research burden in Denmark. One health nurse noted that they didn't have to spend very much time with mothers when recruiting because the screening process was "not very long" (Denmark Local Staff ID2), but another stated that form filling was difficult ("the mothers couldn't handle it," Denmark Local Staff ID2). Yet, these nuances of research burden were mentioned less by the mothers themselves. One reason for this could be because "most of the participating mothers are those that understand research" and have "higher education" which could be "a source of exclusion for others" (Study management ID6). Future research could explore further whether research literacy and burden are reasons for not signing up to an intervention such as this is.

Theme 3: Adoption and sustainability of the singing programme

This next theme explores the potential adoption and sustainability of the intervention. Overall, participants noted that they would "recommend it [the intervention]" (Mother Hungarian Group ID8), with referrers in Denmark expressing a strong desire to continue delivering the sessions ("I definitely want that [the classes] to continue" Denmark Local Staff ID3). However, some participants suggested potential changes to the intervention (subtheme 3.1) for it to be sustainable in the longer-term. Of note, mothers from the Hungarian group remarked that they would have liked more socializing, also including more opportunities to "interact" with their babies (Mother Hungarian Group ID14). Yet, this could be unique to this group for logistical reasons because the mothers couldn't stay in the room after the class finished, in contrast to the Romanian group who could stay and engage in "chit-chat" (Ethnographic Notes). This also supports the rationale for the importance of fostering a sense of "the group" as a mechanism for improved health, as explored in Theme 1. A mental health specialist in Romania also suggested a longer intervention, which was supported by mothers in Denmark who stated that it was hard when the group ended because the classes "completely disappeared from your life" (Mother Danish Group ID1) and that it was hard to "close the wound" in relation to emotions that had been brought out due to engagement with the classes (Mother Danish Group ID9).

From a management perspective, it was viewed as important "to build an infrastructure around these kinds of arts and health initiatives" (Study management ID7) to ensure they can be fully adopted within the contexts of Denmark and Romania (subtheme 3.2). "Passion" was a key part of what made this project work within a setting of limited resources ("money was quite modest" Study management ID10) and time ("I don't actually have a lot of time to spend on this project" Study management ID7). This could be considered a problematic structure when thinking about longer-term sustainability because it is reliant on passionate individuals and creates a precarious foundation. Resources also vary across the countries. In Denmark, the team have secured funding to "keep on doing this for another two to three years" (Study management ID2), whereas Romania haven't. In the latter case, the focus is now on "trying to continue momentum" and working toward the creation of "a social prescribing mechanism" (Study management ID7). The current structures were described as "guerrilla activity" (Study management ID7), and therefore not sustainable in the longer-term, with it suggested that WHO needs to explore how to "advertise [the intervention] to Member States" to build the infrastructure needed (Study management ID7). Further, in Romania, it was noted that the context of Cluj-Napoca would be very different to smaller towns in Romania which have less services and "urban infrastructure" (Study management ID10). This mirrors wider research on social prescribing which argues that implementation varies in different countries, reflecting local, cultural, healthcare and political contexts (36).

Theme 4: Broader contextual factors affecting implementation and sustainability

Cultural and social factors (subtheme 4.1) affected implementation. A project manager from Romania expressed that their context is "complex" because there's "a culture in Romania and an Eastern European ethic of feeling that the research is the 'price you have to pay' to participate" (Ethnographic Notes). Because the classes were free, there may have been a sense that research participation was the "trade-off" for receiving the classes. In Romania, PPD was considered "a taboo subject" with motherhood depicted in a way where the "mother is just this perfect, perfectly happy being" (Study management ID10) and many "underestimating their need for help" (Romania Local Staff ID1), with a lot of "stigma surrounding mental illness" (Romania Local Staff ID3) and "postnatal depression" (Romania Local Staff ID1). This reflects broader literature that argues PPD in Romania is often "ignored" and considered "not a disease" (37). This was reinforced by the suggestion that "Mothers do not trust the healthcare system [in Romania] and that there is anger and negativity toward birth experiences" (Ethnographic Notes). In view of this distrust, it is possible that integration into formal healthcare pathways may be more challenging than in other cultural contexts, as mothers may be less inclined to join a programme relating to mental health through healthcare services. By contrast, mothers in Denmark were directly referred by health nurses for this study, with mothers describing this as a reason for joining, "It was actually because of a 2-month examination with the health visitor. . . and I thought, yeah let's just give it a try" (Mother Danish Group ID1).

The social context of COVID-19 also affected intervention delivery. In Romania, due to the low uptake of COVID-19 vaccination, it was decided that the classes would run into the summer to ensure that they could take place in a semi-outdoor location. However, many mothers experienced "scheduling conflicts" because of it being the summer which "made regular attendance challenging" (Romania Singing Lead ID2). Further, it was noted by a member of the strategic management team that "post COVID" and "with Romania neighboring Ukraine," it is an important time for support to have a "mental health angle" (Study management ID10). This aligns with broader sentiments reflected in the European Commission comprehensive, prevention-oriented and multi-stakeholder approach to mental health (38).

There were also systemic issues (subtheme 4.2). In Romania, it was noted that "the intervention faced various challenges related to the medical system, such as a lack of structured referral pathways and the need for systemic and structural changes" (Management, Romania). Whilst Denmark did follow a referral process for recruitment, there was low uptake and it was hard for healthcare staff to manage multiple priorities. Although, it was hypothesized that this could have been due to the project being a research study, rather than an issue with the referral process itself ("suspect it is a problem with research elements involved"; Meeting Minutes). The Institutional Review Board (IRB) was also described as "a complicated one" that "was a hassle to go through" (Study management ID9), with the processes pushing back the timeline for the project ("I think it took one year," Study management ID10). However, it was also noted that "the protocol was actually bettered" (Study management ID10) through the ethics process. For this study, it took extra time to build the protocol to undergo ethical approval as it was the first arts and health study led with the BCI Unit at WHO Regional Office for Europe. As this intervention is implemented more widely, our findings highlight a need to build on the foundations created here to set realistic timelines and ensure approvals happen smoothly.

Theme 5: Project structure and processes

The project was viewed as having unique organizational collaborations and responsive structures (Subtheme 5.1), comprised of multiple levels of management, including on-the-ground partners and PPI groups, intersectoral collaborations and cross-country management ("a whole kind of machinery," Study management ID7). Fundamental to the structure was the involvement of reputable organizations, with it suggested that "more institutions that are internationally renowned for their high-quality work" would be needed to scale this intervention up in the future (Study management ID4). There was an iterative element to the structure ("kind of doing it as we go along," Study management ID5) which meant that the project was more demanding than expected ("don't think that we actually understood what we were getting into" Study management ID2). Yet, it was suggested that having a more fixed structure could mean being "stronger in certain areas" but not able "to develop this (as) freely and as focused as we (have)" (Study management ID7). Having access to different kinds of resources ("human resources available" Study management ID10) and networks were also important ("rich network of professional health, non-health [and] cultural contacts," Study management ID10), with the study team itself described as a "network of trust" (Study management ID6). Further, the PPI group was "essential in guiding the program and maintaining contacts with its members and informal networks" that were "crucial for its [the intervention's] success" (Romania Local Staff ID1).

The training delivered (Subtheme 5.2) to project staff and singing leaders (2 separate workshops) by United Kingdom organization Breathe Arts Health Research and research training provided by UCL was important to implementation. The training from Breathe supported with what "to prepare for," including how to create "the right atmosphere" (Study management ID6) and make music decisions ("[the song from the training] ended up being sung," Study management ID5). Participants viewed Breathe as "heroes" (Study management ID2) because they were renowned in delivering the intervention, with the training "very motivational" and "inspiring" (Study management ID8). The training helped to make the project feel "real" (Study management ID7, FG) and less theoretical ("it suddenly became not a protocol," Study management ID5). Although delivering training from an organization based in the United Kingdom to support delivery in different cultural contexts could be perceived as a "top-down" approach, participants felt that "coming from UK" didn't have any "judgment value attached" (Study management ID6) with it "mak(ing) it bigger somehow" (Study management ID2). The training provided an emotion-setting role in making participants feel "fueled [with] enthusiasm" and "grateful" (Study management ID8) for the training received. The research training provided

by UCL was viewed as "helpful" for "collecting data" (Study management ID6) and "valuable also for the future" (Study management ID8).

Reflections on the process

Comparing the process of adaptation to the two sites in Denmark and Romania, three areas stand out: logistics; recruitment; and language. In both countries, discussions (informed by the PPI groups, as well as within and between the management team and local implementation groups), led to logistical choices that differed between the Danish, Romanian, and Hungarian singing group sessions. These differences included the choice of locations for the singing groups, timings for when they took place; and the logistical support offered for mothers to attend. Recruitment was also very specifically localized to suit the health systems realities of the participating countries. Although the recruitment in Denmark was linked to the health system through a process of referral from health nurses, challenges did become apparent. Since the referral process was not formally embedded, and because the nurses were not uniformly familiar with the intervention, referrals were slow at first, until a workshop was organized. This allowed the health nurses to better understand the intervention, and to champion it in their practice. In Romania, recruitment was fundamentally different, and relied on advertising and campaigning, both analog (for instance through printed posters in relevant doctor practices) and virtual (through social media and online influencers). Finally, an important concern prior to the project had been the question of linguistic translation. The implementation teams at all levels and in collaboration with the PPI groups paid particular attention to localizing the choice of music and the way the intervention was described. While this was an important part of the implementation process, it is worth pointing out that language was not in fact as much of a barrier as originally anticipated. Significant similarities existed in the way language was deployed to de-medicalise the intervention (e.g., by not using terms equivalent terms to "depression" in the different languages), even if the process of arriving at these conclusions differed (for instance, in the Romanian context, and important argument for de-stigmatizing the word "depression" questioned the utility of softening the language around the Music and Motherhood intervention). Regarding the choices of music used during the sessions, these were of course adapted to the different language settings. Nevertheless, because all singing leads had received the same training, which had introduced them to songs that are not language based, some song choices were actually the same across all groups.

Conclusion

This study demonstrates that an evidence-based arts and health intervention ("Music and Motherhood") can be adapted in culturally-sensitive ways to support populations beyond the original context in which it was developed. It serves as an informative foundation to expand the reach and impact of arts-based interventions in the future. However, cultural and systemic factors need to be considered when thinking about longer-term sustainability, such as in relation to the stigma associated with mental health conditions such as PPD and (dis)trust of healthcare systems that may differ in different countries, alongside the broader changing sociopolitical landscape. Integration of arts interventions into public health needs to consider what infrastructures are suitable to sustain arts and health interventions based on specific local country needs and considerations. Future research should also explore how to adapt this intervention for other country contexts, particularly in view of the challenges and learnings highlighted here (e.g., flexible economic structures, need for passionate teams, IRB processes), with the study team already exploring how to do this through scaling the intervention to Italy.

Data availability statement

The datasets in this article are not publicly available to preserve the anonymity of participants. Requests to access the datasets should be directed to KW, k.warran@ucl.ac.uk.

Ethics statement

The studies involving humans were approved by the Ethics Review Committee of the World Health Organization and the National Ethics Committees in Romania and Denmark. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

KW, CS, and LN drafted the report for this manuscript, with specific feedback from NF, AB and DF. KW led on the design of the methodology for this specific manuscript and the overall study data collection, and NF led on the overall supervision of the project, including funding acquisition. HU and RZ provided specific advice on the Romanian context, and LC and MO provided advice on the Danish context. NL and OB led on the in-country analysis of data and provided summaries of analysis in English for discussion which formed the foundation of themes for this article. All authors contributed to the conception and design of the study (except AB who joined the team after conducting the focus group for the management team), and all authors approved the final manuscript for publication.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

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Effects of participatory 'A'rt-Based Activity On 'Health' of Older Community-Dwellers: results from a randomized control trial of the Singapore A-Health Intervention

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Introduction: The practice of participatory art has been found to support the promotion, prevention, and management of health across the lifespan. However, clinical trials investigating the benefits of creative activities curated with and conducted in museums among older adults in East Asia remains limited.

Methods: The current research utilized a single-site, open-label randomized control trial (RCT) to evaluate a standardized Participatory 'A'rt-Based Activity On 'Health' of Older Community-Dwellers – the Singapore A-Health Intervention. Outcome measures include frailty as assessed by the Centre of Excellence on Longevity Self-administered Questionnaire, wellbeing as assessed by the Warwick-Edinburgh Mental Wellbeing Scales, and quality of life as assessed by the EuroQol-5D. 112 participants aged 60 and above were randomized into the intervention group ($n = 56$) or an inactive control group ($n = 56$). Participants completed four standardized online self-administered assessments at baseline, 5-week, 9-week and 12-week follow-up during the intervention period.

Results: Linear mixed model analyses revealed no statistically significant differences between the intervention group and control group for all outcome measures. However, within the intervention group, a consistent significant reduction in frailty was observed across time from baseline to 9 weeks (MD −0.44, 95% CI −0.85 to −0.039, $p = 0.032$), 5-weeks to 9-weeks (MD −0.64, 95% CI −1.03 to −0.24, $p = 0.002$), and 5-weeks to 12- weeks (MD −0.51, 95% CI −0.91 to −0.10, $p = 0.014$). Moreover, the post-test mean wellbeing score in the intervention group significantly improved over time at 9-weeks (MD 1.65, 95% CI 0.09 to 3.22, $p = 0.039$) and 12-week (MD 2.42, 95% CI 0.67 to 4.16, $p = 0.006$) as compared to baseline scores.

Discussion: The findings demonstrate the potential of a structured art and museum-based intervention as a resource for promoting health among aging populations. Such benefits transcend social, cultural, and societal contexts.

Clinical trial registration: ClinicalTrial.gov, NCT05945589.

KEYWORDS

participatory arts, museum, social prescribing, frailty, wellbeing, older adults, randomized control trial, Singapore

1 Introduction

1.1 Background

Population aging continues to be global health challenge. The World Health Organization anticipates that by 2050, the world's population of people aged above 60 years old will double, while those aged 80 years and above will triple (1). The prevalence of longstanding age-related conditions such as worsening physical, social, and mental health is expected to increase exponentially with a rapidly aging population (2–4). This will inevitably cause a surge in the demand for health services, and therefore a pressing need to innovate and develop creative solutions to assuage the strain on the health care system. There are many forms of non-pharmacological interventions designed to complement current medical interventions with physical activity associated with reductions in frailty (5, 6), however, the practice of participatory art across diverse settings has demonstrated its effectiveness in promoting, preventing, and managing health conditions across the life span (7). Participatory arts engagement can be categorized into two primary areas: active involvement which involves the act of creating or performing art, and passive consumption, which involves attending cultural activities, fostering esthetic appreciation, emotional, and sensory stimulation (8). While there are many forms of art, including visual arts, performing arts, literary arts, cultural heritage, and film as defined by scholars and art councils (8–10), participatory arts activities often encompass a combination of art forms, blurring the boundaries between active participation and passive consumption. Examples of active engagement in visual arts activities could include painting, sculpting, and craftwork while passive engagement involves visiting art fairs or guided museum tours. These activities could be implemented by a wide variety of facilitators such as artists, educators, museum docents, and trained researchers (11–13). Specifically for the older population, studies on visual arts and museum-based programs signaled its effectiveness as a low-risk intervention for the management of psychological symptoms and cognitive functioning (13, 14). However, systematic reviews conducted on these interventions revealed that most studies assessed its effects on mental and emotional wellbeing (12, 15–17), and its effects on health conditions among older adults, particularly in the East Asian context, remains to be investigated. In addition to visual art interventions, there is a growing interest and utilization of the museum artifacts for health promotion among the older population. Common types of programs included reminiscence, object-oriented, art-based, storytelling, and lectures curated for the older audiences (18). Similarly, these programs assessed emotional and social outcomes among their participants, but rarely on physical health outcomes (19, 20).

In 2015, the Centre of Excellence on Longevity of McGill University Canada, together with the Montreal Museum of Fine Arts, developed the 'Participatory Art-Based Activity on Health of Older Community-Dwellers' (i.e., A-Health), with the goal to standardize a robust 12-week framework of art intervention for health enhancement. Findings from a pre-post single arm pilot study of A-Health indicated that curated, sustained and professionally led museum-based art activity can improve quality of life, psychological wellbeing, and health conditions of older adults in Montreal (21, 22). The success of this pilot study has led to the empirical expansion of A-Health via an international randomized control trial (RCT) for testing its effectiveness in health enhancement among older adults of different society and cultural groups. The international RCT involved multiple centers (i.e., museums/galleries) in various countries and had each developed a culturally unique participatory art-based activity program that adhere to the A-Health framework to facilitate parallel data collection and international data comparison.

The current research adopted the standardized 12-week Montreal A-Health participatory art framework with culturally specific modifications that is suitable for the Singaporean context (i.e., Singapore A-Health Intervention). The modifications include adjustments to the visual art activities offered, as well as the selection of the artefacts for the museum tours to align the intervention with the cultural background and historical context of Singapore. The objective of the study was to evaluate the Singapore A-Health Intervention's effectiveness in health and wellness promotion among a sample of Singaporean older adults via a randomized control trial. It was hypothesized that participants in the intervention group will experience greater wellbeing, quality of life and reduced frailty as compared to those assigned to the control group. In addition, the insights gained could foster practice and knowledge transfer to accelerate creative and healthy aging in the local community. The Singapore A-Health Intervention was jointly designed by the Action Research for Community Health (ARCH) Laboratory at Nanyang Technological University (NTU), Lab4Living at Sheffield Hallam University, and National Gallery Singapore (the Gallery).

2 Methodology

2.1 Study design and participants

The study adopts a participatory action research paradigm and a single-site, open-label randomized control trial (RCT) design to develop and examine the effect of a standardized 12-week

museum-based participatory art activity on health condition, wellbeing, and quality of life in older community dwellers (ClinicalTrial.gov, ID: NCT05945589, Institutional Review Board (IRB) Approval: IRB-2020-02-005). Inclusion criteria include community dwelling older adults aged 60 and above, who are fluent in English (the most spoken language among the resident population) and had internet access to complete the online psychometric assessments. Participants who were not able to provide informed consent or were diagnosed with mental health conditions were excluded from the study. Interested participants were required to declare if they had a formal diagnosis of mental health conditions before proceeding with the registration and were asked about their mental health status during the audio or video call with the research team. Participants may also be screened for cognitive acuity using the Mini-Mental State Examination (MMSE) if necessary (23). Eligible participants were recruited through open and rolling recruitment at the museum, partnering Senior Activities Centers (SAC) in Singapore, as well as social media platforms. The choice of social media platforms was based on the existing following of older adults on these accounts. The CONSORT flow diagram is illustrated in Figure 1.

2.2 Randomization

Simple randomization was administered by one research team member using an automated randomizer. Consenting participants were randomly assigned a number, where 1 = Intervention group, and 2 = Control group. The randomization outcomes were only revealed to participants and other members of the research team after completion of the baseline assessment to minimise bias.

2.3 Procedures

Physical and e-copies of the recruitment brochures were distributed through the SACs and on the research and museum team's Facebook and Instagram pages. Interested individuals could register for the study through the SACs, where they were subsequently referred to the research team. They could also indicate their interest on a Qualtrics sign-up page which included key information about the study as well as the inclusion and exclusion criteria. A member of the research team communicated with interested individuals via phone call or video calls on secured video conferencing channels for

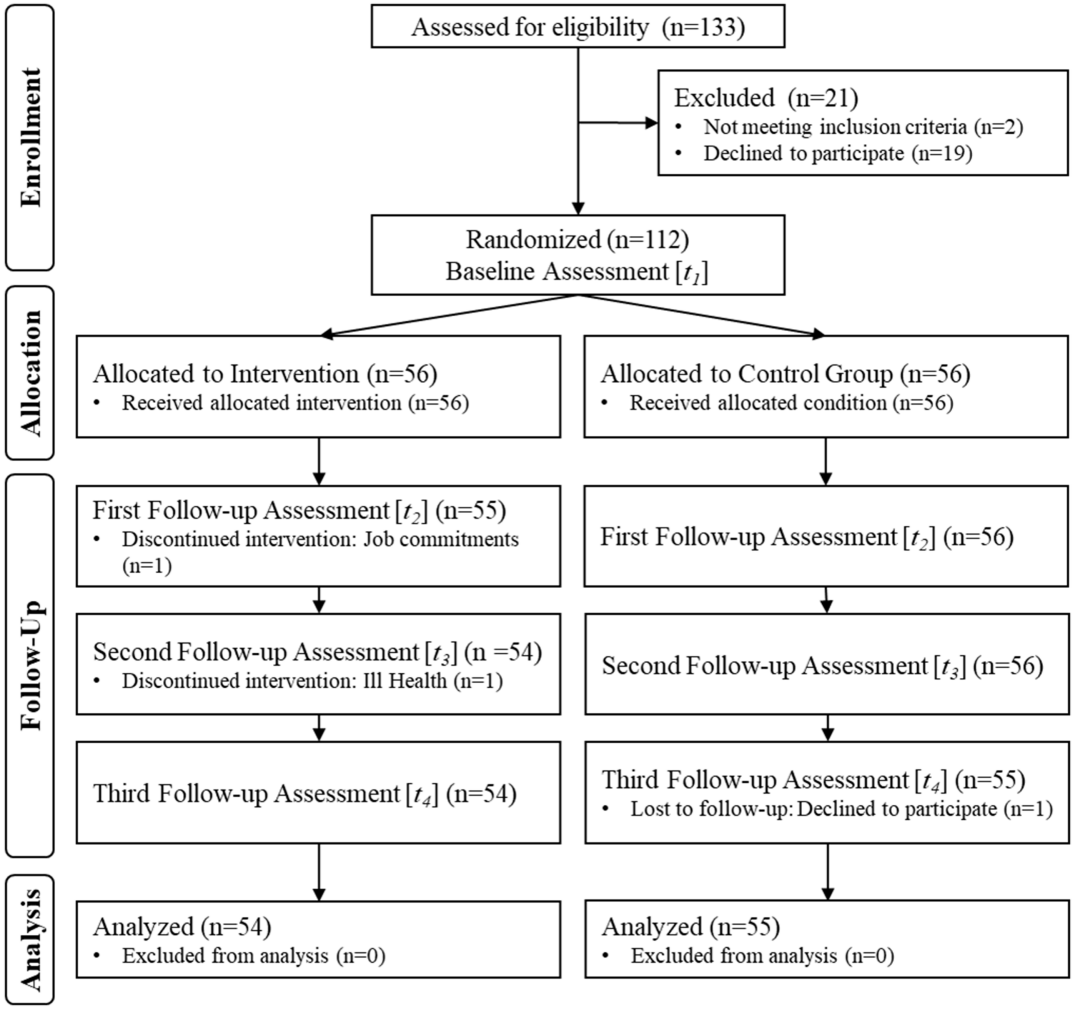

FIGURE 1
CONSORT flow diagram and study procedures.

screening, informed consent, and baseline assessment. Group placement was revealed only after participants completed the baseline assessment. The study was implemented in two phases. The first phase was a feasibility study where 48 participants were randomized into an intervention group ($n = 24$) or control group ($n = 24$) in March 2021. After refinements in the intervention protocol, the second phase included 62 participants who were randomized into an intervention ($n = 31$) or control group ($n = 31$) in September 2021. Participants in the intervention and control group were asked to complete four standardized online self-administered physical and psychological health assessment at baseline [T1], 5-week [T2], 9-week [T3] and 12-week [T4] follow-up during the intervention period. Intervention group participants were also invited to complete an additional questionnaire on wellbeing immediately after the program at the first week, fifth week, ninth week, and twelfth week of the program (Figure 2). Participants received a SGD$20 (approximately USD$15) incentive for completing each of the four standardized online self-administered questionnaires, totaling SGD$80 (approximately USD$58) per participant. Intervention group participants were invited to participate in a 12-week professionally led participatory art program at the museum. Each week consisted of one 2-h art session, for a total of 24 h of museum tours and participatory art activities. Participants in the control condition were not offered any art-based activities and advised not to participate in concurrent health and art-based interventions during the research period. They were provided with an optional guided museum tour after completing their participation in the 12-week research period.

2.4 Intervention design

The 12-week Singapore A-Health Intervention, totaling to 24 h of engagement, adhered to the original intervention's frequency and duration. The intervention targeted the development and sustained practice of three sequential art domains that aims to impart basic art appreciation skill (formal analysis in art) and art making techniques to participants through engagement with the collection at the museum. Based on an overarching theme of Belonging/Perspectives, the sessions were organized according to thematic domains of Past, Present and Future. The themes are unique to the Singapore program and accentuates the original intervention protocol by drawing inspiration from existing work on life review (24) and life reflection (25). Both of which are narrative techniques structured around life events and themes over life course, where conversations would explore major turning points, such as the impact of major historical events, experiences over life course, meaning, values, and purpose. Life review fosters connection between memories and the meaning of life and appraises an individuals' capacity to overcome difficult experiences. It contrasts reminiscence or life history, which often provide a more detailed and descriptive account of life events (26). In appreciating these qualities, Past, Present and Future was conceptualized as a conversation eliciting framework. The themes also serve as a unifying and guiding principle for content development.

Each domain comprised of four weekly sessions, 2 h per session. The first week involved a 45-min guided museum tour led by the museum docents, where the participants viewed and discussed selected artworks based on a thematic domain. This was followed by a 75-min, professional art educator-led artmaking session where participants were introduced to an artmaking technique and guided in developing their individual art pieces in response to the thematic domain. The subsequent three weekly sessions were dedicated to supporting the participants in realizing their creations with continued guidance from the art educator. The concluding session of each domain involved a showcase of the participants' creations and a sharing of their ideas and meanings of their creation to the other participants. A summary of the intervention outline is detailed in Figure 3. At the end of the program, three art pieces, each responding to the thematic domains, were created by individual participants. Samples of participants' artworks can be found in Figure 4.

The intervention was implemented at National Gallery Singapore, a renowned visual arts institution housing the world's largest public collection of Singaporean and Southeast Asian modern art. The collaboration stems from a shared interest to explore and understand how cultural assets can foster wellbeing and human flourishing, coinciding in a timely manner with the museum's endeavor to expand its role in the community by enhancing their community access

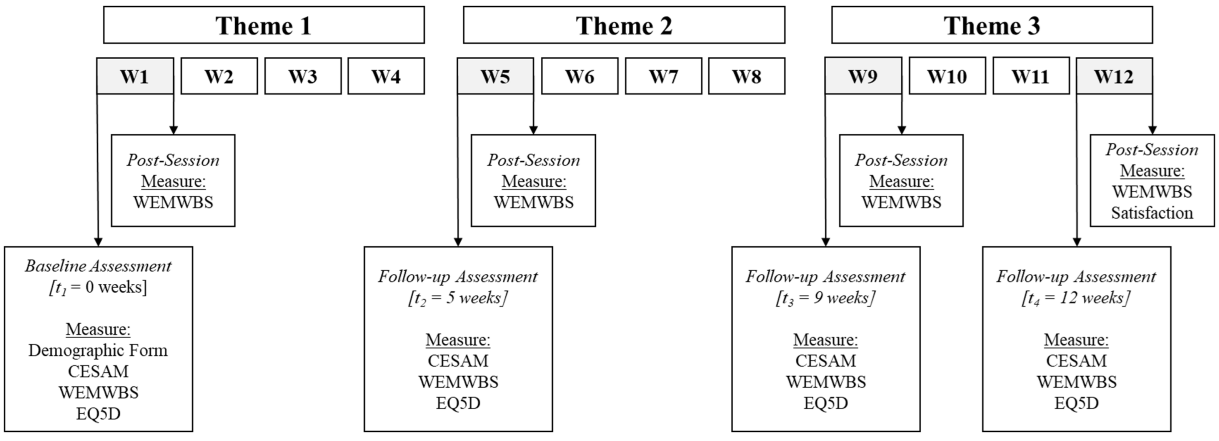

FIGURE 2
Outcome measures administered to intervention group participants. CESAM, The Centre of Excellence Self-AdMinistered Questionnaire; WEMWBS, Warwick-Edinburgh Mental Wellbeing scale; EQ-5D, EuroQol-5D; Satisfaction, Satisfaction Survey.

Overarching Theme: Belonging/ Perspectives
120 mins x 12 Sessions

(Week 1 – 4)	(Week 5 – 8)	(Week 9 – 12)
Theme 1: Past	**Theme 2: Present**	**Theme 3: Future**
Art Technique: Drawing & Dioramas	**Art Technique: Mixed Media Relief Printing**	**Art Technique: Mixed Media Sculpture**

Program Structure (4 Sessions per Theme)

Session 1		Session 2 & Session 3		Session 4	
Art Walk & Talk	45 mins	Let's Create!	90 mins	Finishing Touches	60 mins
Let's Create!	60 mins	Let's Share!	30 mins	Tea & Share	60 mins
Let's Share!	15 mins				

FIGURE 3
A-Health Singapore intervention structure. Notes on intervention design: (1) The intervention structure was co-developed with the gallery team to curate artworks with the activity structure. (2) Artist and docent training sessions were conducted before the commencement of the program.

FIGURE 4
Samples of participants' artworks.

program. The artworks used in the Singapore A-Health Intervention were paintings and sculptures by several key Singapore artists from the museum's permanent collection (DBS Singapore Gallery). The decision to involve a range of representational and abstract art works was informed by the envisioned learning value of the program, aiming to expose participants to less familiar art forms and broaden their artistic horizons.

The artworks, topics for discussion, and art activities were developed jointly with the museum's community access staff, art educators, and participants using a participatory action research method to encourage active engagement, relatability, inclusivity, ownership, and cultural specificity. The Singapore A-Health Intervention was subsequently implemented by museum staff, museum docents, professional art educator and members of the NTU research team. Specifically, the museum tours were conducted by the museum docents, while the artmaking component of the intervention was facilitated by the professional art educator and co-facilitated by research team members.

2.5 Pandemic-influenced protocol

As the study implementation coincided with the COVID-19 pandemic, nationwide health regulations affected the running of the study. Moreover, the target participants of this study, who were above age 60, were considered the "vulnerable population," and additional safeguards were necessary to prevent infection. Regulations on permissible group sizes resulted in participants being divided into subgroups of three to eight and prevented them from mingling with participants from other subgroups. Moreover, lockdowns were implemented (27) over the course of the study resulting in segments of the program being run online. The subsequent introduction of vaccination differentiated measures (VDS) (28) prevented unvaccinated individuals from entering the museum, and a hybrid format with a mix of online and on-site implementation was adopted in those cases. For the workshops in phase one of the study, an online session was held on the twelfth week. As for the workshops in phase two of the study, the online sessions were held on the fourth to eighth week, while the hybrid sessions were held on the ninth to twelfth week.

An online intervention protocol based on the Singapore A-Health Intervention was developed as a contingency plan. The online intervention, which strictly adhered to the original protocol, allowed for a smooth transition between in-person sessions at the museum and online sessions in response to sudden changes in government directives. The online intervention was implemented on a secured video-conferencing platform, Zoom. User manuals and video tutorials were created and shared with participants, and assistance was provided to participants who required additional technical support. To enhance

participant engagement on the online platform, breakout sessions were offered for personalized consultation by the art educator, and weekly milestones and lesson plans were sent to participants in dedicated chat groups prior to the sessions. The hybrid intervention was implemented on-site, with a dedicated research team member attending to the participants who participated in the program online. The art educator would first address the on-site participants and then the online participants. While the dedicated research team member was present to answer participant questions during the program, the art educator would also check in on the online participants to provide technical feedback. During the group sharing session, the research team member would project the video conference onto a projector so that the on-site participants could view the artworks of the online participants and would also share the artworks of the on-site participants with the online participants.

2.6 Outcome measures

Three outcome measures were adopted for this study. The first includes quality of life, as assessed by EuroQol-5D (EQ5D) which comprised of two parts (29). The first part is a questionnaire of five items on mobility, self-care, daily activities, pain, and depressive symptoms. Participants responded on a 5-point Likert scale where a lower score represented better quality of life. The second part of the questionnaire was a visual analog scale of the participant's perceived health ranging from 0 (worst health) to 100 (best health one can imagine). The second outcome measure includes mental wellbeing, as assessed by Warwick-Edinburgh Mental Wellbeing Scales (WEMWBS), a 14-item scale assessing various domains of mental wellbeing (30). Participants responded on a 5-point Likert scale where a larger score represented better mental wellbeing. The third outcome measure include frailty scores as assessed by the Centre of Excellence on Longevity Self-administered Questionnaire (CESAM) (31). It is a 20-item scale assessing multiple aspects of health such as drug intake, memory complaints, health service utilization, and activities of daily living. The scores ranged from 0 (vigorous) to 18 (severe frail). Demographic information including age, gender, ethnicity, socio-economic status, and health status were collected from participants at baseline.

2.7 Data analysis

Allowing for an attrition rate of 5% at follow-up, a target sample of 110 (55 participants for each group) provides 90% power to detect an effect size of 0.55 (based on the results of the pilot study) between the intervention group and the control group at 5% level of significance (two-tailed test). Continuous variables were reported as mean and standard deviation (SD), and categorical variables were reported as frequencies and percentages. Linear mixed model was used (32) for repeated measures outcomes (EQ5D, CESAM, and WEMWBS) to derive estimates of average treatment effect across three follow-up time points with restricted maximum likelihood estimation and robust variance. Timepoint was specified as the fixed effect, and a random effect was specified for individuals to account for correlation between the repeated measurements on the same individual. The same model estimated differences between groups at the 5-, 9- and 12-week time points through modeling the interaction of treatment group and time (dummy). Mixed models are suitable for repeated measurements and allow the inclusion of all available data in the presence of dropouts (33). Regression coefficients (i.e., mean difference [MD]) and 95% confidence intervals (CIs) were estimated for the intervention group compared to the control group from the multivariable model and adjusted for age, sex, ethnicity, education, marital status, employment status, presence of chronic illness, number of workshops done, and baseline physical activity. Distribution of residuals was checked for the suitability of the fitted model and no concern was noted. All quantitative data were entered, and stored, in IBM SPSS v25 (Armonk, NY, USA). All analyses were conducted using Stata v18.0 (StataCorp, Taxes, USA) statistical software and two-sided $p < 0.05$ was considered for statistical significance. The Bonferroni correction (0.05/number of groups) was applied for pair-wise comparisons over time when interpreting statistical significance.

3 Results

3.1 Participant characteristics

A total of 112 participants were recruited, with 109 participants successfully completing the study. The age of participants ranged from 60 to 80 years ($M = 66.6$, $SD = 3.80$), were mostly female (77%), and of Chinese ethnicity (95%). The majority of the participants were retirees (63%), were physically active (95%), and half were living with a chronic health condition (54%). There was no significant difference for all demographic measures between the intervention and control group, except for age and physical activity. The intervention group participants attended an average of 11.25 (SD = 1.73) sessions of the Singapore A-Health Intervention. Please refer to Table 1 for the full participants' information.

3.2 Outcome comparison results

Results from linear mixed models for each outcome are presented in Table 2. The mean overall quality of life improved over time in the intervention group compared to the control group. However, it was not statistically significant (MD −0.77, 95% CI −2.51 to 0.98, $p = 0.390$) with a similar pattern at each follow-up time. Similarly, there was no significant difference between intervention and control group (MD −10.24, 95% CI −28.17 to 7.68, $p = 0.263$) when quality of life analyzed on the visual analog scale.

The overall mean frailty score showed some improvement over time in the intervention group compared to the control group, but it was not statistically significant (MD −1.17, 95% CI −4.20 to 1.86, $p = 0.448$) including at different follow-up times. Within the intervention group, a consistent significant improvement over time was observed (9-week vs. baseline MD −0.44, 95% CI −0.85 to −0.04, $p = 0.032$; 9-week vs. 5-week MD −0.64, 95% CI −1.03 to −0.24, $p = 0.002$; and 12-week vs. 5-week MD −0.51, 95% CI −0.91 to −0.10, $p = 0.014$).

Pre-test overall mean wellbeing score increased over time in the intervention group compared to the control group. However, it was not statistically significant (MD 1.47, 95% CI −12.05 to 15.00, $p = 0.390$) with similar pattern at each follow-up time. The post-test

TABLE 1 Baseline characteristics of study participants.

Demographic information	Total (*n* = 112)	Control (*n* = 56)	Intervention (*n* = 56)
Age (year, mean (SD))	66.6 (3.80)	67.3 (4.05)	65.8 (3.40)
Sex (*n*, %)			
Male	26 (23.2)	11 (19.6)	15 (26.8)
Female	86 (76.8)	45 (80.4)	41 (73.2)
Marital status (*n*, %)			
Single	27 (24.1)	15 (26.8)	12 (21.4)
Married	73 (65.2)	36 (64.3)	37 (66.1)
Divorced / separated	7 (6.3)	3 (5.4)	4 (7.1)
Widowed	5 (4.5)	2 (3.6)	3 (5.4)
Highest Education Attained (*n*, %)			
GCE 'N', 'O' level, GCE 'A' Level or ITE/Higher Nitec and below	32 (28.6)	16 (28.6)	16 (28.6)
Polytechnic Diploma or Professional Certificate	20 (17.8)	11 (19.6)	9 (16.0)
Bachelor's Degree	43 (38.4)	19 (33.9)	24 (42.9)
Postgraduate Degree	17 (15.2)	10 (17.9)	7 (12.5)
Ethnicity (*n*, %)			
Chinese	107 (95.5)	53 (94.6)	54 (96.4)
Indian	2 (1.8)	1 (1.8)	1 (1.8)
Other	3 (2.7)	2 (3.6)	1 (1.8)
Employment status (*n*, %)			
Full-time employed	9 (8.0)	3 (5.4)	6 (10.7)
Part-time employed	33 (29.5)	19 (33.9)	14 (25)
Unemployed / retired	70 (62.5)	34 (60.7)	36 (64.3)
Monthly income (*n*, %)			
No income	29 (25.9)	14 (25.0)	15 (26.8)
Less than S$1,500	29 (25.9)	17 (30.4)	12 (21.4)
S$1,500 to S$2,999	19 (17.0)	10 (17.9)	9 (16.1)
S$3,000 to S$4,999	9 (8.0)	6 (10.7)	3 (5.4)
S$5,000 to S$6,999	6 (5.4)	2 (3.6)	4 (7.1)
S$7,000 or more	5 (4.5)	1 (1.8)	4 (7.2)
Prefer not to tell	15 (13.4)	6 (10.7)	9 (16.1)
Presence of chronic illness (*n*, %)			
Yes	52 (46.4)	27 (48.2)	25 (44.6)
No	60 (53.6)	29 (51.8)	31 (55.4)
Polypharmacy (*n*, %)[a]			
None	55 (49.1)	23 (41.1)	32 (57.1)
One to four types of medication	53 (47.3)	32 (57.1)	21 (37.5)
Five to nine of medication	4 (3.6)	1 (1.8)	3 (5.4)
Home support (*n*, %)[b]			
Yes	1 (0.9)	1 (1.8)	–
No	111 (99.1)	55 (98.2)	56 (100)
ADL Score (/6, Mean ± SD)[c]	5.90 (0.328)	5.89 (0.366)	5.91 (0.288)
IADL Score (/4, Mean ± SD)[d]	3.97 (0.283)	3.95 (0.401)	4.00 (0)
Happy mood (*n*, %)[e]			
Happy	85 (75.9)	41 (73.2)	44 (78.6)

(Continued)

TABLE 1 (Continued)

Demographic information	Total (n = 112)	Control (n = 56)	Intervention (n = 56)
Unhappy	1 (0.9)	–	1 (1.8)
Neither one nor the other	26 (23.2)	15 (26.8)	11 (19.6)
Practice of physical activity (n, %)[f]			
Yes	107 (95.5)	51 (91.1)	56 (100)
No	5 (4.5)	5 (8.9)	–
History of falls in the past 12 months (n, %)[g]			
Yes	16 (14.3)	7 (12.5)	9 (16.1)
No	96 (85.7)	49 (87.5)	47 (83.9)
Number of A-Health Sessions Attended (Mean (SD))	–	–	11.25 (1.73)

[a]Taking prescribed medications for conditions; [b]Receiving help from family, friend or professional for daily living activities; [c]Ranging from 0 (dependent) to 6 (independent); [d]Ranging from 0 (non-autonomous) to 4 (autonomous); [e]Based on answer to the question "How do you feel today?"; [f]Regular physical activity (walking, bicycle, etc.) at least one hour per week in the past month; [g]Based on answer to the question "Did you fall in the previous year?".

mean wellbeing score (in intervention group only) significantly improved over time at 9-week (MD 1.65, 95% CI 0.09 to 3.22, $p = 0.039$) and 12-week (MD 2.42, 95% CI 0.69 to 4.16, $p = 0.006$) compared to baseline scores.

4 Discussion

In summary, the quantitative findings indicated significant improvements over time in frailty and wellbeing for the intervention group but not quality of life. The findings of this study followed a similar trend as the original A-Health intervention in the Montreal Museum of Fine Arts (Quebec, Canada) where improvements in frailty, psychological wellbeing, and quality of life were found (21, 22, 34). In Asia, the A-Health intervention conducted in Tokyo Fuji Art Museum (Tokyo, Japan) resulted in significant improvements in quality of life but not wellbeing, as well as mixed results on frailty (35, 36). However, there were no interaction effects over time for all outcome measures in this study. Nonetheless, this study showcased the value of multi-sector collaboration, and showed the potential roles heritage institutions can play in supporting health promotion in Singapore (37). Furthermore, these findings add to the growing body of literature on the health promoting role of museum-based interventions (38–40). The current research also adds value by providing cross-cultural support and insights on the criteria for successful implementation of an art and museum-based program for healthy aging.

4.1 Understanding the results

The lack of interaction effects for the outcome measures could be due to the potential confounding factors due to the COVID-19 pandemic which impacted the findings. For instance, physical distancing measures required participants to be seated apart in sub-groups of three to eight. The enforcement of such rules may have limited the effectiveness of the program as participants had to be mindful of their interactions with others. The program coincided with two lockdowns, and this might have had an influence on the participant's wellbeing and quality of life, which affected participants' responses on the psychometric measures. There may also be latent effects of transitioning between an in-person intervention to an online or hybrid intervention which influenced the findings.

The significant effect of time on frailty and wellbeing suggests the potential effectiveness of the A-Health intervention in impacting the health of community dwelling older adults. Frailty is a reversible condition and determinants such as depressive symptoms, cognitive function, and the lack of social support (41) could be influenced by participatory arts engagement. Participation in a structured art and museum-based intervention offers an avenue for learning and skill development which could support cognitive functioning. Informal and formal lifelong learning at old age has been reported to be beneficial in the domains of mental, psychological, social, and physical health (42–44). For the Singapore A-Health Intervention specifically, the design of the program was intellectually stimulating and required the synthesis of new knowledge to form an art piece. For instance, the challenges presented in the program, (i.e., having to conceptualize an art piece within the confines of the given themes, while amalgamating contents from the museum tours and professional instruction) required one to activate multiple intelligences to solve hurdles and produce an art piece (45, 46). As a result, participants were driven to take ownership of their learning, and by the end of the program, they were observed to be more comfortable with ambiguity and adept in sourcing for information. To illustrate, participants initially reported that the lack of reference pieces for their artwork was a source of stress. However, for the subsequent art works, participants embraced the uncertainty and adapted by discussing with their peers or doing their own research. More information on the qualitative findings were reported elsewhere in this journal (47). Moreover, the program enabled participants to be more mindful and perceptive of their surroundings, which has benefits to one's physical, mental, social and existential dimensions (48). The acquired skills are transferrable and could have a sustainable impact on the participant's lives after the completion of the program (49). In addition, the group setting of the program supports social connections and relationship building within the community. With loneliness and social isolation on the rise among the older population (50, 51), the Singapore A-Health Intervention offers a safe and enriching way to remain connected even with the added restrictions during the pandemic. These positive impacts might have a virtuous effect on various domains of health, as explained by the multi-level theoretical framework of mechanisms of action which posits that there are multiple simultaneous causal mechanisms which

TABLE 2 Summary of outcome measures by treatment group using linear mixed model.

Outcomes	Baseline	5-week post baseline		9-week post baseline		12-week post baseline	
	Mean (SD)	Mean (SD)	MD (95% CI)	Mean (SD)	MD (95% CI)	Mean (SD)	MD (95% CI)
Between group comparison							
EQ-5D							
Intervention	5.59 (1.04)	5.67 (1.06)	−0.03 (−0.31 to 0.24)	5.61 (0.96)	−0.12 (−0.47 to 0.23)	5.57 (0.90)	0.003 (−0.38 to 0.38)
Control	5.55 (1.04)	5.66 (0.86)		5.68 (0.81)		5.53 (1.10)	
EQ-5D VAS							
Intervention	85.9 (9.95)	84.7 (11.3)	−1.90 (−6.14 to 2.35)	86.3 (9.61)	0.47 (−3.93 to 4.87)	86.3 (9.42)	−0.54 (−4.96 to 3.89)
Control	85.3 (12.8)	85.9 (9.54)		84.9 (14.6)		85.9 (10.5)	
CESAM (Frailty)							
Intervention	1.46 (1.85)	1.65 (2.01)	−0.11 (−0.67 to 0.45)	1.02 (1.60)	−0.52 (−1.09 to 0.05)	1.15 (1.53)	−0.24 (−0.81 to 0.33)
Control	1.88 (1.50)	2.18 (2.09)		1.95 (1.80)		1.80 (1.73)	
Pre-test WEMWBS							
Intervention	57.7 (8.42)	57.7 (8.20)	0.05 (−1.60 to 1.71)	58.1 (8.02)	0.17 (−1.97 to 2.31)	58.6 (8.09)	−0.11 (−2.53 to 2.30)
Control	57.9 (6.78)	57.8 (6.35)		58.0 (6.43)		58.7 (7.63)	
Within intervention group only (pairwise) comparison							
CESAM (Frailty)	1.46 (1.85)	1.65 (2.01)	0.19 (−0.20 to 0.59)	1.02 (1.60)	−0.44 (−0.85 to −0.04)	1.15 (1.53)	−0.32 (−0.72 to 0.09)
Post-test WEMWBS	55.7 (7.18)	56.7 (8.50)	0.82 (−0.41 to 2.05)	57.6 (8.36)	1.65 (0.09 to 3.22)	58.5 (8.22)	2.42 (0.69 to 4.16)

VAS, Visual Analog Scale; WEMWBS, Warwick-Edinburgh Wellbeing Scale; SD, standard deviation; MD, mean difference; CI, confidence interval. Between group MD was calculated by the linear mixed model and each model was adjusted for age, sex, ethnicity, education, marital status, employment status, presence of chronic illness, number of workshops done, and baseline physical activity.

interact with each other resulting in better outcomes (52). Overall, the current study contributes to the growing literature on the effectiveness of visual arts participation on mental and physical health benefits such as reduced chronic pain, increased mobility, and increased vigor among older adults (53).

4.2 Limitations and future directions

Despite the encouraging findings generated from this study, there are caveats that should be considered. Firstly, in terms of sampling, majority of the participants were female, of Chinese ethnicity and had a college degree which limits the generalizability of the findings. Additionally, participants were recruited through open recruitment where interested participants signed up for the study. It may be argued that the participants already had an interest in the arts prior to the intervention and this may be a confounder. Moreover, in the first phase of the study, spouses who were recruited were randomized into different groups (i.e., intervention and control group) and their informal exchange of experiences may have had an impact on the findings. However, this was addressed in the second phase where spouses were randomized into the same group. Future research could adopt a stratified sampling method for a more representative sample of the Singapore older population.

Secondly, this intervention was tested on a profile of healthy, community-dwelling older adults who were highly educated and English-speaking, and thus would require further refinement and testing for other populations of older adults. Also, while this study shown the positive impact of a 12-week, 24-h museum-based intervention, the optimal dosage is not ascertained. Future studies could investigate the suitable dosage of the A-Health intervention for social prescription.

Thirdly, the outcome measures used in this study consisted of self-reported measures which could be used as a foundation for further evaluation using a mixture of self-reported and objective health measures. Participants in the study also suggested that the quantitative measures might be limited in scope as it included only frailty, general wellbeing, and quality of life, and could be expanded to evaluate a more holistic assessment of health.

Fourthly, the intervals between assessment were relatively short (baseline, 5-weeks, 9-weeks, 12-weeks) and could be expanded in subsequent longitudinal investigations. Moreover, although efforts were made to conceal the allocation to avoid bias during the baseline assessment, researchers were aware of the group allocation after baseline assessment. As a result, there may be a possibility of an expectation bias, where improvements in the outcomes might be due to the participants' expectations of benefit from receiving the treatment, rather than the treatment itself. While this is a challenge commonly faced in the field and reported in systematic reviews and meta-analyses (13, 17), future research could consider implementing the intervention with separate teams of interventionists and assessors to reduce bias. Furthermore, the control group was not wait-listed for later treatment, which may have led to nocebo effects. In future studies, participants in the control group could be assigned to an active group to reduce the risk of nocebo effects or a wait-list control group to ensure equal opportunities to receive the intervention. Researchers could also use measures to assess for the participant's expectations about their assigned condition and control for these expectations during analysis.

Finally, as with other participatory arts interventions, the A-Health intervention is complex and multi-faceted. With external influences and further adjustments to the protocol due to the pandemic, replicability and generalizability was limited. Additionally, the intervention mechanisms were not ascertained in the current study. Nonetheless, implementation during the COVID-19 pandemic provided a unique opportunity to understand the impact of the program which shows promise in benefitting an older adult's physical and psychological wellbeing even during a pandemic. Furthermore, this study highlighted the importance of a strong support system between stakeholders and structured session design for better adaptability during disruptions, and this aspect could be explored further in future studies. Future investigations could adopt other research approaches such as an implementation science approach or a realist approach for a holistic understanding of the intervention. Implementation science focuses on integrating research findings and evidence-based practices to enhance the quality and effectiveness of the intervention (54), while a realist approach could provide insights to how and for whom the intervention is effective for (55).

5 Conclusion

The Singapore A-Health intervention shows promise in enhancing wellbeing and improving frailty for community-dwelling older adults in Singapore during the pandemic. These findings support the 12-week A-Health protocol across cultures, adding to the growing body of empirical evidence on the benefits of arts and museum interventions, as well as the value of art and cultural institutions and multisector collaborations in supporting the health of rapidly aging populations. Similar findings from comparative international RCTs from Canada and Japan further show that such benefits transcend social, cultural, and societal contexts.

Data availability statement

The datasets presented in this article are not readily available because the original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author. Requests to access the datasets should be directed to andyhyho@ntu.edu.sg.

Ethics statement

The studies involving humans were approved by NTU Institutional Review Board (NTU-IRB). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

AH and OB designed the study and obtained funding. MT designed the art and museum engagement activities. SM, SG, GY, AT, YY, and KG was involved in the implementation of the research study. AH, RB, and SM conducted the analysis. All authors contributed to data interpretation, as well as the writing and revision of the manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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Museum-based art activities to stay young at heart? Results of a randomized controlled trial

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Background: Health benefits have been reported with art activities. Heart rate is a biomarker of health state. The aim of this randomized controlled trial (RCT) was to compare the changes in heart rate over a 3 month-period in older adults participating in art-based activities at the Montreal Museum of Fine Arts (MMFA, Quebec, Canada) and in their control counterparts.

Methods/design: Participants (mean age 71.0 ± 5.1; 84.9% female) were a subset of older community dwellers recruited in a RCT in two parallel groups ($n = 28$ in the intervention group and $n = 25$ in the control group) who had their heart rate recorded. They attended weekly participatory MMFA-based art activities over a 3-month period. Heart rate was collected via the smart watch Fitbit Alta HR at baseline (M0) and at 3 months (M3). The outcomes were mean heart rate per hour for the full day, including active and inactive hours.

Results: Heart rate for full day ($p = 0.018$) and active hours ($p = 0.028$) were slower in the intervention group compared to the control group. Decrease in mean heart rate for full day between M0 and M3 in the intervention group was higher than in the control group ($p = 0.030$). The linear regression showed that MMFA-based art activities decreased full day heart rate (Coefficient of regression Beta = −6.2 with $p = 0.010$).

Conclusion: MMFA-based art activities significantly decreased full day heart rate, suggesting a health benefit in older community dwellers who participated in the RCT.

Clinical trial registration: NCT03679715.

KEYWORDS

art, health, museum, older adult, clinical trial

1 Introduction

Museum-based activities like guided visits or art-making workshops demonstrate potential to improve the mental and physical health of older adults (1–5). Most existing studies that attest to the health benefits of museum-based arts activities use self-reported questionnaires for the health assessment (2–8). The main disadvantage of these questionnaires is the subjectivity of responses, which may result in inaccurate or invalid answers (9). In addition, today's questioning is not

whether art has benefits on health but what are the mechanisms of these benefits. Few studies explored this avenue but showed a positive association between proxy measures for the experience of stress in humans and visual art (5). For instance, art making resulted in significant lowering of cortisol levels salivary (10). Thus, examining health benefits of art requires to employ objective measures. To date, there is no information about museum-based activities effect on heart rate, which is a proxy measure of autonomic nervous system functioning (11).

A healthy state requires normal physiological functions, which are regulated in part through the autonomic nervous system, itself composed of the sympathetic and the parasympathetic nervous systems (12–14). Together, these two systems control vegetative functions and the stress response (14–16). Heart rate is controlled by the autonomic nervous system (12). The sympathetic and parasympathetic nervous systems increase and suppress heart rate, respectively (12–16). Heart rate is a simple, non-invasive, and objective measure that is easily recordable in daily living activities via smart watches (17). Aging is often associated with an imbalance in autonomic nervous system activity, with sympathetic activity increasing in comparison to parasympathetic activity, ultimately leading to an increased heart rate (13–15). This imbalance results in an inability to control stress response that, over time, may lead to an unhealthy state (14, 18). For instance, higher resting heart rate was associated with worse functional status and with higher risk of future functional decline in older adults, independent of cardiovascular diseases (19). It has been showed that heart rate may improve with mindfulness practice (20). There are few data about the effects of museum-based activities on physiological measures depending on sympathetic and parasympathetic nervous system balance like heart rate and blood pressure. It has been reported in a clinical trial that participants who were exposed to figurative art significantly decreased their systolic blood pressure compared to those exposed to modern art and museum office, but no effects were observed in the heart rate (21).

Recently we performed a randomized controlled trial (RCT) with the aim to compare changes in frailty status, well-being and quality of life in community-dwelling older adults living in Montreal (Quebec, Canada) participating in a 3-month session of weekly "Thursdays at the Museum" carried out at the Montreal Museum of Fine Arts (MMFA) and in their control counterparts who did not participate in MMFA-based art acitivities (8). A total of 165 older community dwellers were recruited in this RCT with two parallel groups (intervention vs. control). The intervention group showed significant improvements to frailty, well-being and quality of life when compared to the control group. This health benefit suggests that sympathetic and parasympathetic nervous system activities were more balanced in the intervention group, suggesting in a lower heart rate in the intervention group compared to the control group following the end of the program. We had the opportunity to test this hypothesis by using heart rate data collected during the RCT carried out at the MMFA. This study aims to compare changes in heart rate among older adults participating in the MMFA-based art activity and their control counterparts over the 3 month-period of the study.

2 Materials and methods

2.1 Population

A total of 198 individuals living in the urban area of Montreal (Quebec, Canada) were enrolled in the RCT and randomized to intervention ($n = 100$) and control groups ($n = 98$) between March 2019 and November 2019. Recruitment, assessment, and follow-up have been previously reported (8). To summarize, participants were MMFA visitors aged 65 years and over who lived at home or in an unassisted residence. Among the 198 enrolled participants, 3 (1.5%) withdrew their consent in the intervention group and 10 (5.1%) in the control group before the baseline assessment. In addition, 20 (10.1%) participants dropped out during the 3-month follow-up period (15 in the intervention group and 5 in the control group). Among the 165 participants who completed the 3-month period of assessment, 60 (30.3%) participants agreed to record their heart rate: 30 in the intervention group and 30 in the control group. Seven (11.7%) participants were excluded from the present study because of technical issues with heart rate recording. As a result, 53 (26.8%; mean age 71.0 ± 5.1; 84.9% female) had their heart rate recorded and were selected for the present study (28 participants in the intervention group and 25 in the control group). A flow diagram detailing participant selection and follow-up in the RCT is presented in the Figure 1.

2.2 Study design

The design was a RCT in two parallel groups (intervention vs. control). Block randomization with a block size of 1 was used to divide the groups. Participant in the intervention group were not blinded but investors were blinded to the intervention and the results of assessments. The CONSORT guidelines were applied for this RCT (22). The project number on the ClinicalTrials.gov website is NCT03679715.

2.3 Intervention

The intervention consisted of weekly participatory art activities carried out at the MMFA over a 3-month period. These activities have previously been described in detail (8). Briefly, 2-h workshops were carried out in a group setting over the course of 12 consecutive weeks. Participants were divided into two groups, meeting either on Tuesdays or Wednesdays. Each workshop was conducted by two arts and culture facilitators who led interactive arts and crafts activities targeting creativity (e.g., abstract painting/life drawing), craft skills (e.g., bookbinding/mini-fanzine) or fine motor skills (e.g., rolled paper and stained-glass painting). The workshops were structured as follows: (i) presentation of the activity's objective, (ii) choice of medium, (iii) technical instruction.

2.4 Assessment and outcomes

Clinical information was collected before the first workshop at baseline (M0) and after the last workshop at the end of the 3-month period (M3) and comprised age, sex, and the Centre of Excellence Self-AdMinistered questionnaire (CESAM) (23). The CESAM is a validated questionnaire that assesses different subdomains of health via 20 close-ended questions, including polypharmacy (i.e., number of therapeutic classes daily taken ≥5), activities of daily living and instrumental activities of daily living, mood and history of falls in the past 12 months. CESAM was filled out by participants under the supervision of Principal Investigator representatives at their place of

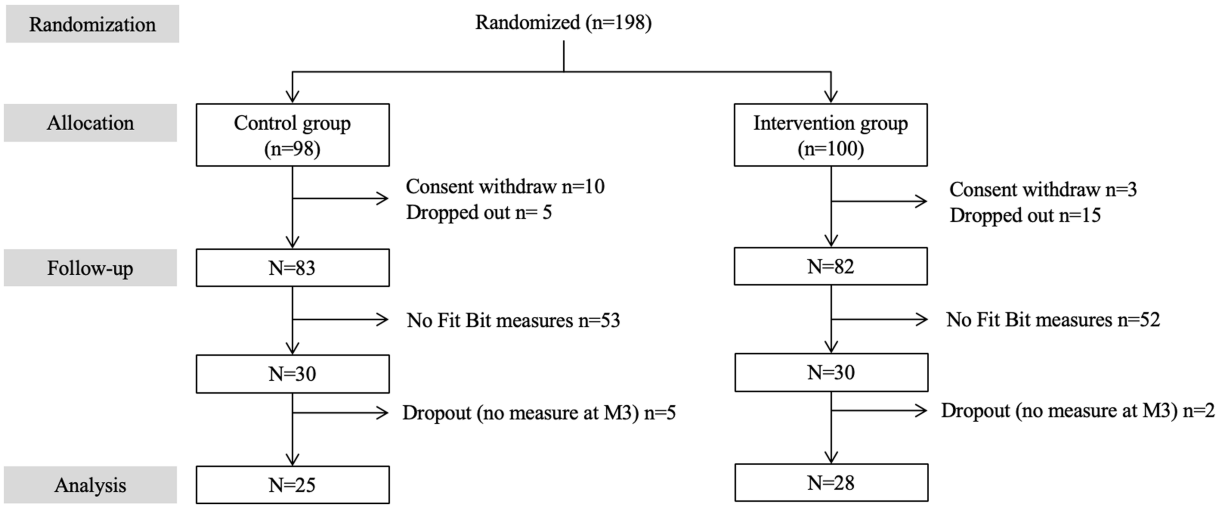

FIGURE 1
Consort flow diagram detailing selection and follow-up of participants in the RCT.

living. The score ranges from 0 (i.e., best health condition) to 18 (i.e., worst health condition).

Heart rate was recorded with a Fitbit Alta HR, which is a watch-like device that continuously tracks HR using photoplethysmography (11). Heart rate was me measured twice in this RCT. The first recording was performed over the 2 days before the first workshop (M0) and the second recording was performed over the 2 days after the last workshop (M3). The choice of 2 days of recording has been made with the objective to obtain sufficient data for statistical analysis. The Fitbit Alta HR smartwatch was selected because of its simple setup and usability (11, 18–20). Participants were instructed to wear the device on the wrist of their choice and to remove it only in situations where it may get wet (e.g., doing the dishes, showering) over 5 consecutive days. They were also instructed not to change wrists. For the present study, we used the mean heart rate per hour during active hours (i.e., between 12 pm and 6 pm), inactive hours (i.e., between 12 am and 6 am), and over the course of a full day (i.e., 24 h). We calculated the change of heart rate parameters during the first (M0) and second assessments (M3) using the following formula: [(M3 value − M0 value)/((M3 value + M0 value)/2) × 100].

2.5 Ethical considerations

The Jewish General Hospital Ethics Committee (Montreal, Quebec, Canada) approved the present study (2019-1493). All study participants provided their written informed.

2.6 Statistics

Participants' characteristics were described using means, standard deviations (SD), frequencies and percentages. Inter and intra-group comparisons were performed with Mann–Whitney *t*-tests, Wilcoxon tests, Chi-squared or Fisher's Exact tests, as appropriate. Linear regressions were used to examine the association between changes in heart rhythm parameters between M0 and M3 (used as dependent variable, with a separate model for each heart rate parameter) and MMFA-based art activity (used as independent variable), adjusted for participants' baseline characteristics. The fixed threshold of significance for *p*-values was <0.05.

3 Results

No significant difference for clinical characteristics and heart rate parameters was found between the intervention and the control groups at baseline (Table 1). At M3, mean heart rate for full day (70.2 ± 6.9 vs. 74.3 ± 6.5 with $p = 0.018$) and active hours (78.4 ± 8.1 vs. 82.7 ± 8.9 with $p = 0.028$) were significantly slower in the intervention group compared to the control group. There was no significant difference between groups for inactive mean heart rate (59.9 ± 6.4 for the intervention group vs. 63.2 ± 7.0 for the control group with $p = 0.028$). The decrease in full day mean heart rate observed between M0 and M3 in the intervention group was higher than the control group (−8.1 ± 7.1% vs. −2.3 ± 8.4% with $p = 0.030$ for full day). There was no significant difference between groups for change in active hours (−3.4 ± 8.4% in the intervention group vs. −1.1 ± 9.5% in the control group with $p = 0.310$) and in inactive hours (−6.7 ± 10.7% in the intervention group vs. −3.1 ± 9.3% in the control group with $p = 0.061$). Comparison of changes in heart rate parameters between M0 and M3 showed that the decrease in heart rate was greater for full hours compared to active hours in the intervention group ($p = 0.001$; Figure 2). Multiple linear regressions showed that decrease in heart rate between M0 and M3 for full day heart rate was negatively associated with MMFA-based art activity (coefficient of regression beta = −6.2 with $p = 0.010$; Table 2).

4 Discussion

The results show that the MMFA-based art activity significantly reduced full-day heart rate. Mixed results were shown for active hours and no effect was reported for inactive hours.

TABLE 1 Characteristics of participants ($n = 53$).

	Participants		p-value*
	Control ($n = 25$)	Intervention ($n = 28$)	
Baseline characteristics			
Age > 80, *n* (%)	2 (8.0)	3 (10.7)	0.736
Male, *n* (%)	2 (8.0)	6 (21.4)	0.173
Number of drugs daily taken ≥5, *n* (%)	20 (80.0)	23 (82.1)	0.842
Abnormal ADL score (/6)[†], *n* (%)	4 (16.0)	2 (7.1)	0.310
Abnormal IADL score (/4)[‡], *n* (%)	2 (80.0)	0	0.127
Bad mood[‖], *n* (%)	7 (28.0)	6 (21.4)	0.579
History of falls in the past 6 months, *n* (%)	10 (40.0)	8 (28.6)	0.380
CESAM frailty score (/18)[§], mean ± SD	3.1 ± 2.2	2.5 ± 2.5	0.233
Heart rhythm parameters (per hour), mean ± SD			
Full day			
M0	76.1 ± 7.7	76.1 ± 7.9	0.831
M3	74.3 ± 6.5	70.2 ± 6.9	**0.018**
Variation between M0 and M3 (%)[¶]	−2.3 ± 8.4	−8.1 ± 7.1	**0.030**
Active hours[#]			
M0	83.6 ± 9.9	81.1 ± 9.1	0.581
M3	82.7 ± 8.9	78.4 ± 8.1	**0.028**
Variation between M0 and M3 (%)[¶]	−1.1 ± 9.5	−3.4 ± 8.4	0.310
*Inactive hours***			
M0	65.3 ± 7.5	64.0 ± 6.0	0.378
M3	63.2 ± 7.0	59.9 ± 6.4	0.074
Variation between M0 and M3 (%)[¶]	−3.1 ± 9.3	−6.7 ± 10.7	0.061

SD, standard deviation; ADL, activities of daily living with score ranges between 0 (dependent) and 6 (independent); IADL, instrumental activities of daily living with score ranges between 0 (non-autonomous) and 4 (autonomous); M0, baseline, M3, 3 months; CESAM, Centre of Excellence Self-AdMinistered Questionnaire.
*Comparison based on Mann–Whitney *t*-tests, Chi-squared or Fisher's Exact tests, as appropriate; [†]Score ≤ 5/6; [‡]Score ≤ 3/4; [‖]Based on answer to the question "How do you feel today?" unhappy; [§]Mean score calculated from computerized self-administered questionnaire composed of 20 questions providing a score ranging from 0 (vigorous) to 18 (severe frailty); [¶]Calculated from the formula [((M3 value − M0 value)/((M3 value + M0 value)/2)) × 100]; [#]Between 12 pm and 6 pm; **Between 12 am and 6 am; p-value significance (i.e., <0.05) indicated in bold.

Mean full-day heart rate significantly decreased in the intervention group compared to the control group in our study. To the best of our knowledge, this is the first time that such an effect of museum-based art activity is being reported in older adults. The effect may be interpreted as a health benefit. Heart rate represents the balance between the sympathetic and parasympathetic nervous systems, with a slower heart rate indicating a better balance and thus a healthy state (15–18). This statement suggests that heart rate could be considered as proxy measure of healthy aging. The autonomic nervous system is essential for adapting to stressful events and its main function is to maintain homeostasis (15). Therefore, its maintenance and balance are essential for healthy aging (16). A slower full-day heart rate in older community dwellers suggests an improvement in the balance between the sympathetic and parasympathetic nervous systems, and thus a better health state. This result is consistent with the literature on the health effects of museum-based art activities for older adults (3–8). Indeed, previous studies have shown improvements in participants' mental and physical health states (5–8). Because the physiological measure assessed in this study is a biomarker of physical health status, our results suggest an improvement in participants' physical health through improved autonomic balance.

To date, however, museum-based art activities have been assessed using self-reported questionnaires (3–8). Thus, the reported change in full-day mean heart rate cannot be compared to the results of other studies. The decrease in mean full-day heart rate may be explained by an improvement in participants' well-being, which influences the autonomic nervous system. Indeed, well-being contributes to stress regulation by limiting chronic system activations, thus improving overall health. Another explanation may be an increase in participants' physical activity levels - they needed to walk to attend the museum activities - which is beneficial to the cardiac autonomic system. Thus, it is likely that their physical activity saw a significant increase during this study.

Regarding the active and inactive hours variables, mixed results for the former were demonstrated. The mean heart rate for active hours was lower in the intervention group compared to the control group at M3, but no significant change between M0 and M3 was observed. In addition, no effects of the intervention were observed for inactive hours. These non-conclusive results may be explained by the small number of participants, which leads to a lack of data to show significant effect. In addition, it may be suggested that the condition of inactive hours - which correspond to a resting condition - is not sensitive enough to observe an effect, because the heart rate is slower when compared to active hours.

The RCT design of the study is a major strength, as it provides the highest level of evidence on the effectiveness of an intervention. In addition, the use of a physiological biomarker bypasses the biases of self-administered questionnaires. However, there are certain limitations which should be considered. First, this RCT is a pilot study with a small

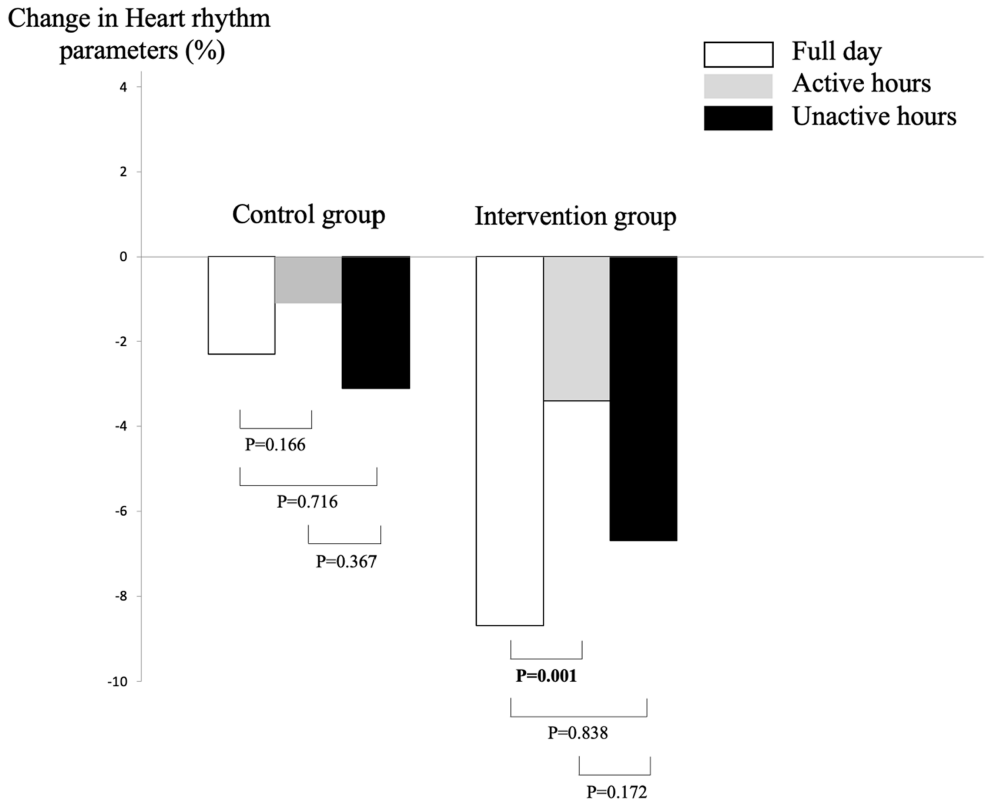

FIGURE 2
Comparison of changes in heart rate parameters between baseline and the end of the museum-based art activity at 3 months in the control ($n = 25$) and intervention groups ($n = 28$). Comparisons based on Wilcoxon test. Change calculated from the formula: [(M3 value − M0 value)/(M3 value + M0 value)/2) × 100]. p-value significance (i.e., <0.05) indicated in bold.

TABLE 2 **Linear regressions showing the association between (a) changes in heart rhythm parameters between baseline and following the intervention (M3) (used as dependent variable, separated model for each heart rate parameter) and (b) museum-based art activity (used as independent variable) in participants ($n = 53$).**

Change in heart rhythm parameters between M0 and M3*	β	[95% CI]	*p*-value
Full day	−6.2	[−10.8; −1.6]	**0.010**
Active hours†	−2.4	[−7.6; 2.8]	0.358
Inactive hours‡	−4.1	[−10.2; 1.9]	0.173

β, coefficient of regression beta; CI, confident interval; all models adjusted on baseline characteristics of participants (please see Table 1).
*Calculated from the formula [((M3 value − M0 value)/((M3 value + M0 value)/2)) × 100]; †Between 12 pm and 6 pm; ‡Between 12 am and 6 am; p-value significance (i.e., <0.05) indicated in bold.

sample size of participants, which may explain mixed and non-conclusive results for active and unactive hours, respectively. Second, recruiting the participants in the older visitors of museum may be a bias because were already interested in museum-based art activities and, thus, may expose to show no or limited effects of the intervention. In addition, because of participants interest in art, the benefices in art-based activities may be limited to older people who are interested in art. Third, we used mean heart rate values, whereas heart rate variability measurements would provide more insight into autonomic nervous system processes. Fourth, we did not have access to the patients' treatments and, therefore, could not consider the effects of medications like beta-blockers on heart rate. However, the participants of control and intervention groups were similar. Thus, it may be suggested that if some of them took heart rate lowering medications, the proportion in each group was the same that limited the effect on the results.

In conclusion, MMFA-based art activities were associated with a significant decrease in full-day mean heart rate, suggesting a health benefit in older community dwellers who participated in the RCT. It would be interesting to reproduce this study with a larger number of participants and to measure heart variability, in order to confirm the health benefits observed in this study. The perspective of confirmation of heart rate benefits of museum-based art activities in an aging population may be useful for promotion of healthy aging and prevention of adverse effects of stress on mental and physical health.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by The Jewish General Hospital Ethics Committee (Montreal, Quebec, Canada). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

OB conceived of and designed the experiments, performed the experiments, and contributed reagents, materials, analysis tools or data. MC and OB analyzed and interpreted the data and writing of the manuscript. JM, AP, and AG revision of manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Productive art engagement in a hybrid format: effects on emotions of older adults during COVID-19 pandemic

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Introduction: Previous studies have shown benefits of productive art-activity on frail older adults' mental and physical health. In this study, we investigated the effects of art-producing activities in a hybrid format (in-person and online) in a context of lockdown compared with previous studies taking place in museums and their effects on wellbeing, quality of life, physical frailty, and apathy in older adults.

Methods: We conducted a randomized unicentric control trial on a sample of 126 seniors older than 65 years (mean age 71.9 ± 2.3, 81% women) living in Nice (France). Participants were randomized in two parallel groups (intervention group with $n = 62$ vs. control group with $n = 64$) conducted during pandemic, between March and May 2021. The intervention group involved participatory art-based activities conducted in a hybrid format, either in-person or online, once a week for 2 h over a 12-week period. No specific intervention was proposed to the control group. The main aim was to evaluate how this hybrid format would impact the wellbeing, quality of life, and physical frailty of participants. The secondary aim was to compare our results with the previous studies conducted by Beauchet et al., and the third aim was to evaluate the impact of the intervention on apathy. Validated scales were implemented in RedCap and administered at baseline (M0) and at the end of the third month (M3).

Results: The intervention group showed significant improvement in their quality of life ($p = 0.017$) and their level of apathy ($p = 0.016$) after intervention. Emotional blunting increased significantly in the control group ($p = 0.016$) while it remained stable in the intervention group. No significant improvement was observed on the frailty, and wellbeing scores remained constant in both groups.

Conclusion: This randomized control trial confirmed emotional effects on seniors practicing an art-based activity in a hybrid format during pandemic on a weekly basis for 3 months.

Clinical Trial Registration: ClinicalTrials.gov, identifier: NCT04570813.

KEYWORDS

quality of life, wellbeing, apathy, productive art-activity, hybrid format

1 Introduction

Because life expectancy has raised consequently, the proportion of older adults is growing fast (1). Living longer in good health condition is a challenge. Involvement in art activities is now well known to improve wellbeing (WB) and quality of life, which are both involved in mental health, linking with longevity and acting as protector factors (2). Life evaluation and hedonic states or emotions are taking a great part in personal experiences and are closely related to mental health. The practice of art-based activities has positive effects on health and wellbeing of older adults (3) and can reduce feelings of loneliness and depressive symptoms, as well as enhance socialization (4). Art therapy is recognized as a valid intervention in mental health, and creativity has been incorporated into gerontology and social sciences of aging, making art practice and health in older adults the foreground of research (5). Creative activities helped to regulate emotions, in particular art and music production (6). Art participants are more likely to use the activity that they found the most helpful as a form of avoidance of negative feelings and a way to socialize with others (7). They can access to web-based activities in order to avoid boredom and feelings of isolation (8). According to Thomson et al. (9), the practice of art-based activities, by allowing the acquisition of new skills, reduce social isolation and decrease anxiety. These activities enhance wellness and happiness scores, and improve emotion and motivation. The practice of art therapies online is a therapeutic process that provides pleasure from the activity as well as the interaction with the art-therapist 9 (10). However the WB and the quality of life can be affected by changes in functional ability, independence and activity performance (4).

The COVID-19 pandemic run worldwide and they were over 14 million deaths (11). Total or partial lockdown had been enacted everywhere across the world; in France, a total lockdown was decided from March 2020 to May 2020, and a partial lockdown was decided from December 2020 to February 2021.

Art-engagement during the COVID-19 pandemic have been associated to people's abilities to cope during lockdown. In that pandemic period, stay-at-home orders were experienced because sanitary reasons, an increasing number of people did suffer from emotional distress, anxiety, depression and loneliness. Art-engagement may have played an important role in people's WB, reducing stress level, lowering level of loneliness and helping escape from negative emotions related to pandemic (12). Art activities could prompt psychological, social and behavioral responses associated with management of WB and mental health. The use of online technologies to provide digital arts in online groups helped older people in a period of emergency (3) and many individuals engaged in art due to a lack of other leisure activities (12).

Emotional wellbeing tends to increase with age, and this tendency was reported also during the COVID-19 pandemic (13), despite older adults being more infected. Behavioral age markers are associated with social withdraw and a reduction in activities that could lead to apathy (14). Apathy in healthy older adults, manifested as a loss of motivation, is very common, which is more than emotional or mental disorders (15). It can affect motivation in three domains, behavioral, social, and emotional, and it is prevalent in varying degrees in healthy people (16).

In previous studies, Beauchet et al. showed that producing art engagement at a museum (17) revealed benefits to frail older adults' mental and physical health.

2 Aim and hypothesis

Based on the studies previously conducted by Beauchet et al. (18, 19), the initial project was to replicate in Nice the studies carried out in Montreal and Tokyo. These studies were single-blind randomized control study (RCT) based on artistic productive art engagement at museums of older adults (65+) in the intervention group and life as usual in the control group. Studies were conducted for 3 months, and effects on WB, quality of life and frailty were analyzed. Due to the COVID-19 circumstances, we adapted the way to participate in the artistic productive art engagement, proposing a hybrid way of producing art engagement, either in-person or remote, depending on the orders of Health French Authorities (20). We also modified the place of art engagement because MAMAC was closed, and we performed the in-person activities at the Institut Claude Pompidou in Nice.

Moreover, the first aim of our study was to verify if this hybrid format would allow our sample of older adults to benefit from art-productive activity and show effects on WB, quality of life, and frailty, as it did on the studies by Beauchet and colleagues. The second aim of this study was to determine if art engagement production in a hybrid format in a pandemic period could have an impact on older adults' feelings, interrogating apathy via emotions, behavior, and social practice.

3 Materials and methods

3.1 Design

Data were collected through Research Electronic Data Capture (REDCap), a secure web application for building and managing online surveys and databases, between January and December 2021. All participants were informed about the subject of the

research and the hybrid presentation of the study. They all provided their consent to participate. After providing informed consent, participants completed the study questionnaires. Ethical approval was received from the Institutional Ethics board of Quest III (Clinical Trial Number: NCT04570813).

3.2 Participants

The recruitment and follow-up of participants (65+) were carried out in Nice between January and December 2021. Participants were recruited according to three primary approaches: the first used the large senior's database of the City of Nice, the second used the print media coverage in the geriatric hospital and the Center Memoire Recherches Ressources (CMRR), and the third used media diffusion in the local newspaper (Nice-Matin). We got initially 185 responses, 59 were excluded based on the criteria of selection, or some never showed up. The selection criteria were to fulfill the inclusion criteria (being 65 years or older, having access to a smartphone or tablet connected to the Internet, speaking and understanding French, being available during the 3-month period, and being affiliated to the French social security); the non-inclusion criteria were not being able to give or sign consent to participate, show a sensory and/or cognitive deterioration identified by the investigator during inclusion, and not being under guardianship. People were excluded from the study if they withdraw their consent.

A total of 126 people meeting the inclusion criteria were registered to participate in the ART&Santé study by the end of December 2020. The sample size estimation was based on the variation on the wellbeing score before (M0) and after (M3) the study; the difference between the intervention group and control group was estimated to be 5.2 ± 10.3. The minimum number of participants to be able to show this difference between the two groups with a bilateral hypothesis, alpha risk = 5%, and power = 90% is 63 per group. The theoretical number of participants would be 126. Considering an 18% rate of participants lost during the follow-up period, the total number of participants required is 150, but we were not able to reach. The consents were signed between January and February 2021. In total, 64 people were assigned randomly to the intervention group and 62 people were assigned to the control group. In the latter, 6 people dropped out just after the randomization. The inclusion visit had to wait till the end of the local lockdown by the end of February. A total of 126 people underwent the baseline assessment. Overall, 31 participants did not complete final evaluations ($N = 21$) or stopped the protocol ($N = 10$), 13 in the control group and 17 in the intervention group (Figure 1).

3.3 Procedure and design

The study was a unicentric (CHU-Nice, Nice, France) RCT, single-blind (principal investigator and representative staff blinded, except the coordinator of the study), randomized, controlled, clinical trial in two parallel groups (intervention group participate in art-based activity vs. control group did not participate in art-based activity but receive a guided tour of the MAMAC at the end of the 3-month period). Participants were randomized into one of the two groups, randomly allocated to the intervention or control group by block randomization with a block size of 1 to limit potential imbalance (Figure 1). The study design was identical to the one described in Beauchet et al. (18), except that the art-activity was provided in-person, or remote, and that the sessions didn't take place at museum, but in the Institute Claude Pompidou. We chose this location because we had enough room to respect Health autorities recommendations. The remote activities were provided via the Internet platform Zoom (Zoom video Communication). The control group participants (no participation to an art-based activity) answered the surveys they received by email link by the end of the third month and by the end of the study they were invited to a guided tour of the MAMAC.

Participants in the intervention group were involved in producing art-based activities in hybrid way 2 h every week for 3 months. Art activities took place in the ICP, with the instructions of half-gauge or online for videoconference. Art activities were always animated by an artist who was chosen by the MAMAC. The public health instructions were constantly adjusted by the Health Authorities.

The intervention consisted of a 3-month cycle of weekly participatory art-based activities such as art-making as part of a group. All participants were engaged in the creative process, allowing them to become authors and observers of others' work. Participants met once a week for 2 h in a dedicated room or videoconference to perform and produce an artistic creation under the supervision of an artist. Sessions took place every morning or afternoon for 1 week, with a maximum of eight participants as request. A total of three artists and three topics were explored, each one during four consecutive workshops. The three topics are music, drawing and painting, and photography and have been organized months before by the MAMAC with artists they were used to work with. We had to provide some adaptations to the initial format because of the remote sessions, especially in the musical sessions.

The musical session (March 2021) was adapted according to the recommendations (20). We offered a free connection to the "SoundTrap" sofware, guided by a written tutorial connection sent by email. People were invited before to connect to Zoom and learnt the way it worked, and then they were individually called by phone when unable to connect to Zoom or SoundTrap. They received three sessions totally remote, and for the last one, they performed in-person group sessions, in accordance with the instructions of half-gauge. They had to produce music, create words, and then sing and perform on percussions together.

The drawing and painting session (April 2021) was partially remote, the instructions for the beginning of the work were given by Zoom on the first session, then participants had to come to the CMRR to get the tools for the second session that was remote, and the two last sessions were in-person groups at ICP, in accordance with the instructions of half-gauge, and people were ask to sculpted flowers and leaves that were picked on the previous sessions and then used as pad to print on fabric.

The photography session (May 2021) was partially remote because sanitary conditions were improving constantly. Only the first session was on Zoom platform; people received instructions and had to take pictures on their own choice. Then, for the last three sessions, they were performing in-person groups at ICP, in accordance with the instructions of half-gauge.

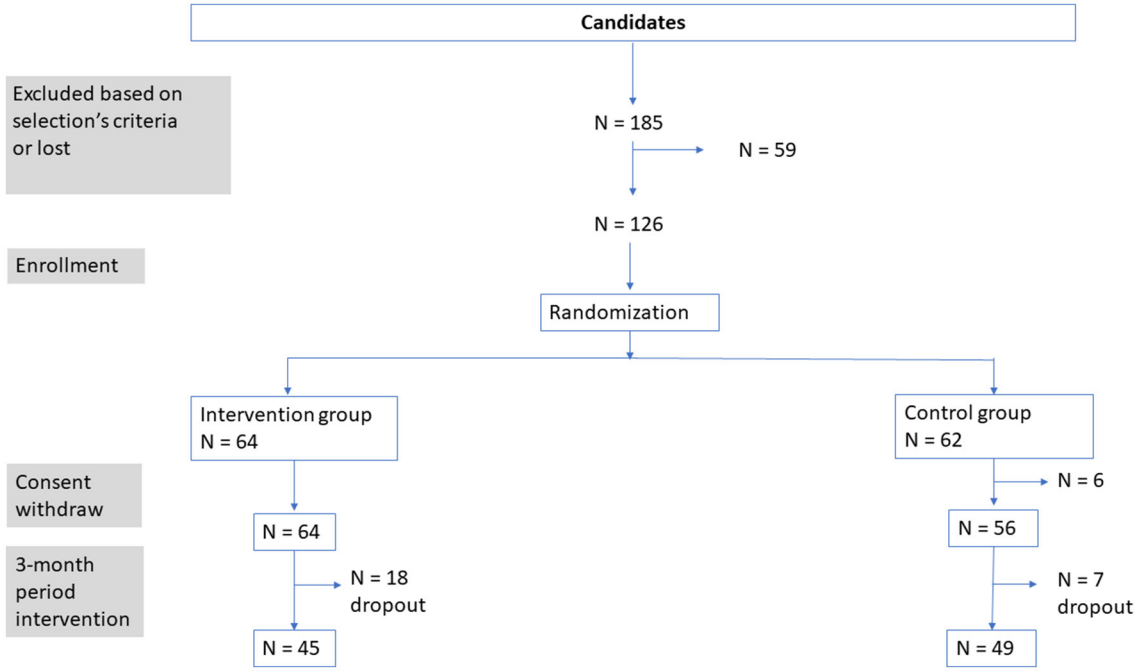

FIGURE 1
Selection and follow-up of participant's diagram.

Because some people of this sampler were not in possession of adequate electronic tools or had bad connections or could not use it, the Thursday sessions were totally assisted in the CMRR, in accordance with the instructions of half-gauge, and we provided electronic tablets and in-person assistance to connect to the collective Zoom.

3.4 Measures

The baseline assessment (M0) was in-person process using the RedCap program, taking place at ICP before the first workshop, with checking of inclusion criteria and filling in the demographics data (name initials, age, sex, and gender). Then, questionnaires were filled out under the supervision of principal investigator.

The wellbeing was assessed using the Warwick–Edinburg Mental Wellbeing Scale (WEMWBS) self-administered questionnaire (21). This questionnaire is validated and composed of 14 positively worded items with five response categories. It covers most aspects of positive mental health (thoughts and feelings). The score ranges from 14 (none of the time) to 70 (all the time). Cronbach's alpha coefficient was 0.94.

The quality of life was assessed by EuroQol-5D (EQ-5D) (22). This evaluation is a standardized measure of health status that provide a descriptive profile and a single index for health status, composed by a five-item questionnaire in which each question ranging from 1 (no issue) to 5 (worst issue) opening to a summary score between 0 (no issue) and 25 (worst issue), and a visual analog scale represents respondent's self-perceived health ranging from 0 (worth) to 100 (best health). The EQ-5D yield two scores: questionnaire score and VAS score. Cronbach's alpha coefficient was 0.67.

The Center of Excellence Self-Administered (CESAM) questionnaire assessing health and functional status was proposed according to the procedure described in Beauchet et al. (18). This questionnaire summarizes information into two measures: a global frailty score ranging from 0 (absence of deficit) to 18 (all deficits present) and a stratification of frailty in four stages: vigorous (0–3), mild frailty (4–7), moderate frailty (9–13), and severe frailty (>12). Cronbach's alpha coefficient was 0.34.

The Apathy Motivation Index (AMI) (16) was proposed to assess emotions to healthy subjects by indicating the level of apathy and motivation, providing means of different mechanisms underlying sub-clinical lack of motivation in emotional, social, and behavioral domains. This index summarizes three subscales, such as behavioral activation (mean 1.58), social motivation (mean 1.69), and emotional sensitivity (mean 1.05). Cronbach's alpha coefficient was 0.63.

At the end of the workshop sessions (end of the third month, M3), WEMWBS, EQ-5D, CESAM, and AMI were reevaluated online on the RedCap application, each participant was requested via email by sending a connection link.

3.5 Statistical analysis

Means, standard deviations (SD), frequencies, and percentages were used to describe participants' characteristics. Inter-group and intra-group comparisons were performed using unpaired and paired *t*-tests, McNemar test, Stuart–Maxwell test, or chi-square tests as appropriate. Changes in questionnaires between M0 and

TABLE 1 Demographic and characteristics of the population at inclusion.

Demographic and characteristics at inclusion							
	Participants $N = 126$		Control group $n = 64$		Intervention group $n = 62$		*P value*
	Mean	[SD]	Mean	[SD]	Mean	[SD]	
Age	71.9	[5.3]	71.2	[4.7]	72.8	[5.8]	0.084
Female (%); Male	102	(81.0); (19)	49	(76.6)	53.0	(85.5)	
Wellbeing (WEMWBS) (/70)	54.5	[7.4]	55.0	[6.8]	54.0	[8.0]	0.471
Quality of life (EQ5-D) (/25)	7.6	[2.4]	7.4	[2.0]	7.9	[2.8]	0.277
Apathy (AMI)							
Emotions (/4)	2.6	[0.5]	2.6	[0.5]	2.6	[0.5]	0.961
Social (/4)	2.9	[0.6]	2.9	[0.6]	2.9	[0.6]	0.909
Behavior (/4)	3.1	[0.6]	3.1	[0.6]	3.1	[0.6]	0.942
AMI_total (/4)	2.8	[0.3]	2.8	[0.3]	2.8	[0.4]	0.888
Frailty (CESAM) (/18)	2.9	[2.1]	2.6	[2.2]	3.2	[2.0]	0.134
Frailty Total							0.398
Vigorous, *n (%)*	79	(65.8)	44	(71.0)	35	[60.3]	
Mildly frail, *n (%)*	38	(31.7)	16	(25.8)	22	[37.9]	
Moderately frail, *n (%)*	3	(2.5)	2	(3.2)	1	[1.7]	

M3 were calculated using the formula: [(score M3) – (score M0)/(score M3+score M0)/2] ×100. Multiple linear regressions were used to examine the association between variations in each questionnaire's scores (used as dependent variables with separated models for each score) and the participatory art-based activity (used as an independent variable) adjusted on participants' baseline characteristics (i.e. age, sex, and group). $P < 0.05$ were considered statistically significant for linear regressions. All statistics were performed using R 4.0.5 software.

4 Results

A total of 126 older adults were enrolled in the study, including 64 in the control group and 62 in the art-activity intervention group.

There was no significant difference in baseline between the intervention and control groups in all measures. The characteristics of participants are presented in Table 1.

Baseline characteristics of all participants, including age and scores in WEMWBS, EQ-5D, CESAM, AMI, and frailty scores, were recorded.

The results of the control group compared with the intervention group are shown in Table 2. In total, 32 participants did not complete final evaluations by RedCap ($N = 22$) or stopped the protocol ($N = 10$), 15 in the control group and 16 in the intervention group; the dropout rate was finally 25% instead of 18% and reduced the statistical power of the study. All missing data were excluded.

The wellbeing scores (WEMWBS) before and after the workshop neither improve in the control group ($p = 0.411$) nor the intervention group ($p = 0.681$). The quality of life (EQ-5D questionnaire) significantly improved for the control group between M0 and M3 ($p = 0.004$) and the intervention group ($p = 0.017$). There were no differences between the control and intervention groups at M3 ($p = 0.457$). The emotion score of the AMI was significantly different between the control and intervention groups at M3 ($p = 0.010$), with the control group scoring significantly higher ($p = 0.016$) (meaning higher emotional blunting) while the intervention group scores were stable. The frailty scores (CESAM) neither improve after the intervention in the control group ($p = 0.626$) nor the intervention group ($p = 0.799$), with a proportion of vigorous participants higher on a non-significant way for the control group ($p = 0.717$) but lower in the intervention group ($p = 0.513$). The proportion of mildly frail was higher at M3 in both groups.

We have performed the analysis of the previous study by Beauchet et al. (18) (Table 3), to analyze the changes between M0 and M3 for the control group vs. intervention group (formula: [(score M3) – (score M0)/(score M3+score M0)/2] ×100). We have found the same results with significant differences only on AMI emotion score ($p = 0.035$) between the two groups.

Finally, multiple linear regressions were used to examine the association between variations in each questionnaire's scores and the participatory art-based activity adjusted on participants' baseline characteristics (e.g., age, sex, and group). We found only a difference in emotion score of AMI with increased emotional apathy in the control group but not in the intervention group (Table 4). A correlation was found between the evolution of the score AMI total and the evolution of the score AMI emotion (Spearman rho=0.56; $p < 0.001$).

TABLE 2 Comparison of mean wellbeing, quality of life, frailty, and apathy between control and intervention.

Scores of Wellbeing (WEMWBS), quality of life (EQ-5D), frailty (CESAM) and apathy (AMI) for control and Intervention groups (mean and *p*-value)												
	Participants										Control vs. intervention groups *p*	
	Control $n = 49$					Intervention $n = 45$					M0	M3
	M0		M3			M0		M3				
	Mean	[SD]	Mean	[SD]	*p*	Mean	[SD]	Mean	[SD]	*p*		
Wellbeing (/70)	54.3	[7.4]	54.5	[7.6]	0.411	54.6	[8.6]	55.5	[8.2]	0.681	0.889	0.576
Quality of life EQ-5D(/25)	7.6	[2.1]	6.7	[1.4]	0.004	7.8	[2.4]	6.9	[1.6]	0.017	0.629	0.457
Quality of life: visual analogic scale (/100)	74.1	[13.9]	72.0	[14.8]	0.623	76.8	[17.5]	75.1	[13.8]	0.667	0.416	0.342
Frailty(CESAM) (/18)	2.8	[2.3]	2.4	[2.2]	0.626	3.0	[1.9]	3.0	[2.1]	0.799	0.676	0.266
Vigorous, *n (%)*	28	(57.1)	26	(68.4)	0.717	25	(67.6)	21	(56.8)	0.513	0.837	0.567
Mildly frail, *n (%)*	9	(23.7)	11	(28.9)		11	(29.7)	15	(40.5)			
Moderately frail *n (%)*	1	(2.6)	1	(2.6)		1	(2.7)	1	(2.7)			
Apathy (AMI)												
Emotions (/4)	2.6	[0.6]	2.7	[0.5]	0.016	2.5	[0.5]	2.5	[0.5]	0.514	0.540	0.010
Social (/4)	2.8	[0.6]	2.7	[0.5]	0.497	2.9	[0.6]	2.9	[0.6]	0.963	0.426	0.147
Behavior (/4)	3.0	[0.6]	3.0	[0.6]	0.723	3.0	[0.6]	3.0	[0.6]	0.957	0.971	0.754
AMI total (/4)	2.8	[0.3]	2.8	[0.3]	0.556	2.8	[0.3]	2.8	[0.3]	0.733	0.901	0.793

5 Discussion

The current study examined the effects of 3-month art-based participatory activities on a hybrid way, remotely, or in-person, on wellbeing, quality of life, frailty, and emotions.

The first aim of our study was to determine if art engagement production in a hybrid format in the pandemic period could have an impact on WB, quality of life, and frailty and to compare this impact with the previous studies.

The WB did not improve in our study in any group (intervention or control) and that is consistent with the previous studies (18). The quality of life improved significantly in both groups, with no significant difference between them. This is not consistent with the previous study, where the results revealed a significant variation in quality of life after the 3-month period for the intervention group ($p \leq 0.001$) (18). We did assume that art engagement could have effects on the quality of life as it was notified in some studies even in a pandemic period (12), but we can hypothesize that the same evolution in quality of life from both group in our study is related to the improvement in the sanitary context between March and May 2020. These results can also be explained by the insecurity of the context: continuous changes in sanitary measures and impossibility of predicting the modality of the next workshop beforehand. This uncertain context could have affected the intervention group, reducing the improvement in the quality of life. In previous studies conducted online with creative arts, it has been shown that older adults could be more embodied with emotional experiences, but the studies were qualitatively analyzed through thematic analysis with therapeutic environment (10) which is not the case in our study. Even if we provided an individual help by phone to start with, it has been a complicated process and could have modified the benefit expected by the art engagement activity.

The frailty scores were not significantly different in both groups before and after art-based engagement, and it was the same in the previous studies, $p = 0.086$ (18). In details, our data revealed a higher proportion of vigorous participants, but on a non-significant way, in the control group and a lower proportion in the intervention group. This improvement in the frailty score could be linked to emotional stimulation via art-engagement. However, these non-significant results should be interpreted with caution. Indeed, the internal consistency of the CESAM scale (used to assess frailty) was very poor in our sample (Cronbach's alpha = 0.34), suggesting that self-reported frailty may not be completely reliable in our study.

The second aim of this study was to monitor the impact of a 3-month art engagement on emotions via apathy. The pandemic

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TABLE 3 Changes in questionnaires between M0 and M3 with the reproduction of the formula by Beauchet et al. (19).

Evolution of the answers to surveys from M0 to M3 [according to Beauchet et al. (19)]							
Participants							
			Control $n = 49$		Intervention $n = 45$		
	Mean	[SD]	Mean	[SD]	Mean	[SD]	*P*-value
Wellbeing (WEMWEBS)	−0.4	[2.7]	0.3	[4.1]	0.3	[4.1]	0.384
Quality of life (EQ-5D)							
Questionnaire score (/25)	−2.9	[5.7]	−2.0	[5.5]	−2.0	[5.5]	0.498
Visual analogic scale (/100)	−0.5	[5.6]	−0.1	[6.2]	−0.1	[6.2]	0.777
Frailty (CESAM) (/18)	−3.1	[22.0]	−6.9	[22.6]	0.8	[21.0]	0.131
Apathy (AMI)							
Emotions (/4)	0.7	[4.8]	1.8	[4.5]	−0.4	[4.9]	0.035
Social (/4)	−0.2	[4.9]	−0.3	[4.3]	0.0	[5.5]	0.784
Behavior (/4)	0.0	[4.9]	−0.2	[5.2]	0.2	[4.6]	0.710
Total (/4)	0.1	[3.1]	0.3	[3.1]	−0.2	[3.2]	0.516

TABLE 4 Multiple linear regressions examining the association between variations in each questionnaire's scores.

Multiple linear regressions examining the variations in questionnaires' scores			
	Intervention		
	Adj β	[95% CI]	*p*-value
Wellbeing (WEMWBS)	0.64	[−0.96; 2.24]	0.429
Quality of life (EQ-5D)			
Questionnaire score (/25)	1.05	[−1.51; 3.62]	0.415
Visual analogic scale (/100)	−0.15	[−2.89; 2.59]	0.913
Frailty (CESAM) (/18)	6.81	[−3.64; 17.26]	0.198
Apathy (AMI)			
Emotions (/4)	−2.45	[−4.56; −0.33]	0.024
Social (/4)	0.24	[−2.02; 2.49]	0.834
Behavior (/4)	0.56	[−1.68; 2.80]	0.620
Total (/4)	−0.48	[−1.91; 0.95]	0.507

context is a source of severe apathy. In our study, the emotional blunting score raised significantly in the control group between the beginning and the end of the study and remained constant in the intervention group. Given the extremely anxious context caused by repeated lockdown and the loss of the usual social, hobbies, and cultural activities among seniors (23), we can presume that the art engagement proposed by the "ART et Santé" program acted as a protective factor. These results are in line with other studies that have shown that art engagement helps to maintain persistent positive affective state (24). Art engagement is a factor of risk-reducing of mental health problem among older adults (3) and improve emotional functioning (25).

In addition, our study showed that the online producing art-activity is a good way to preserve positive emotions. This is in line with the effects of the 3-month cycle of weekly virtual museum tours (26). Virtual museum tours have demonstrated benefits including positive emotion improvement when proposed in a group setting. Engaging active art-participation can modify perceptions and so far, stimulate positive emotions, no matter which modality. Our conclusions are in accordance with the fact that the distant artistic activities could be used to stimulate emotions, motivation, sensorially and goal-directed activity (20). This study highlights that emotional feelings linked to apathy can benefit from an artistic engagement, and that apathetic people could benefit from interventions even if modalities evolve as long as they allow emotional stimulation (26).

This study was able to highlight some novel aspects related to the ability of proposing art-productive engagement online with older adults in a pandemic period, proposing in-person if sanitary conditions make it possible, with positive effects on emotions by reducing negative feelings.

Despite these promising results, several limitations should be noted.

Our sample was very homogenous in sex, being predominantly composed of women from Nice, making it difficult to generalize our results. However, this is consistent with previous studies having the same rate of women participants (8, 18).

By adapting our study to the pandemic context, we faced a rate of dropout more important than expected, reducing the generalization of the findings to broader situations. The study was initially proposed to take place at a museum but ended to be a hybrid art engagement with no museum involved because of sanitary conditions. People were aware of this situation, but

they dropped-off the study when the modality changed for the first time from in-person session to online. This highlights their difficulties to accept the changes. Access to web-based programs is a technology challenge for some older adults and could be a barrier to participate and answer to online questionnaires (8), because it needed specific material and was time-consuming. These may have linked to poor acceptability of the study (20). The remote condition may have affected the abilities of older adults to cope with the situation (12) because they are very motivated to engage in artistic activities in groups, with all the social aspects that this underlies. Their motivation to participate in remote art-activities may have been low, even when remote access was not a problem (7). The way that modalities switched according to sanitary conditions may have increased the level of dropout, and we may assume that it would have been more advantageous to stick on one modality within the same intervention. The other reason that may explain the dropout rate is the control group not being active. People may have engaged in art-activities because they were desperate to find leisure activities in the pandemic period but not willing to engage in a research study. As a result, the generalization of the effects of this study is limited and needs replication.

The level of art-engagement, the acceptability of the study, and the digital abilities of older people were not taken into account, and these are variables that could have influenced the results of this study.

The inclusion of music as online art engagement may have been counterproductive as it is showed as not being the most effective for people aged +65 years (6).

The frailty assessment using the CESAM scale showed very poor internal consistency, suggesting the importance of further studies to properly assess the effect of art engagement on frailty.

The RCT design, the reproduction of the design of previous studies to compare the results, and the fact to successfully carry out a study in the context of COVID-19 pandemic are the main strengths of our study. Nevertheless, these limitations are also a real advantage: they reflect the reality of the possibilities of intervention and assessments during a pandemic context of lockdown.

6 Conclusion

We conclude that a hybrid art engagement activity with older adults is a way to enhance emotional stimulation and reduce the risk of apathy in participants in the very special context of pandemic and stay-at-home orders. We also conclude that art-activity productive engagement in a hybrid way could represent an emotional protection factor in the context of a pandemic for older adults and could be predictors of mental health.

Future perspectives would be to reproduce this study out of pandemic context. It would also be interesting to get an active control group. A longer inclusion period would also allow to monitore long-time effects of act-engagement, and increasing the number of participants would provide stronger statistical power to the results.

Health policy should consider helping older adults by using online technologies and to provide productive arts in online groups, even outside the pandemic context, considering that many older adults lived in remote areas and could be beneficial to such sessions.

Data availability statement

The data analyzed in this study is subject to the following licenses/restrictions: only if demanded to the investigator. Requests to access these datasets should be directed to auriane.gros@univ-cotedazur.fr.

Author contributions

MP: Conceptualization, Data curation, Methodology, Project administration, Resources, Writing – original draft, Investigation. KG: Conceptualization, Methodology, Project administration, Resources, Writing – review & editing. AP: Data curation, Visualization, Writing – review & editing, Investigation. JL: Project administration, Writing – review & editing, Data curation. AD: Conceptualization, Data curation, Writing – review & editing. RF: Writing – review & editing, Formal analysis, Validation. AM: Writing – review & editing, Supervision. GS: Supervision, Writing – review & editing. OG: Supervision, Writing – review & editing, Funding acquisition. VM: Data curation, Methodology, Writing – review & editing, Investigation. PR: Conceptualization, Methodology, Supervision, Writing – review & editing, Investigation. OB: Conceptualization, Methodology, Resources, Validation, Writing – review & editing. AG: Funding acquisition, Supervision, Writing – review & editing, Conceptualization, Data curation, Investigation, Methodology, Project administration, Resources.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Utilizing the arts to improve health, resilience, and well-being (HeRe We Arts®): a randomized controlled trial in community-dwelling individuals with chronic medical conditions

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Background: Healthcare workers are concerned with promoting behavior changes that enhance patients' health, wellness, coping skills, and well-being and lead to improved public health. The purpose of this randomized controlled trial was to determine if participation in an 8-week arts-based program leads to improved mood, health, resilience, and well-being in individuals with chronic health conditions as compared to a wait list control group.

Methods: Self-report questionnaires for well-being, mental health, physical health, overall health, social health, mood, coping, and resilience were administered at baseline, Week 8 (end of program), and Week 16 (8-week follow-up).

Results: Statistically significant improvements were noted in all outcome measures for the treatment group, as well as in most areas compared to the control group. Many of the positive results at Week 8 were either maintained or further improved at Week 16.

Discussion: These results suggest that arts-based programming can have a positive effect on the mood, health, resilience, and well-being of individuals with chronic health conditions. Therefore, arts-based programming should be utilized more frequently in the management of chronic conditions in community-dwelling individuals. These benefits should be further assessed in larger clinical trials.

KEYWORDS

arts, arts in health, arts integration, health, resilience, well-being, music therapy, art therapy

Introduction

Healthcare professionals increasingly focus on the promotion of behavior changes to improve their patients' health, well-being, and coping skills. Specific areas of focus include chronic health conditions, mental health, physical health, aging, obesity, and unhealthy lifestyles (1–3). These issues have led to increased attention to racial migration, an aging population, rate of growth in population, economic and social effects of the population as it ages, movement to rural areas from urban areas, frequent hospital readmissions, inadequate care, and increased behavioral health needs (4, 5). Due to the wide variety of concerns, and individuals facing these concerns, it is important to find multiple ways of addressing them as it is unlikely that one specific method would be effective for everyone.

The World Health Organization in 1948 defined health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (6, 7). Therefore, health encompasses multiple domains (emotional, physical, occupational, intellectual, spiritual, and social). Well-being has been defined as an individual's perception of physical health, improved symptoms, and psychological functioning (8). Resilience has been defined as individuals' abilities and/or characteristics that help them to bounce back, recover from challenges, cope with adversity, and manage stress (9–12). If the ability to cope is negatively impacted, the imbalance in homeostasis that is caused could also lead to physical and mental health issues (10, 11).

Individuals suffering from chronic health conditions are impacted in physical, mental, and social areas of their lives as they attempt to deal with various stressors, learn new ways to cope, and improve their resilience (13). A growing number of treatment programs are offered to help promote self-care, adherence to physical activity, manage anxiety, stress, and depression, and optimize quality of life and optimism.

Programs have been created to help with recovery from illness and improving individuals' resilience while facing multiple challenges (9, 10, 14–17). Some of these programs utilize the arts. While many were single interventions that focused on just one art modality (e.g., visual arts, crafting, music, drumming, writing, movement, or theater) throughout the course of the program or study, others combined multiple artistic interventions or mixed art with more traditional health promotion interventions.

We designed the HeRe We Arts® program to include multiple arts interventions over the course of several weeks so that the participants could be presented with a variety of experiences. The use of multiple interventions or strategies is also known as bundling (18), and the bundling approach has been used in health-related research (19, 20). Therefore, we believed that multiple interventions should be used that focused on individual needs, as well as those of the community, family and society as individuals have different strengths, abilities, preferences, and learning styles (21–23). Our goal was to intervene in the context of a population health initiative, targeting community-dwelling individuals with a wide spectrum of personal and medical situations and challenges, with the overall goal of reducing health inequities, working with a variety of settings for intervention delivery. In this context, integrating complementary arts-related components into the program was our preferred strategy (23).

This study was designed to address the broad problem of revising current health programs while addressing the need to promote wellness, population health, public health, and prevention (1–3, 5). The specific problem to be addressed was revising current health programs to help improve the health, resilience, well-being, and mood of adults coping with chronic health conditions (2, 17–30). At the time of this study, there was limited literature regarding the use of arts-based interventions utilizing various styles of learning to help improve resilience, well-being, health, and mood in outpatient settings (21–23, 25, 31–40).

The purpose of this randomized controlled trial (RCT) was to determine if participation in an 8-week arts-based program, delivered in a group format within an outpatient community setting, would lead to improved health, resilience, mood, and well-being in adults with chronic health conditions as compared to similar individuals in a wait-list control group. An arts-based approach was chosen as it was believed to be non-threatening, inexpensive, and something familiar, safe, and comfortable that would engage participants of all ages, genders, backgrounds, ethnicities, and abilities. The primary theory that informed this study was arts integration theory (AIT). AIT is a means of teaching topics, meeting objectives, and engaging in creative processes through various arts experiences (41). These interventions are provided by trained individuals in order to connect the skills from the arts to other subjects (42). This study was designed to expose individuals to multiple arts experiences in the hope that they would find at least one that resonated with them and that they would engage in in the future. It was also hoped that support and social relationship would assist with the improvement of the coping skills, behavior changes, and health outcomes (43–47).

Specifically, this study aimed at assessing within-and between-group differences at end of intervention (Week 8) and 8-week follow-up (Week 16) on mood, well-being, resilience, perceived health status, and self-reported physical activity. We hypothesized that participants in the treatment group would demonstrate within-group improvement, and greater improvement compared to the control group, for all outcome measures at Week 8, and that these improvements would be maintained at Week 16.

Materials and methods

Setting

The study was conducted at two local urban community health and education centers (Langston Hughes Community Health & Education Center and Stephanie Tubbs Jones Health Center), one suburban family health center (Lakewood Family Health Center), and one local urban hospital (Akron General Hospital) within a single healthcare system. These locations were chosen because their administrators were creatively working on addressing the health needs of members of their local communities, many of which were considered to be underserved neighborhoods where individuals were dealing with chronic health conditions that were causing many doctor visits and hospital readmissions. IRB-approved fliers about the program were posted at and shared with individuals attending these locations. Health care providers, employees, and volunteers at these locations assisted with the recruitment of participants by sharing the flier, discussing the study, and/or referring individuals to call the number on the flier if interested in participating. Large community rooms, education rooms, conference rooms, gyms, and/or auditoriums were where each of the weekly sessions were held.

Participants

Participants were recruited from areas surrounding the local community health and education centers and/or hospital. The inclusion criteria were: at least 18 years old; diagnosed with at least one chronic health condition (as reported by the participant) for which health promotion and maintenance were recommended; able to participate safely in all program sessions; proficient in English; and cognitively able to consent to participate. Exclusion criteria were severe visual or auditory impairment; and severe and/or uncontrolled comorbidity precluding safe participation in a physical activity program.

Study design

Individuals who expressed interest in participating in the study were screened by study personnel either in person or by phone using a pre-determined script that was based on the inclusion/exclusion criteria. If the individual was deemed eligible to participate, study personnel met with the individual, explained the study, reviewed the informed consent form, and obtained written informed consent. Randomization then occurred based on an online random number generator (48). This tool works differently every time it is used as it is set to the time of the computer's clock (48). Each participant was assigned to either the treatment group or a wait-list control group based on the blocks assigned by the random number generator. Spouses, family, or friends needing to accompany a disabled participant were also invited to participate if they met the inclusion/exclusion criteria. The treatment group attended the first set of sessions that were offered, whereas the control group would not attend the sessions until they were offered the following time, which occurred at least 12–16 weeks after the first round of sessions. Similar information regarding involvement in arts experiences were collected for both groups.

Ethics statement

Written informed consent was obtained for all participants in this study, and the privacy rights of human subjects were observed. This study was approved by the hospital's Institutional Review Board (IRB) study #17–1732. The work described here was carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans. Data were collected and managed using REDCap electronic data capture tools hosted at [Vanderbilt University] (49, 50). REDCap (Research Electronic Data Capture) is a secure, web-based software platform designed to support data capture for research studies. Data were de-identified to protect confidentiality and anonymity. This study was considered minimal risk by our IRB.

Intervention

Each week of the 8-week arts-based program included an educational component and an experiential component. All of these components were designed to incorporate different learning styles and abilities of the participants, many of which related to Gardner's Theory of Multiple Intelligences (21). These are listed below for each week. Personnel involved in the various sessions included the hospital's art and music therapists and art curators, as well as music therapists from Beck Center for the Arts, a local community arts partner. All of them were trained to the study protocol and program curriculum. Although many of the sessions were led by music or art therapists, the program was designed such that it could be led by creative arts therapists, artists, musicians, actors, writers, and/or healthcare providers with an arts background. Each session was approximately 2 h in length, allowing time for socialization and refreshments, didactic learning, and active participation. A small stipend (USD 10) was provided to study participants at every session to help cover their expenses and time, including testing sessions for the control group. This helped some participants with paying for their transportation. An additional payment of USD 20 was sent after the completion of the questionnaires at Week 16. Participants who missed sessions were kept in the study, unless they requested to withdraw. Study personnel also called the participants at times to touch base and to remind them of the next week's session.

The following is an outline of the 8-week program; however, at times weeks 2 through 7 were conducted in a different order based upon space requirements and presenter availability.

Week 1

Introduction to the Arts and Health was an introduction to the 8-week series of courses, and an introduction to the connection between the arts and health, as well as to the concepts of well-being and resilience. An interactive art experience was utilized, with participants creating a talisman key chain to represent themselves and their desires for the program. Intelligences addressed: linguistic–verbal, logical-mathematical, visual–spatial, body-kinesthetic, and intrapersonal (21).

Week 2

Music, Well-Being, and Resilience was a session that provided information on how music could elicit positive physical and emotional responses. The social aspects of music were discussed as were the benefits of listening to music. Interactive music interventions were utilized, including lyric discussion, singing, instrument playing, and music-assisted relaxation techniques. Intelligences addressed: musical, body-kinesthetic, interpersonal, and intrapersonal (21).

Week 3

Movement and Physical Activity was a session that included information on the importance of physical activity in improving mood, health, resilience, and well-being; as well as the emotional release that could occur. Discussion was held on how pairing the arts (particularly music) with physical activity could increase interest in, and length of, the activity. Interactive movement and drumming exercises based on the Drums Alive® program were utilized. Drums Alive® is a program that utilizes rhythm, music, and physical fitness to create physical, emotional, social, and mental well-being (51). Intelligences addressed: body-kinesthetic, interpersonal, and visual–spatial (21).

Week 4

Art and Well-Being was a session that included discussion of how artmaking could be utilized to promote healthy habits, resilience, well-being, self-care, and self-expression. Participants were encouraged to

create a collage representing themselves on the front of a journal that would later be used during the Writing and Communication/Self-Expression week. Pictures, words, phrases, etc. from magazines, scrapbook supplies, decorative objects, and mod podge were utilized to decorate the covers of the journals. Participants were encouraged to share about their journal covers with the other participants if they were willing to do so. Intelligences addressed: visual–spatial, body-kinesthetic, and intrapersonal (21).

Week 5

Writing and Communication/Self-Expression was a session in which the participants utilized the journals they created in a previous session. Information was provided on the importance of communication and self-expression to one's health, resilience, and well-being. A variety of poetry, journaling, storytelling, and song-writing techniques were taught and practiced. Participants were encouraged to share from their journals as they felt comfortable. Intelligences addressed: linguistic–verbal, and intrapersonal (21).

Week 6

Theater and Socialization was a session in which information was provided on the importance of interaction, support, and understanding of others to one's mood, health, resilience, and well-being. Interactive theater games were utilized and discussions regarding attending, and volunteering at, theater productions were held. Discussions were also included regarding stepping out of one's comfort zone and on the importance of socialization. Intelligences addressed: linguistic–verbal, body-kinesthetic, and interpersonal (21).

Week 7

Art Appreciation and a Healthy Brain was a session that included information on the effects of visual arts on cognition, emotion, learning, and memory. Examples of uses of music to improve brain functioning were also shared. Various visual art forms, especially surrounding public art, were shared and discussed; and participants engaged in a small group art-making experience. During this experience they were encouraged to utilize provided supplies that included pictures of sculptures, markers, colored pencils, scissors, etc. to create their own sculpture garden. Many created a theme for their garden and shared the art they created with the other groups. Intelligences addressed: naturalistic, body-kinesthetic, logical-mathematical, interpersonal, and visual–spatial (21).

Week 8

Summary/Integration of the Arts into Daily Lives included an integration of the knowledge and skills learned in all the other sessions. These were summarized and discussed, and participants were encouraged to share how they had been using the arts outside of the sessions. They were also reminded to continue to utilize the arts in their daily lives to promote mood, health, resilience, and well-being after the completion of the program. The session ended with a group drumming experience. Intelligences addressed: linguistic–verbal, logical-mathematical, musical, and interpersonal (21).

Data collection and outcome measures

Data collected included participants' demographic information (age, gender, race/ethnicity, location of group, medical diagnoses, comorbidities), goals, and responses to measurement tools. The dependent variables that were addressed included mood, health, resilience, well-being, physical activity, and behavior change. Data were collected on all of these variables except behavior change through the use of the following standardized questionnaires: Godin-Shephard Leisure Time Physical Activity Questionnaire (GSLTPAQ), Short Depression-Happiness Scale (SDHS), Short Warwick-Edinburgh Mental Well-Being Scale (SWEMWBS), PROMIS Scale v1.2 – Global Health, and Brief Resilient Coping Scale (BRCS). Behavior change was measured on a weekly basis through following up with participants to ask if they completed the items they listed on their Weekly Take-Away Forms. Data were collected on the independent variable of arts-based programming through the post-session surveys that were provided at the end of each session, as well as the Pre/Post-Test HeRe We Arts® Survey.

At Week 1 all pre-test and baseline assessments were conducted, the Weekly Take-Away Form was completed, and the participants filled out the Weekly Post-Session Survey. Prior to the start of the sessions for Weeks 2–7 each participant was individually asked if they completed the Take-Away from the previous week, and at the end of the sessions the Weekly Post-Session Survey and Weekly Take-Away Form were completed. During Week 8 all post-tests and final 8-week surveys were conducted and prior to the start of the session each participant was individually asked they completed the Take-Away from the previous week. Individuals in the control group completed the same assessments as the experimental group at Weeks 1, 8, and 16.

The instruments listed below were used in a feasibility study that was conducted prior to the original randomized controlled trial. They were found to be short, easy to use, and easy to understand. Some could be completed in five (5) minutes, but none of them took longer than 20 min to complete. Permission was obtained for the various instruments that required permissions; however, many were in the public domain or were available for use for research.

The Godin-Shephard leisure-time physical activity questionnaire (GSLTPAQ) was utilized to measure physical activity. This questionnaire asks participants how many times on average, over a 7-day period, they engage in strenuous, moderate, or mild exercise for more than 15 min, and the average frequency of activity that leads to increased heart rate (52). Rationale for use included the short length of the scale, the ease of understanding it, and its ability to characterize the level of physical activity of the participants.

The Short Depression-Happiness Scale (SDHS) was used to assess mood and overall well-being. It is based on the Depression-Happiness Scale (DHS), but it is designed to take a shorter amount of time, as well as to provide a means of assessing change while keeping the completion of self-report measures to a minimum. It contains 6 items, 3 negative and 3 positive. The negative items include: I feel dissatisfied with my life, I felt cheerless, and I felt that life was meaningless (53). The positive items include: I felt happy, I felt pleased with the way I am, and I felt that life was enjoyable (53). Individuals completing this questionnaire are asked to think about how they felt in the past 7 days and to rate the frequency of item on a 4-point scale. Rationale for selection included the scale being short, it was easy to understand, and it allowed the researchers to assess participants' mood (depression and happiness) which is essential to their health and well-being.

The Short Warwick-Edinburgh Mental Well-Being Scale (SWEMWBS) was utilized to assess participants' well-being. It asks participants to answer 7 questions by choosing the answer that best describes their experience over the last 2 weeks. Ratings include none of the time, rarely, some of the time, often, or all the time (54, 55). This test was designed to measure the feeling and functioning aspects of positive mental well-being. Rationale for selection included the scale being short, easy to understand, and its ability to assess well-being.

The PROMIS Scale v1.2—Global Health was utilized to assess health. It is a self-report measure to identify symptoms, feelings, behaviors, and functions in the areas of physical, mental, and social health (56). The rationale for use included the scale being fairly short and easy to understand, as well as its ability to assess global health and well-being.

The Brief Resilience Coping Scale (BRCS) was utilized to measure coping or resilience. It is a 4-item measure designed to identify participants' abilities to cope with stress; and it may be helpful for recognizing those participants who may need to learn techniques to help improve their coping skills and resilience (57). Based on their scores on this scale, participants are identified as low resilient copers, medium (average) resilient copers, or high resilient copers (57, 58). Rationale for use included the scale being short, easy to understand, and its ability to assess resilience.

In addition to these validated and reliable measures, the researchers in the original study created a pre-test/post-test HeRe We Arts® Survey to test knowledge on arts and well-being, as well as satisfaction at endpoints. In addition, to improve knowledge and promote behavioral changes, at the end of each week's session participants were asked to complete the following sentence on a Take-Away Form: "I plan to use _____ at least once this week in order to improve my health and well-being" on a typed sheet of paper that they took home. Research personnel took a picture of this statement on their encrypted Cleveland Clinic iPhone. These photos were then downloaded onto a secure drive and kept in the participants' research folders. The researcher guiding the study followed up with them the next week to learn if they had completed their take-away from the previous week. Finally, at the end of each session, the participants completed a Weekly Post-Session Survey to obtain information on learning and satisfaction.

Quantitative and qualitative analyses

Data analysis included the total number of participants enrolled, the number (%) of participants attending the sessions, and the number (%) of participants withdrawing from or removed from the study. Descriptive statistics were generated on the responses to the satisfaction questionnaires. Assessment included whether participants were successful in implementing the strategies in the short term (during the program), and in continuing to implement the strategies 8 weeks (or 2 months) after program completion, based on a 3-level rating (1 – Fully; 2 – Partially; 3 – Not at all). Paired *t*-tests were used to test for change over time on outcome measures within the experimental group, two-sample *t*-tests were used to test for difference results between the experimental group and the control group, with $p < 0.05$ considered statistically significant. No adjustment was made for multiple comparisons, owing to the fact that this was a pilot RCT. Qualitative coding analysis were used to obtain information from any open-ended questions on the surveys. Mean changes were calculated from baseline with 95% confidence intervals in measured scales. Imputations were used and a value was assigned to data that was missing. Missing data was minimized by reviewing it for completion when it was submitted by the participants; however, some data was still missing or not completed by some of the participants.

Prior to the start of the study a G* Power analysis, power 0.80 and effect size 0.25, was conducted in order to determine the number of participants needed to demonstrate statistical significance. At that time, it was estimated that 128 individuals would be needed, with 64 assigned to each group.

Results

Participants

See Figure 1 for the CONSORT Flow Diagram. A total of 192 participants were assessed for eligibility, and 48 of those screened were removed due to exclusion criteria. Of the 144 remaining, 48 more were removed due to inability to continue participating, withdrawal from the study, lack of participation, or lack of completing follow-up questionnaires. In the end, the final numbers in the control group and treatment group were not evenly distributed.

Of the 96 who completed the study, 36 were in the control group and 60 were in the treatment group. The age range of participants was 18–91 years with the average age of the participants being 61.5 years. A total of 89.6% of participants were female, almost 60% were African American or Black, and over one third had high school degrees or less. See Table 1 for descriptive statistics and a summary of the cohort characteristics. Participants had at least one diagnosed chronic health condition, but some had more than one. Those listed most frequently were hypertension (59.4%), overweight or obese (54.2%), rheumatism or arthritis (46.9%), neck or back pain (39.6%), pre-diabetes or diabetes (26.0%), depression (22.9%), breathing or lung problems (21.9%), anxiety (20.8%), chronic pain (20.8%), and heart condition (11.5%).

Quantitative data

There was statistically significant improvement in the treatment group from Weeks 1 to 8 for SDHS, SWEMWBS, BRCS, PROMIS Mental T Score, PROMIS Physical T Score, PROMIS Q1, and PROMIS Q9 and from Weeks 1 to 16 for SDHS, SWEMWBS, BRCS, PROMIS Mental T Score, PROMIS Physical T Score, PROMIS Q1, and PROMIS Q9 (Table 2). Table 2 also reports between-group differences in mean change scores. There was a statistically significant difference favoring the treatment group results from Weeks 1 to 8 for SDHS, SWEMWBS, PROMIS Mental T Score, PROMIS Physical T Score, PROMIS Q1, and PROMIS Q9. From Weeks 1 to 16 there were significant differences for SWEMWBS, PROMIS Mental T Score, PROMIS Physical T Score, and PROMIS Q9.

Table 3 demonstrates a summary of the results specific to each research question and hypothesis. Participants who engaged in the HeRe We Arts® program also completed pre-and post-surveys

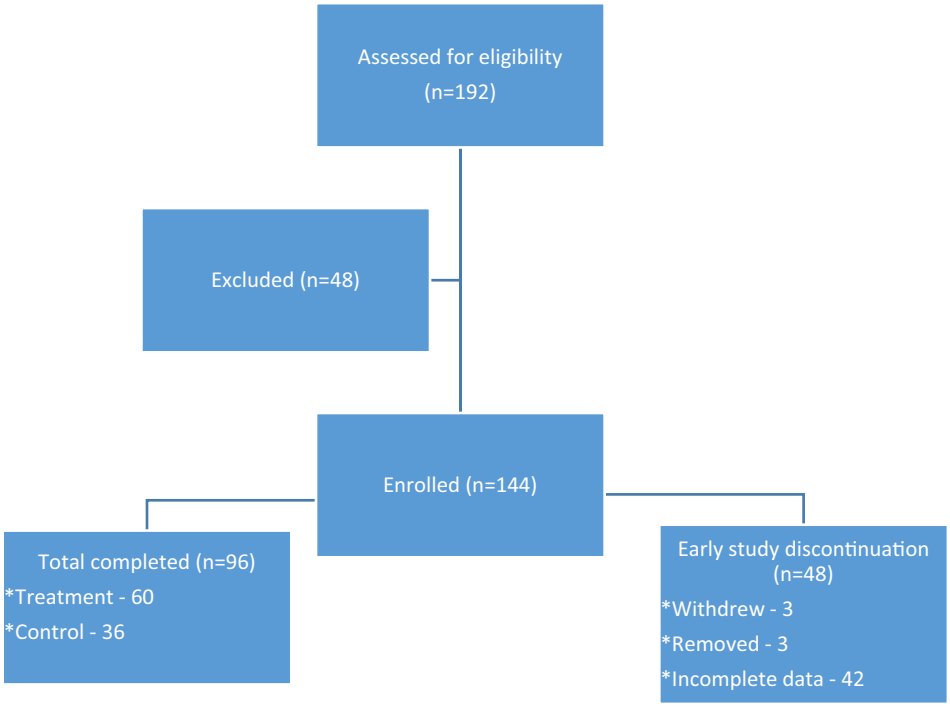

FIGURE 1
The enrollment flow diagram demonstrating eligibility, exclusion, enrollment, completion, and early study discontinuation.

regarding their use of various art forms and whether they believed that their health and/or well-being could improve by participating in arts-based programming. Overall, participants engaged in more art forms after the program, and 98.6% as compared to 76% indicated that they felt participating in arts-based programming could improve their health and/or well-being (Table 4). In addition to the questionnaires listed above, at the completion of each session participants completed post-session survey data (Table 5). This indicated the percentage of change in their stress, anxiety, and mood during each session; as well as how they rated the helpfulness of the session. The sessions rated the highest (very good and/or excellent) included Movement, Writing, and Theater. During the Introduction, Movement, Art Appreciation, Theater, and Summary sessions 100% of participants indicated that their stress, anxiety, and mood got better or stayed the same.

Qualitative data

Due to the large amount of quantitative data obtained during this study, the qualitative data obtained via questionnaires and/or semi-structured interviews with the participants will be addressed in a separate manuscript. However, we would like to share some of the comments made by participants:

- "It meant so much to me that you took the time to learn and use our names."
- "I have the power to do things to help me relax; it's up to me."
- "I came out of my dark spot and now deal with the real journey of life."
- "It got me out of the house, and I've made some new friends."
- "This is the first thing I ever signed up for that I finished."
- "I can be more than my pain."

Discussion

In this RCT comparing the HeRe We Arts® program to wait-list controls, we observed statistically significant improvements in the treatment group at the end of the program on most outcome measures (except for physical activity on the GSLTPAQ), which was sustained 8 weeks later. We also found statistically significant between-group differences favoring the treatment group on all of the PROMIS scales, SDHS, and SWEMWBS at Week 8, and on PROMIS Mental Health, PROMIS Physical Health, PROMIS Q9, and SWEMWBS at Week 16.

The GSLTPAQ was the only score that did not significantly improve with treatment. This may be due in part to the fact that a longer intervention is necessary to promote change in physical activity. Only one session of the program directly addressed physical activity. In addition, participants may need one-on-one coaching to understand how to overcome individual barriers to physical activity. Therefore, arts-based programming may be coupled with more traditional physical activity programs to achieve optimal results.

It was hypothesized that the change in BRCS scores would be significantly greater for the treatment group than for the control group; however, this was not the case, although there was a statistically significant improvement at Week 8 and Week 16 within the treatment group. This finding may be related to insufficient sample size and needs to be further investigated. Additional content directly related to resilience may need to be added to the program curriculum.

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TABLE 1 Descriptive statistics.

Variable	Level	[ALL]	N
Randomized group	Control group	36 (37.5%)	96
	Experimental Group	60 (62.5%)	
Age		62.0 [55.0; 69.0]	96
Gender	Female	86 (89.6%)	96
	Male	10 (10.4%)	
Race/Ethnicity	Black/African American	57 (59.4%)	96
	White/Caucasian	31 (32.3%)	
	Other	8 (8.33%)	
Highest Degree/Level of School Completed			
	High school or less	33 (34.4%)	96
	Associate or technical degree	23 (24.0%)	
	Bachelor's degree	25 (26.0%)	
	Graduate degree	15 (15.6%)	
Employment Status	Employed	21 (21.9%)	96
	Self-Employed	4 (4.17%)	
	Homemaker	1 (1.04%)	
	Student	2 (2.08%)	
	Retired	48 (50%)	
	On Disability	13 (13.5%)	
	Unemployed	7 (7.29%)	
Baseline SDHS		14.0 [11.0; 16.0]	96
Baseline SWEMWBS		26.0 [23.8; 29.2]	96
Baseline BRCS		15.0 [13.0; 17.0]	96
Baseline Godin Activity Score		22.5 [15.0; 42.2]	96
Baseline PROMIS Mental T Score		44.6 [41.1; 50.8]	96
Baseline PROMIS Physical T Score		42.3 [37.4; 50.8]	96
(At baseline) In general, would you say your health is	Poor/Fair	29 (30.2%)	96
	Good	50 (52.1%)	
	Very Good/Excellent	17 (17.7%)	
(At baseline) In general, please rate how well you carry out your usual social activities and roles…			
	Poor/Fair	23 (24.0%)	96
	Good	36 (37.5%)	
	Very Good/Excellent	37 (38.5%)	
Arthritis/rheumatism	No	51 (53.1%)	96
	Yes	45 (46.9%)	
Back or neck pain	No	58 (60.4%)	96
	Yes	38 (39.6%)	
Heart condition	No	85 (88.5%)	96
	Yes	11 (11.5%)	
Diabetes	No	71 (74.0%)	96
	Yes	25 (26.0%)	
Chronic pain	No	76 (79.2%)	96
	Yes	20 (20.8%)	
Hypertension/high blood pressure	No	39 (40.6%)	96
	Yes	57 (59.4%)	

(Continued)

TABLE 1 (Continued)

Variable	Level	[ALL]	N
Lung/breathing problem	No	75 (78.1%)	96
	Yes	21 (21.9%)	
Anxiety	No	76 (79.2%)	96
	Yes	20 (20.8%)	
Cancer	No	91 (94.8%)	96
	Yes	5 (5.21%)	
Stroke	No	94 (97.9%)	96
	Yes	2 (2.08%)	
Depression	No	74 (77.1%)	96
	Yes	22 (22.9%)	
Obesity/overweight	No	44 (45.8%)	96
	Yes	52 (54.2%)	

TABLE 2 Change in outcome measures.

Variable	Treatment group	Control group	Within-group	Between-group
	Mean difference (95% CI)	Mean difference (95% CI)	*p* values	*p* values
Baseline to Week 8				
SDHS	1.43 (0.74, 2.13)	0 (−0.94, 0.94)	***<0.001***	***0.016***
SWEMWBS	1.8 (0.87, 2.73)	0 (−1.15, 1.15)	***<0.001***	***0.016***
BRCS	1 (0.09, 1.91)	0.14 (−0.71, 0.99)	***0.031***	0.166
Godin Activity Score	5.42 (−2.11, 12.95)	0.86 (−6.81, 8.53)	0.155	0.395
PROMIS Mental T Score	4.08 (2.54, 5.61)	1.33 (−0.19, 2.85)	***<0.001***	***0.012***
PROMIS Physical T Score	3.12 (1.82, 4.41)	0.15 (−1.22, 1.51)	***<0.001***	***0.038***
PROMIS Q1	–	–	***<0.001***	***0.005***
PROMIS Q9	–	–	***<0.001***	***0.002***
Baseline to Week 16				
SDHS	0.97 (0.34, 1.6)	0.17 (−0.73, 1.07)	***0.003***	0.146
SWEMWBS	1.6 (0.76, 2.44)	−0.64 (−1.48, 0.2)	***<0.001***	***<0.001***
BRCS	1.27 (0.49, 2.04)	−2.06 (−8.89, 4.78)	***0.002***	0.133
Godin Activity Score	0.08 (−7.65, 7.81)	0.48 (−1.46, 2.42)	0.983	0.677
PROMIS Physical T Score	2.5 (1.41, 3.59)	0.5 (−1.06, 2.06)	***<0.001***	***0.038***
PROMIS Q1	–	–	***0.015***	0.066
PROMIS Q9	–	–	***<0.001***	***0.012***

The bold values represent *p* values that are statistically significant.

Participant survey results indicated an increase in the belief that participating in arts-based programming could help improve well-being and/or health as responses to this question changed from 76% prior to the program to 98.6% after. There also appeared to be an increase in the percentage of change for the use of various art forms such as creating and viewing art (+35% and + 59%), singing or playing instruments (+26%), performing theater (+50%), participating in and viewing dance (+45% and + 12%), and writing (108%). Possibilities for the greatest increase in writing was that it may have previously been the least familiar of the various art forms or the fact that participants may have engaged in this more frequently because they provided with a journal that they decorated during the Art and Well-Being session and were urged to use outside of sessions.

Individuals who participated in the HeRe We Arts® program seemed to have a high level of satisfaction with the program. Responses on the Post-Session Survey demonstrated that 98.6% were very or extremely likely to recommend the program, 97.3% rated the sessions as very good or excellent, and 98.6% rated the sessions as very or extremely helpful. Although it is possible that participants felt they needed to rate everything positively, they were encouraged on multiple occasions to be honest. It is believed that participants were honest in their responses as noted by the fact that some sessions were marked as only somewhat helpful or not so helpful or only as good or fair. Participants also marked if their anxiety, stress, and/or mood stayed the same or got worse. Therefore, if they responded honestly to some questions, it is believed that they responded honestly to all questions.

TABLE 3 Research questions, measures, hypotheses, and outcomes.

Research question	Items measured	Questionnaire	Hypotheses	Outcomes
Q1	Mood & well-being	SDHS	a. Treatment group will have improved mood and well-being when comparing Week 8 to participants' own baseline b. Treatment group will have better mood and well-being than control group at Week 8 c. Treatment group will have improved mood and well-being when comparing Week 16 to participants' own baseline d. Treatment group will have better mood and well-being than control group at Week 16	a. Supported b. Supported c. Supported d. Not supported
Q2	Well-being	SWEMWBS	a. Treatment group will have improved well-being when comparing Week 8 to participants' own baseline b. Treatment group will have better well-being than control group at Week 8 c. Treatment group will have improved well-being when comparing Week 16 to participants' own baseline d. Treatment group will have better well-being than control group at Week 16	a. Supported b. Supported c. Supported d. Supported
Q3	Resilience	BRCS	a. Treatment group will have improved resilience when comparing Week 8 to participants' own baseline b. Treatment group will have better resilience than control group at Week 8 c. Treatment group will have improved resilience when comparing Week 16 to participants' own baseline d. Treatment group will have better resilience than control group at Week 16	a. Supported b. Not supported c. Supported d. Not supported
Q4	Health & well-being	PROMIS Mental Health T Scores	a. Treatment group will have improved health and well-being when comparing Week 8 to participants' own baseline b. Treatment group will have better health and well-being than control group at Week 8 c. Treatment group will have improved health and well-being when comparing Week 16 to participants' own baseline d. Treatment group will have better health and well-being than control group at Week 16	a. Supported b. Supported c. Supported d. Supported
Q5	Health	PROMIS Physical Health T Scores	a. Treatment group will have improved health when comparing Week 8 to participants' own baseline b. Treatment group will have better health than control group at Week 8 c. Treatment group will have improved health when comparing Week 16 to participants' own baseline d. Treatment group will have better health than control group at Week 16	a. Supported b. Supported c. Supported d. Supported
Q6	Health & well-being	PROMIS Question 1 Overall Impression Scores	a. Treatment group will have improved health and well-being when comparing Week 8 to participants' own baseline b. Treatment group will have better health and well-being than control group at Week 8 c. Treatment group will have improved health and well-being when comparing Week 16 to participants' own baseline d. Treatment group will have better health and well-being than control group at Week 16	a. Supported b. Supported c. Supported d. Not supported
Q7	Health & well-being	PROMIS Question 9 Social Health Scores	a. Treatment group will have improved health and well-being when comparing Week 8 to participants' own baseline b. Treatment group will have better health and well-being than control group at Week 8 c. Treatment group will have improved health and well-being when comparing Week 16 to participants' own baseline d. Treatment group will have better health and well-being than control group at Week 16	a. Supported b. Supported c. Supported d. Supported
Q8	Health	GSLTPAQ	a. Treatment group will have improved health when comparing Week 8 to participants' own baseline b. Treatment group will have better health than control group at Week 8 c. Treatment group will have improved health when comparing Week 16 to participants' own baseline d. Treatment group will have better health than control group at Week 16	a. Not supported b. Not supported c. Not supported d. Not supported

Recommendations for future research include the utilization of a larger sample size. This will allow for the possibility of generalization of results, as well as for more statistically significant results. It is further recommended that there be more of an attempt to equally randomize the size of the treatment and the control groups. As a follow-up to this, it may be valuable to engage the control group earlier by providing them with another type of program so that they stay involved and complete the study. It could also be helpful to include a

TABLE 4 HeRe We Arts® pre-post survey results (treatment group only—Week 1 to Week 8).

Question	Pre-survey *N* = 75 [n (%)]	Post-survey *N* = 74 [n (%)]	% Change
Do you think by participating in arts-based programming you can improve your health and/or well-being?			
Yes	57 (76)	73 (98.6)	
Do not Know	18 (24)	1 (1.4)	
	N = 85	*N* = 57	
Art forms currently used			
Art (viewing)	27 (36)	43 (58.1)	+59%
Art (creating)	26 (34.7)	38 (51.4)	+35%
Dance/movement (viewing)	26 (34.7)	29 (39.2)	+12%
Dance/movement (active participation)	22 (29.3)	32 (43.7)	+45%
Music (attending performances)	31 (41.3)	21 (28.4)	−32%
Music (listening to)	56 (74.7)	50 (67.6)	−11%
Music (playing instrument/singing)	19 (25.3)	24 (32.4)	+26%
Theater (attending performances)	28 (37.3)	28 (37.8)	−0%
Theater (performing)	4 (5.3)	6 (8.1)	+50%
Writing	26 (34.7)	54 (73)	+108%

measurement of social relationships as this appeared to be a valuable component for participants. This was noted in the quantitative and qualitative data. Finally, it is recommended that the 8-week HeRe We Arts® program be compared to another type of 8-week group such as a health education program. This might not only assist with follow-through and increasing engagement, it might also help to control for the Hawthorne Effect and help to truly determine the usefulness of arts-based programming for improving health outcomes.

Contributions to practice

Although it is possible to make recommendations for clinical practice based on the results of this study, due to the inability to meet the required number of participants it is not possible to generalize these results to other populations. As population health continues to be an area of concern, and there continues to be an aging population, programs like HeRe We Arts® could be a beneficial means of improving the health, resilience, mood, and well-being of individuals. Improvement was noted in all of these areas for individuals dealing with chronic health conditions; and it is also possible that programs like this could be helpful for individuals coping with various mental and physical health problems. Programs utilizing the arts are fairly inexpensive, enjoyable, accessible, and effective. They can help provide education about health topics while engaging participants in something they can easily do on their own or with others to improve their health, resilience, well-being, coping, and socialization. This is especially important after the pandemic when isolation, loneliness, quality of life, health, well-being, cognition, and socialization became challenges facing many people, but especially older adults and those with chronic health conditions (59–61). The following recommendations for practice are suggested based on the results found in this study:

1. Consider utilizing multiple arts interventions within one program. This allows for different learning styles, preferences, abilities, and strengths of participants while addressing multiple behaviors at once (21–23, 26, 39, 62–65).
2. Utilize arts integration theory as the theoretical framework for clinical practice and programming. Individuals participated in experiential and didactic learning, and they were encouraged to utilize what they learned outside of sessions, share it with their families and friends, and integrate the use of the arts into their lives. To our knowledge, this is one of the first studies to utilize multiple arts forms and arts integration theory in population health to address well-being, health, resilience, and mood in individuals with chronic health conditions. Therefore, continuing to use this theory will help to expand the theoretical framework in this area.
3. Utilize arts integration theory and arts-based programs to assist with improving resilience and coping skills. Previous research on resilience has demonstrated that as teamwork developed and therapeutic relationships occurred, psychological health and stress improved (66). Therefore, programs such as HeRe We Arts® could be models for accomplishing this.
4. Consider using arts integration theory and arts-based programming to assist with improving the health of those living with chronic health conditions. The results of this study demonstrated improved anxiety, stress, mood, well-being, resilience, and physical and mental health outcomes; therefore, more programs like this should be considered. A unique aspect of HeRe We Arts® was that it was offered in various communities, some of which were in underserved, lower-income neighborhoods where individuals often do not have access to mental health support, medical care, healthy foods, or programs to help improve their health and coping skills. Many

TABLE 5 Post-session specific survey data.

Question	Intro [n (%)]	Music [n (%)]	Art [n (%)]	Writing [n (%)]	Movement [n (%)]	Art appreciation [n (%)]	Theater [n (%)]	Summary [n (%)]
Overall, how would you rate this session?	*N* = 69	*N* = 69	*N* = 68	*N* = 72	*N* = 68	*N* = 67	*N* = 70	*N* = 64
Excellent	44 (63.8)	56 (81.2)	51 (75.0)	54 (75.0)	58 (85.3)	49 (73.1)	59 (84.3)	53 (82.8)
Very good	19 (27.5)	10 (14.5)	13 (19.1)	16 (22.2)	9 (13.2)	13 (19.4)	9 (12.9)	9 (14.1)
Good	5 (7.2)	2 (3.0)	4 (6.0)	2 (3.0)	1 (1.0)	4 (6.0)	1 (1.0)	2 (3.0)
Fair	1 (1.0)	1 (1.0)	0	0	0	1 (1.0)	1 (1.0)	0
Poor	0	0	0	0	0	0	0	0
How helpful was the content presented?	*N* = 69	*N* = 69	*N* = 68	*N* = 72	*N* = 68	*N* = 67	*N* = 68	*N* = 64
Extremely helpful	37 (53.6)	47 (68.1)	48 (70.6)	53 (73.6)	56 (82.4)	47 (70.1)	55 (80.9)	50 (78.1)
Very helpful	28 (40.6)	20 (29)	19 (27.9)	16 (22.2)	10 (14.7)	14 (20.9)	11 (16.2)	14 (21.9)
Somewhat helpful	3 (4.0)	2 (3.0)	1 (1.0)	3 (4.0)	2 (3.0)	5 (7.0)	1 (1.0)	0
Not so helpful	1 (1.0)	0	0	0	0	1 (1.0)	1 (1.0)	0
Not at all helpful	0	0	0	0	0	0	0	0
Did you notice any change in your level of stress during the session?	*N* = 69	*N* = 69	*N* = 68	*N* = 72	*N* = 68	*N* = 67	*N* = 70	*N* = 63
Got better	48 (69.6)	58 (84.1)	59 (86.8)	55 (76.4)	62 (91.2)	53 (79.1)	64 (91.4)	54 (85.7)
Stayed the same	21 (30.4)	10 (14.5)	8 (11.8)	16 (22.2)	6 (9.0)	14 (21.0)	6 (9.0)	9 (14.3)
Got worse	0		1 (1.0)	1 (1.0)	0	0	0	0
N/A	0	0	0	0	0	0	0	0
Did you notice any change in your level of anxiety during the session?	*N* = 69	*N* = 68	*N* = 67	*N* = 72	*N* = 68	*N* = 67	N = 70	*N* = 63
Got better	40 (58.0)	53 (77.9)	51 (76.1)	53 (73.6)	57 (83.8)	50 (74.6)	58 (82.9)	50 (79.4)
Stayed the same	29 (42.0)	14 (20.1)	15 (22.4)	18 (25.0)	11 (16.2)	17 (25.4)	12 (17.1)	13 (20.6)
Got worse	0	1 (1.0)	1 (1.0)	1 (1.0)	0	0	0	0
N/A	0	0	0	0	0	0	0	0
Did you notice any change in your mood during the session?	*N* = 68	*N* = 69	*N* = 68	*N* = 72	*N* = 68	*N* = 66	*N* = 70	*N* = 63
Got better/increased	54 (79.4)	57 (82.6)	59 (86.8)	57 (79.2)	60 (88.2)	54 (81.8)	64 (91.4)	54 (85.7)
Stayed the same	14 (20.6)	10 (14.5)	9 (13.2)	14 (19.4)	8 (11.8)	12 (18.2)	6 (8.6)	9 (14.3)
Worse/decreased	0	2 (3.0)	0	1 (1.0)	0	0	0	0
N/A	0	0	0	0	0	0	0	0

of the HeRe We Arts® participants thanked the researchers for providing them with new skills, learning their names, caring about them, and bringing the program to their community.

5. Utilize creativity and arts-based programs to assist with improving well-being of participants, while at the same time educating these individuals on the importance of well-being. This is also in line with previous research which hypothesized that mental well-being could be improved through participating in arts interventions (31, 33).
6. Consider utilizing arts-based programming to address mental health needs such as stress, depression, anxiety, emotional well-being, and mood. The results of this study indicated that mood, anxiety, and stress improved for the majority of participants during each session. This is consistent with previous research that hypothesized that arts experiences could help promote mental well-being and improve mental health (31, 33, 67).
7. Utilize community arts-based programming to increase socialization. Arts-based programming has been found to improve social identity, personal and social well-being, socialization, and physical and mental health while also creating social connectedness and the opportunity to create new friendships (1, 33, 38, 67–69).
8. Utilize arts-based programming as a means of changing behaviors. This study demonstrated that many of the participants changed their behaviors during the 8 weeks of the program, and that they also either maintained this change or continued to improve on the changes for up to 2 months after the completion of the program. These changes in behaviors could improve various health indicators, act as preventative measures, and possibility even keep patients out of the hospital.

Limitations of the study

The major limitation with this study is that the sample size did not reach the level that was identified as needed to determine statistical significance. Some of this was due to excluding so many potential participants at the beginning of the study (42), as well as excluding another 48 for withdrawing from or not completing the study. Therefore, lack of follow-through was a definite limitation to the study. The limited number of dropouts in the treatment group, compared to the wait-list control group, suggests that the feasibility and tolerability of the program were good. Lack of an active control group could also be considered a limitation. However, we chose to use the wait list

control design for this initial study, with the intention to conduct another study later utilizing a RCT design with an active control group. Another limitation was the lack of generalizability. This includes the inability to generalize to a broad population of individuals, to all individuals dealing with chronic health conditions, or to persons in non-urban settings. Another limitation was the randomization process as some of it occurred through random selection, but some was due to convenience sampling when spouses, family, or friends asked to be in the same group due to transportation needs. The make-up of the groups could be seen as a limitation or as a benefit. The groups were not homogeneous as individuals had a variety of chronic health conditions. This could be seen as a benefit in that participants learned from each other and some even stated they did not feel as bad about their own situation when they saw what others were experiencing. It is also possible that not all individuals, or health conditions, would benefit at the same level. Finally, it is possible that response bias may have occurred as participants wanted to demonstrate positive responses. The researchers attempted to control for this; however, as they frequently reminded individuals that they wanted accurate responses, no matter what those responses might be.

Conclusion

The broad problem addressed by this study was the need to improve the mood, health, resilience, and well-being of adults living with chronic health conditions and adapting current health programs to address these needs. In addition, a related problem addressed was improving individuals' physical and mental health outcomes, well-being, mood, resilience, coping skills, stress, and health indicators while promoting behavior change. In addition, this study was designed to address the gap in the literature on the use of arts-based interventions to assist in improving population health, mood, resilience, and well-being. Our findings helped to demonstrate that arts-based programming, with an underlying theoretical framework of arts integration theory, can have a positive effect on the overall mood, health, resilience, and well-being of individuals with chronic health conditions. This supports previous research that was conducted utilizing the arts to improve such domains as depression, anxiety, socialization, identity, stress, mood, self-worth, coping, quality of life, resilience, mental health, physical health, pain, distress, and the various types of well-being. Although arts integration theory has been increasingly used outside of education, most of the literature is still within the educational field. Therefore, this study took the various tenets of arts integration theory, applied them to teaching topics such as improving mental and physical health, resilience, coping, mood, and various types of well-being. The arts were utilized for art's sake, but also to increase learning of other concepts, change neural pathways, promote community, and increase brain processes.

Our results suggest that individuals who participated in the HeRe We Arts® program developed new, or renewed, coping skills to assist them in dealing with their chronic health conditions. For some, this was dealing with pain or changes in physical abilities, and for others this was dealing with emotional distress or depression. These participants also benefited from the opportunity to socialize with each other, as well as the opportunity to have something to do that provided encouragement for them to leave their homes, thereby decreasing their isolation and depression. Based on these findings, arts-based programming should be utilized more frequently to maintain and improve public health; and further research should be conducted in order to analyze the outcomes of such programming.

Data availability statement

The datasets presented in this article are not readily available because they require a DUA. Requests to access the datasets should be directed to gallagl@ccf.org.

Ethics statement

The studies involving humans were approved by Cleveland Clinic Institutional Review Board. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

LG, DB, and TS contributed to the conceptualization of the program and methodology, and assisted with leading the program and with data collection as needed. FB and MJ contributed to the methodology. LG reviewed the literature. IB performed formal statistical analysis. FB and LG reviewed and contributed to the data analysis. All authors contributed to the article and approved the submitted version.

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Conflict of interest

LG, TS, DB, MJ, and FB own intellectual property for the HeRe We Arts® program. The HeRe We Arts® trademark is registered by the Cleveland Clinic Foundation in the U.S. Patent Office.

The remaining author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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Prefrontal engagement predicts the effect of museum visit on psychological well-being: an fNIRS exploration

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Recent research suggests that museum visits can benefit psychological well-being by reducing symptoms of stress and anxiety. However, these reported relaxing effects remain inconsistent between studies. Shedding light on the underlying cerebral mechanisms of museum visits might support a better understanding of how it affects psychological well-being. This study aimed to investigate the prefrontal engagement evoked by artwork analysis during a museum visit and to determine if these prefrontal substrates are associated with the museum's effect on psychological well-being in older adults. Nineteen adults aged between 65 and 79, toured a Baroque-style exhibit at the Montreal Museum of Fine Arts for approximately 20 minutes while equipped with a near-infrared spectroscopy system measuring the prefrontal cortex's hemodynamic activity. For each painting, participants received the instruction to either (1): analyze the painting and produce a personal interpretation of its signification (*analytic condition*) or (2) visualize the painting without any specific thoughts (*visualization condition*). Questionnaires measuring stress, anxiety, and well-being were administered before and after the visit. Sixteen older women (71.5 ± 4 years) were included in the analyses. Results showed that, at the group level, the *analytic condition* was associated with an increased activation pattern in the left ventrolateral prefrontal region, typically related to attentional processes (not observed in the *visualization condition)*. The activation associated with the *analytic condition* predicted pre-/post-visit reductions in self-reported anxiety and stress in the sample of older women. These observations suggest that the level of engagement of attentional processes during artwork analysis may play a major role in the effect of a museum's visit on self-reported symptoms of anxiety.

KEYWORDS

fNIRS, visual art, stress, aging, neurocognition, museum

1 Introduction

In 2015, the Aging and Health Program of the World Health Organization (WHO) suggested encouraging artistic and cultural practices to foster health in older adults (1). This recommendation is supported by a rising number of scientific publications shedding light on the role of the arts in improving health and well-being. Fancourt and Finn gathered them in an exhaustive scoping review for the WHO in 2019 (2). Among these activities, receptive arts engagement is distinguished from active arts engagement in that it only requires observing, listening, and viewing art pieces, such as theatre, music, and visual art. In older adults, translational and longitudinal research suggests that receptive arts engagement is associated with better mental health and higher indications of well-being (3, 4). Consensual, accessible, and already part of daily life habits for many people, the museum visit gives interesting perspectives on health interventions. Included in a three-month intervention of weekly creative workshops, the museum visit may have contributed to the benefits of the intervention on the mental health and well-being of older adults (5, 6).

Previous research suggests that museum visits can acutely affect visitors' moods, as well as the subjective experience of stress and its biomarkers (7–9). The calm and restorative environment of the museum, as well as the quality of activity and art collections, may shape psychological well-being outcomes such as concentration and relaxation (10). Hence, the engagement with visual artwork, even passive (i.e., viewing art), may be directly involved in the effects of the museum visit on mood and stress. The preliminary results of a scoping review published by Law et al. (11) showed that viewing artwork might consistently reduce self-reported stress and changes some physiological stress markers, such as systolic blood pressure. This stress reduction would be moderated by important factors, such as the setting in which the artwork is exposed, the artwork itself, the individual characteristics of viewers (e.g., age, gender, art expertise, visit expectations), or the received instructions. A comprehensive understanding of how and by which psychophysiological mechanisms museum activities operate beneficial effects on well-being is paramount to support its use as an effective lifestyle prescription in preventive medicine.

The recent information-processing VIENNA model (12) suggests a continuum of psychological states the viewer encounters when facing visual artwork. These states range from incomprehension and anxiety to feelings of fullness, harmony, and flow. According to this model, a person's response to visual artwork is influenced by the interaction between the bottom-up processing of artwork features and the top-down influence of viewer intention, memory, or knowledge. Viewing visual artwork would first involve a sequence of bottom-up perceptual processes, engaging the cortical networks related to visual perception (occipital cortex and visual dorsal stream, association area). This first sequence would be associated with a primary affective and emotional response reappraised through a secondary top-down executive process involving the fronto-limbic circuit. During this second sequence, efferent projections of the prefrontal cortex (PFC) to the limbic and parietal regions would support the creation of a coherent meaning with the visual elements and influence the emotion felt by the viewer (12). Investigating prefrontal activity associated with artwork viewing can thus bring some interesting highlights, likely to provide new knowledge about the neurocognitive processes supporting the effect of the museum visit on an individual's psychological state. Performing this investigation directly in an ecological and artistic environment such as a museum may affect the top-down neurocognitive processes of artwork (13).

In the present study, functional near-infrared spectroscopy (fNIRS), a noninvasive optical imaging technique, was used to perform a primary exploration of prefrontal engagement in analyzing artwork during a museum visit. Then, an examination was conducted to determine whether this prefrontal engagement is associated with changes in subjective stress, anxiety, and well-being after the visit.

2 Methods

2.1 Participants

Nineteen adults aged between 65 and 79, including eighteen women and one man, participated in fNIRS acquisitions at the Montreal Museum of Fine Arts (MMFA). Participants were recruited from the community through a pool of participants who consented to be contacted for research purposes and by advising members of the MMFA of the research project. To be enrolled, individuals had to be aged between 55 and 85 years old with a normal or corrected vision and audition, be francophone or anglophone, be able to walk with or without technical assistance (e.g., canes and ankle braces), and obtain a score greater than twenty-six on the Mini-Mental State Evaluation. Individuals were excluded if they had a neurological disease history, postural or balance disorders, a recent history of alcohol or substance abuse, reported pain >2/10 on a visual analog scale or had undergone surgery requiring general anesthesia in the last six months.

This study complied with the International Conference on Harmonization Good Clinical Practice (ICH-GCP) and all applicable regulatory requirements. It received the approval of the Centre for Interdisciplinary Research in Rehabilitation of Greater Montreal (CRIR) research ethics board (CRIR-1486-0302). Participants' consent was collected before assessments.

2.2 Procedure

Each participant was invited to the MMFA for an assessment of approximately 60 minutes, including a 20-minute visit to a permanent exhibit. During the visit, the participant was equipped with a wireless fNIRS device (Brite 23, Artinis Medical Systems, Netherlands – 11 detectors, 7 sources, 21 channels, wavelengths: 760 and 850 nm) to measure the hemodynamic activity evoked by visual art processing in the prefrontal cortex. All participants performed the same tour of six paintings in a museum room alone. In front of each painting, the participants were asked to:

(1) *"Analyze the painting"*: look into its elements (characters, landscapes) and its composition, and try to provide a personal interpretation of its meaning (analytic condition);

or

(2) *"Visualize the painting"*: look at the painting without any thoughts and focus specifically on its center or one of its structural elements, such as a specific color dot, for the duration of the trial (visualization condition).

They received these instructions through a wireless headset. The details of both instructions were given before the beginning of the tour. Each participant performed the tour of all six paintings twice in the same order with no pause, alternating between visualization and analytic conditions for each painting (e.g., tour 1 – Painting 1: visualization condition, tour 2 – Painting 1: analysis condition). The order of paintings was the same for all participants, but experimental conditions were counterbalanced between participants to minimize carryout effects. In front of the painting, the trial lasted 20 seconds and was followed by a resting period between 20 and 45 seconds (random jittering, average inter-trial interval: 25 s). During each resting period, participants were asked to fix their gaze on the empty spaces of a corner of the room. Participants were then asked to walk to the subsequent painting. Walking duration ranged from 7s to 17s, depending on the physical distance between paintings. The timeline for the fNIRS measurement procedure is schematized in Figure 1. Stimulation events were sent using software triggering to synchronize the experimental paradigm with the NIRS signals accurately (14). The paintings were part of the same Baroque collection. This collection was selected for the homogeneity of Baroque production in terms of technique used and visual representation. Also, the Baroque collection was in an easy-to-access museum room near a quiet space for questionnaire completion. All paintings had comparable formats and involved social and non-social representations (i.e., portrait, landscape, mythological pieces). The paintings selected for the tour are presented in the Supplementary Material. The visits took place within the regular activities of the MMFA.

Before and after the visit, three auto-administered questionnaires assessed the subjective stress, well-being, and participants' anxiety state: the Visual Analog Scale of Stress (VAS) (15), the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) (16), and the State Subscale of State-Trait Anxiety Inventory (STAI-Y) (17).

2.3 fNIRS data processing

fNIRS data were processed using brainstorm (18) and the nirstorm plugin (github.com/Nirstorm/nirstorm#nirstorm) under Matlab 2017. Signals were first reviewed for major artifacts, and some channels were rejected where heartbeats could not be seen. Participants with too many artefactual channels were discarded (over 50% of the channels). Pre-processing steps were performed in the channel space and comprised motion correction (19) and high-pass filtering with a cut-off of.01 Hz to remove slow varying fluctuations. Channel time series were then projected on the cortical surface of the Colin27 template (20) using the Minimum Norm Estimate algorithm (21). Within-subject t-stat mappings of concentration changes in oxygenated [HbO] and deoxygenated hemoglobin [HbR] evoked by the two experimental tasks (analytic and visualization) were obtained by a first-level Generalized Linear Model (GLM) with a pre-colored noise model (22) applied to the cortical time-series of each subject. The measured variations in [HbO] and [HbR] reflect neurovascular coupling associated with neuronal activity. Regional averages were computed using a coarse version of the MarsAtlas cortical parcellation (23) that consisted of 14 regions, as depicted in Figure 2. Lastly, task-specific functional masks were computed from a group-level analysis to keep only the areas potentially engaged in the experimental paradigm. To do so, a second-level GLM with a mixed-effect noise model (22) was applied to produce binary maps from t-stats thresholded at $p < .05$ (uncorrected). For each experimental condition, this allowed filtering out the regions that elicited no activity at the group level. At the end of this NIRS processing pipeline, within-subject and region-specific effect sizes were used as task-related hemodynamic responses to investigate

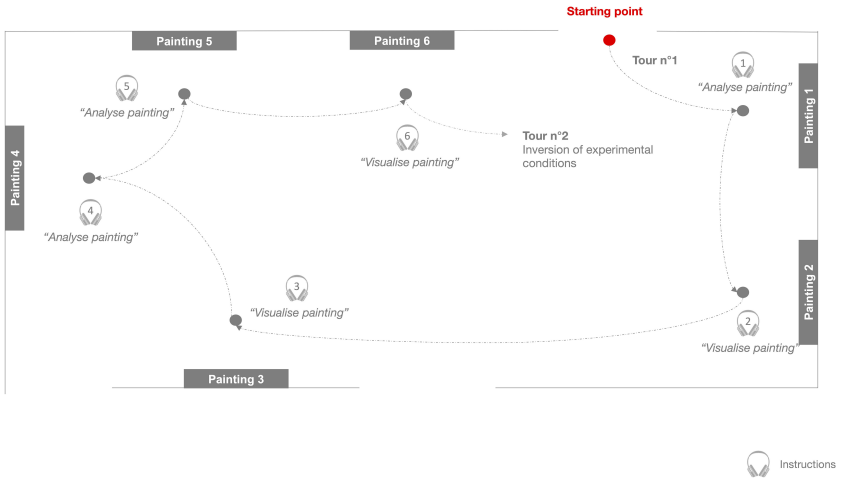

FIGURE 1
Schematic representation of the timeline for the fNIRS measurement procedure.

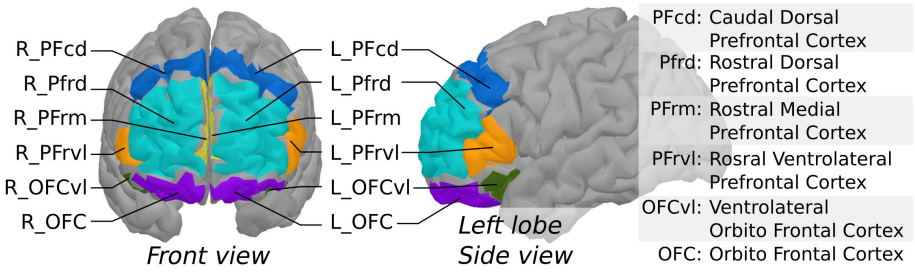

FIGURE 2
Segmentation of the prefrontal cortex based on MarsAtlas, used to produce region-averages of NIRS task-related effects.

their relationship with the other study variables in the following statistical analyses.

2.4 Data analyses

Wilcoxon signed-rank tests were performed to compare the scores pre-/post-visit from the auto-administered questionnaires (i.e., VAS, WEMWBS, STAI-Y). A delta was computed for each questionnaire by subtracting the pre-visit from the post-visit score (ΔVAS, ΔWEMWBS, ΔSTAI-Y). Using the group-level activation mask (left and right rostral ventrolateral prefrontal cortex, PFrvl), the analytic and visualization conditions' within-subject effects were integrated into a series of linear hierarchical stepwise regressions against ΔVAS, ΔWEMWBS, ΔSTAI-Y. The regression models were adjusted for the participant's age (bloc 1) and included the stepwise selection of the HbO or HbR responses in bloc 2. The centrality and normality of the residuals were verified. Neither heteroscedasticity nor multicollinearity was observed. Analyses were performed using SPSS statistics version 28 (IBM Corp, Armonk, New York, USA), and the significance threshold for each test was set at 0.05.

3 Results

Two participants of the initial sample of 19 participants were excluded from the analyses because of bad fNIRS signal quality. Another participant was excluded because of the extreme variation in their pre-/post-visit questionnaires, especially in the STAI-Y scores. An increase of 30 pts (from 21 pre-visit to 51 pts post-visit) on his STAI-Y score was observed, against a mean change of -0.56 ± 5.3 pts for the group of participants. Thus, the sample used for the subsequent analyses included sixteen participants, only female, aged 71.5 ± 4 years.

3.1 Pre/post-visit changes in questionnaire scores

Participants showed a significant increase in their WEMWBS score post-visit (55.06 ± 5.1 pts) compared to pre-visit (51.44 ± 5.1) ($p = 0.004$), indicating a statistically meaningful change in reported well-being (24). No significant changes were observed in the STAI-Y and VAS scores. Pre-/post-visit changes in the STAI-Y, WEMWBS, and VAS of stress scores are displayed in Figure 3.

3.2 Group-level fNIRS main task effects

Figure 4 presents maps of the prefrontal activity evoked by analytic and visualization conditions using the Colin27 template. At the group level, the analytic condition was associated with a prefrontal activity pattern involving a significant increase in HbO and a decrease in HbR concentrations in the left PFrvl, corresponding to typical hyperemia generated by neurovascular coupling. A localized decrease in HbO concentration was also observed in a small cluster of the left rostral dorsal prefrontal

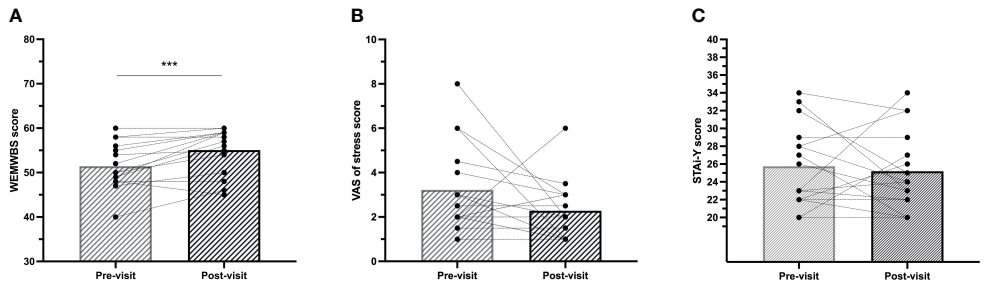

FIGURE 3
Comparison of scores reported by the participants pre- and post-visit for **(A)** the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS), **(B)** the Visual Analogue Scale (VAS) of stress, and **(C)** the State Subscale of State-Trait Anxiety Inventory (STAI-Y). The height of the bar represents the mean. ****p-value* <.005.

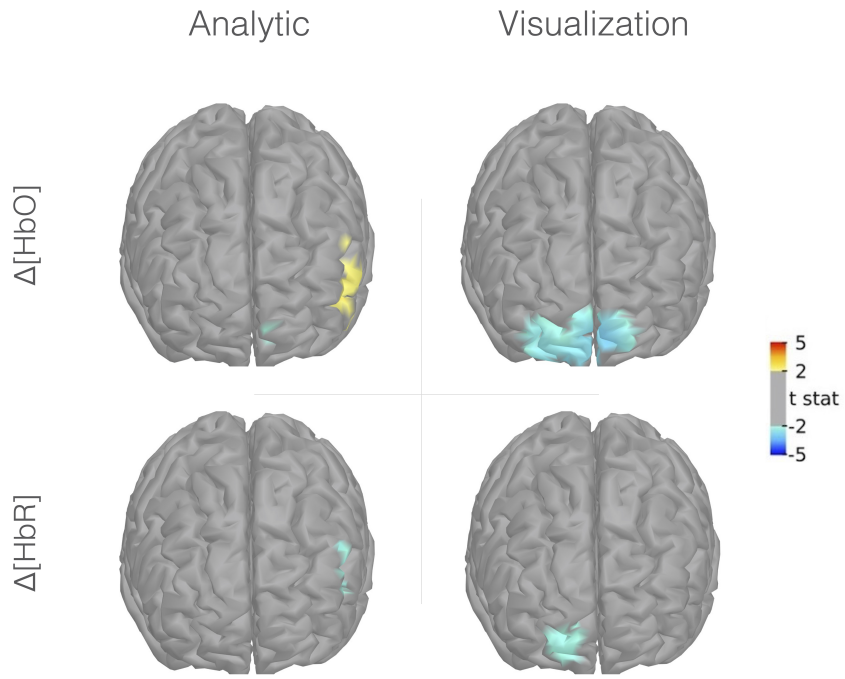

FIGURE 4
Group-level fNIRS cortical mapping (Colin27 template) of Δ[HbO] (upper portion) and Δ[HbR] (lower portion) in the analytic (right portion) and visualization conditions (left portion). Frontal view, left is right, uncorrected t-stat with a threshold *p-value* < *0.05*.

cortex (PFrd). A different pattern was observed in the visualization condition. The visualization condition was associated with a bilateral decrease in HbO concentration in the PFrd and a decrease in HbR concentration in the right PFrd. This pattern corresponds to a deactivation process through vasoconstriction. The contrast between analytic and visualization conditions did not reach significance.

3.3 Regression-based prediction of pre/post visit changes in questionnaire scores by individual fNIRS task effects

Stepwise regression analyses showed that 40.0% of the variance in the ΔSTAI-Y was predicted by a model including the HbO responses (R2 = 0.40, R2Adj = 0.30, F (1,13) = 4.87, p = 0.046), and 33.0% of the variance in the ΔVAS of stress was predicted by a model including the HbR responses (R2 = 0.33, R2Adj = 0.22, F (1,13) = 4.98, p = 0.044). The activity in the left PFrvl region evoked by the analytic condition was the only significant predictor retained in each model. More precisely, a higher HbO in the left PFrvl during the analytic task was associated with a lower ΔSTAI-Y (β = -3.30; p = 0.046), i.e., a greater decrease in the STAI-Y score after the visit. Also, a higher HbR in the left PFrvl during the analytic task was associated with lower ΔVAS of stress (β = -0.81; p = 0.044), i.e., a greater decrease of the VAS of stress score after the visit. These two models are presented in Tables 1, 2. Regression models performed to predict the variance in the ΔWEMWBS failed to reach statistical significance, but a trend was observed for a model including the HbR responses (R2 = 0.23, R2Adj = 0.12, F (1,13) = 3.98, p = 0.068). This model only included the HbR evoked in the left PFrvl region during the analytic condition, with a higher HbR in the left PFrvl during the analytic task associated with higher ΔWEMWBS (β = 1.16; p = 0.068), i.e., a greater increase of the WEMWBS score after the visit (Supplementary Table 1).

4 Discussion

This study aimed to explore the prefrontal substrates engaged by the top-down processing of artwork during museum visits and their association with the change in reported well-being after the visit. To do so, the participants were required to analyze the selected paintings by breaking down their visual content (character, landscape) and producing a personal interpretation of their significance while being equipped with an fNIRS. The results demonstrated that analyzing painting engages a consistent pattern of prefrontal activity across participants. This pattern engages the left PFrvl, a region typically associated with attentional and cognitive control processes. Such a pattern of prefrontal activity was not observed when participants were required to visualize the painting (control task), which evoked a bilateral deactivation of the PFrd. According to the regression analyses, the activity of the left PFrvl associated with the analysis of paintings might support the reduction of self-reported stress and anxiety symptoms in older adults after the visit, as assessed by the pre/post visit variations in STAI-Y and VAS scales. The regression models predicted 40% and 33% of the variance in the pre-/post-visit changes of self-reported anxiety and stress, respectively, with increased left PFrvl activity in the analytic condition associated with a post-visit reduction of these

TABLE 1 Hierarchical regression predicting the Δ_{STAI-Y} pre-/post visit with age (Step 1), ΔHbO responses selected by a stepwise procedure (Step 2).

Model		β	SD	CI_{95}	R^2; R^2_{Adj}	Model F(df), p
1	Constant	38.91	23.33		0.17; 0.11	F (1,14) = 2.87, p = .112
	Age	-.552	.326	[-1.251,.147]		
	Constant	44.39	20.86		0.40; 0.30	F (1,13) = 4.87, p = .046
2	Age	-.609	.290	[-1.233,.017]		
	HbO left PFrvl (analysis)	**-3.288**	**1.49**	**[-6.507, -0.069]**		

β, unstandardized beta coefficient; CI_{95}, 95% confidence interval; F(df), degrees of freedom for the F-test; HbO, Oxyhemoglobin; p, p-value; R^2, R-squared; R^2_{adj}, adjusted R-squared; SD, Standard Deviation.
The bold value indicated a significant association in the regression model (p <0.05).

symptoms. These models excluded the activity engaged by the mere painting visualization. Together, these observations suggest that the top-down cognitive control processes might play a critical role regarding the extent to which museum visits affect older adults' psychological well-being.

To our knowledge, the top-down neurocognitive processing of artwork has scarcely been done before in a museum context. Yet, exposure to original paintings in an ecological and artistic environment, such as a museum, is likely to affect the appraisal of paintings' aesthetic qualities and influence the viewers' expectations. Most of the previous research performed in the field, including those using fNIRS (25, 26), was done in-lab, required participants to be seated or lengthened, and pieces of art resumed a screen projection. In daily life, the contact with artwork is likely to take place in a privileged and/or collective spaces such as a museum, interacting with an individual in movement, sometimes in interaction himself, and presenting a piece of art in relief, embedded in a context that might magnify its aesthetic dimension. These contextual factors are likely to affect the psychological effect of art exposure and top-down processes involved in art viewing. Previous research demonstrated that contextual information introducing a picture as a piece of art favors a so-called "aesthetic" processing mode (13, 27, 28). This processing mode would enable a subjective and perceptive experience of the artwork, engaging the viewers' attention while other objects, events, and everyday concerns would be suppressed (29). A recent model [i.e., the VIENNA model, (12)] called this mode of processing a "flow state," which would correspond to an effortless concentration associated with a feeling of aesthetic, emotional harmony. Functional magnetic resonance neuroimaging studies showed that viewing oriented on aesthetic (i.e., concentrating on the mood, color, shape of the painting, and the feeling evoked) engages the left lateral prefrontal areas (28). This observation merges with the pattern of activity observed in the present study, suggesting a potential overlap between cognitive control processes tied to painting analysis and the aesthetic viewing orientation fostered by Cupchick et al. (28),. According to these authors (28), this activation would be tied to the self-referential nature of aesthetic perception, which requires maintaining attention on internally generated cognitions (i.e., endogenous attention) (30, 31). Such endogenous attention might have also been involved in analyzing the painting performed here, during which the participant had to concentrate on pictural elements to provide a personal interpretation. Hence, the engagement of PFrvl in painting analysis may be linked to the involvement of mnemonic processes aiming to retrieve and select the stored knowledge relevant to interpreting the painting's elements and symbolism (31).

Furthermore, the left PFrvl engagement level in the analytic condition is associated with the reduction of stress and anxiety following the museum visits. This suggests a linear relationship between the cognitive processes engaged by the viewer in painting analysis and the extent to which the museum visit affects perceived stress and anxiety. Previous research assessing fNIRS activity evoked by artwork viewing reported a consistent pattern of prefrontal activity when participants were asked to interpret the artist's emotions (25). Much evidence collected during the past decades identifies the lateral prefrontal cortex as a key brain structure involved in fronto-limbic pathways linked to bidirectional interaction between emotion and cognition (32–34). Kirk et al. (35) observed its engagement in art-related emotional regulation

TABLE 2 Hierarchical regression predicting the Δ_{VAS} pre-/post visit with age (Step 1), ΔHbR responses selected by a stepwise procedure (Step 2).

Model		β	SD	CI_{95}	R^2; R^2_{Adj}	Model F(df), p
1	Constant	9.94	10.86		0.07; 0.00	F (1,14) = 1.00, p = .333
	Age	-.152	.152	[-.478,.173]		
	Constant	4.38	9.90		0.33; 0.22	F (1,13) = 4.98, p = .044
2	Age	-.076	.138	[-.375,.222]		
	HbR left PFrvl (analysis)	**-.813**	**.349**	**[-1.601, -0.026]**		

β, unstandardized beta coefficient; CI_{95}, 95% confidence interval; F(df), degrees of freedom for the F-test; HbR, deoxyhemoglobin; p, p-value; R^2, R-squared; R^2_{adj}, adjusted R-squared; SD, Standard Deviation.
The bold value indicated a significant association in the regression model (p <0.05).

processes. More precisely, they reported a strong coupling between PFrvl and the amygdala when an individual faces an image with a high emotional valence (e.g., fearful image), presented as an artwork instead of a real-life event picture. This result was interpreted as the engagement of a top-down appraisal process that would inhibit innate emotional response (i.e., utilitarian emotions, fight-flight) to allow a more distanced and reflective perspective. Consistently, our results suggest that when participants are involved in a task requiring a reflective perspective on the painting, the level of engagement of attentional processes might be involved in emotional response modulation, a mechanism likely to moderate the stress-reducing effect of museum visits.

If the small sample size may have contributed to the absence of a pre-/post-visit decrease in self-reported stress and anxiety, this lack of significant changes supports the existence of potential moderating factors in the stress-reducing effect of the museum visit (10). It has been recently proposed that the stress-reducing benefits of visual art stimulation may be due to its capacity to distract the viewer from their stress (10). However, our results suggest that more than a simple distraction, an active engagement towards the artwork might play a moderating role in reducing perceived stress and anxiety symptoms observed after the visit. This observation challenges the notion of museum visits as a receptive art engagement when considering its potential to affect the psychological state acutely. Recent research in art-health museum practices, such as art therapy and museum education, attributes their benefits for psychological well-being to the capacity of artwork to create meaningful connections with individuals' emotions, past, and memories (36). Our observations support this assumption but suggest that this capacity may fluctuate between individuals. Hence, further explorations are needed to confirm these preliminary observations and shed light on the factor moderating an active engagement of the viewer with the artwork and if we can facilitate it with museum mediation or additional information. Such a conclusion might support future development in art-health museum practices, such as the "museum prescription" approach, by fostering the neurocognitive processes involved in their effect on well-being.

Some important elements must be considered to bring an accurate conclusion to this study, reflecting the scope of these results and their perspectives. First, the recruiting procedure of this study did not achieve parity between women and men. Exclusively composed of women, the final sample of participants restrains the generalization of the above-mentioned observations. Indeed, aesthetic preferences might differ between women and men. Previous research showed that, compared to men, women tended to find more pleasing and relaxing representational art with soft edges and smooth contours, such as impressionist and baroque paintings (37–39). Hypothetically, this observation would be due to sex differences in visuospatial abilities, with women tending to preferentially process categorical spatial relations while men process coordinate spatial relations (40). However, as these studies compare individuals based on their biological sex, we cannot exclude that psychosocial aspects fluctuating with gender roles (e.g., education, cultural references, tolerance for uncertainty) may have contributed to these observations. This last assumption is supported by the fact that sex-related differences in terms of aesthetic preference were not observed in women and men with a particular familiarity or expertise in visual art (38, 40). In the present study, the recruitment strategy involved reaching MMFA and community members who are likely to have heterogeneous degrees of familiarity with visual art. Yet, prior knowledge about the art object shapes its visual exploration, orients attention, and seems to favor aesthetic appraisal (41). Controlling or measuring the degree of participants' expertise and familiarity with visual art might have provided relevant information for interpreting fNIRS results. However, this study selected only baroque representational paintings that are rather accessible, limiting the potential bias related to the interaction between participants' expertise and abstract art appreciation (42). A replication of this experimental paradigm with other painting styles or assessing observer expectations would be particularly interesting to further investigate the influence of top-down and bottom-up processes on psychological well-being. Finally, future studies may consider including the measurement of physiological stress markers (e.g., salivary cortisol samples or heart rate) to understand the psychophysiological mechanisms underlying the stress-reducing benefits of the museum visit.

Performed directly in the museum environment, this neuroimaging study gives new insight into the neurocognitive processes that support the effect of museum visits on psychological well-being. They suggest that the level of engagement of attentional processes during artwork analysis may play a major role in the effect of a museum's visit on self-reported symptoms of anxiety and stress, at least in older women. These preliminary observations pave the way for future investigations aiming to identify the determinants of active engagement against the artwork during the museum visits and their potential to increase the visit's effect on psychological well-being.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Centre for Interdisciplinary Research in Rehabilitation of Greater Montreal (CRIR) research ethics board (CRIR-1486-0302). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

EGD: Conceptualization, Formal analysis, Investigation, Supervision, Writing – original draft, Project administration, Funding acquisition. TV: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Supervision, Visualization, Writing – review & editing. CL: Conceptualization, Investigation, Writing – review & editing. AB: Investigation, Writing – review & editing. LT: Investigation, Writing – review & editing. SN:

Conceptualization, Funding acquisition, Investigation, Project administration, Resources, Supervision, Validation, Writing – review & editing. EdG: Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – review & editing. LB: Conceptualization, Funding acquisition, Methodology, Project administration, Resources, Supervision, Validation, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyt.2024.1263351/full#supplementary-material

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Slow art plus: developing and piloting a single session art gallery-based intervention for mental health promotion via a mixed method waitlist randomized control trial

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Introduction: The current study builds on the expertise of National Gallery Singapore and Nanyang Technological University Singapore (NTU) in developing and piloting an enhanced version of the Slow Art program, namely "Slow Art Plus" for mental health promotion.

Methods: A single-site, open-label, waitlist Randomized Control Trial (RCT) design comprising of a treatment group and waitlist control group was adopted (ClinicalTrials.gov ID: NCT05803226). Participants ($N = 196$) completed three online questionnaires at three timepoints: baseline [T1], immediately post-intervention/s baseline [T2], post-intervention follow-up/immediately post-intervention [T3]. Qualitative focus groups were conducted to evaluate program acceptability.

Results: A mixed model ANOVA was performed to understand intervention effectiveness between the immediate intervention group and waitlist control group. The analyses revealed a significant interaction effect where intervention group participants reported an improvement in spiritual well-being ($p = 0.001$), describing their thoughts and experiences ($p = 0.02$), and nonreacting to inner experiences ($p = 0.01$) immediately after Slow Art Plus as compared to the control group. Additionally, one-way repeated measure ANOVAs were conducted for the intervention group to evaluate maintenance effects of the intervention. The analyses indicated significant improvements in perceived stress ($p < 0.001$), mindfulness ($p < 0.001$) as well as multiple mindfulness subscales, active engagement with the world ($p = 0.003$), and self-compassion ($p = 0.02$) 1 day after the completion of Slow Art Plus. Results from framework analysis of focus group data revealed a total of two themes (1: Experiences of Slow Art Plus, 2: Insights to Effective Implementation) and six subthemes (1a: Peaceful relaxation, 1b: Self-Compassion, 1c: Widened Perspective, 2a: Valuable Components, 2b: Execution Requisites, 2c: Suggested Enhancements), providing valuable insights to the overall experience and implementation of the intervention.

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Discussion: Slow Art Plus represents a unique approach, offering a standardized, multimodal, single-session program that integrates mindfulness and self-compassion practices, as well as reflective and creative expressions with Southeast Asian art. It demonstrates potential in meeting the mental health needs of a wide range of individuals and could be readily incorporated into social prescribing initiatives for diverse populations.

KEYWORDS

social prescribing, gallery and museum collections, mindfulness, participatory art, self-compassion, psychological well-being

1 Introduction

1.1 Background

According to the World Health Organization, there is a concerning rise in poor mental health and the prevalence of mental illness worldwide. The prevalence of mental disorders has increased over 13% over the past decade, with depression emerging as one of the prominent cause of disability and suicide as a leading cause of death (1). Similar trends have also been observed in Singapore, as depression and suicide have emerged as two major mental health challenges faced by local society (2). While some factors contributing to poor population mental health could be linked to stress and the inability to cope with life demands (3), the COVID-19 pandemic, with its associated disruptions and isolation, has had a widespread negative impact on mental well-being (4). To address and prevent a looming public mental health crisis, much effort has been placed on mental health promotion in many developed countries in the past decade. Mental health promotion endeavors to minimize the presence of risk factors, enhance protective factors, and promote healthy behaviors which could minimize the risk of developing a diagnosable mental disorder (5). Interventions designed to promote mental health and enhance overall well-being are best implemented within contexts where an individual reside, work, and flourish (6). These interventions encompass a wide range of initiatives, including but not limited to mental health programs implemented in schools and workplaces, social support initiatives, as well as community engagement efforts that uplift the psycho-social determinants of health such as resilience, kindness, and social connectedness.

Mental health promotion in the community through the intersection of mindfulness, self-compassion, and art-based intervention has immense potential to improve individuals' well-being. Mindfulness, defined as the non-judgmental acceptance of one's moment-to-moment experience, has been extensively linked to improved overall mental well-being (7). Self-compassion entails actively comforting and soothing oneself with a sense of understanding, recognizing that suffering is a shared human experience (8). According to a meta-analysis by Ferrari et al., self-compassion interventions has resulted in significant improvement in well-being, including mindfulness, stress, anxiety and depression (9). Meditation and mindfulness-based approaches have been practiced across centuries, offering solace and benefits to countless individuals. Although it is not formally established that visual arts engagement is related to mindfulness, there is evidence that point toward shared characteristics between both activities (10, 11). Both activities demand engagement in the present moment, foster a state of flow characterized by intrinsic motivation and absorption, and promote the cultivation of mindfulness in daily life (12). Past research has shown that mindfulness practices enhance mental habits conducive to creativity (13) which may result in richer art-viewing experiences and expressive artwork among children and adults (14). The integration of art appreciation and mindfulness extends beyond the gallery, where such practices were proposed to support meaning-making and the development of practical wisdom among business students, suggesting the role of mindful art appreciation in supporting management education (15, 16).

A growing body of international research has demonstrated the positive impact of arts-based interventions on health promotion and the management of various health conditions (17, 18). Systematic reviews of art-based interventions have indicated that participation in a range of art forms can effectively promote better quality of life, social well-being, and psychological health (19). In addition, the use of arts in mental healthcare settings was beneficial in improving communication skills, stimulating creativity, and supporting behavioral changes (20). Moreover, large population-based studies documented significant associations with engagement in cultural activities and better physical and psychological health (21). In Singapore, a nationwide survey conducted in 2016, known as the Arts for Aging Well Study revealed that active participation in artistic activities and exposure to esthetic experiences had a significant impact on the psychological health, social connections, and spiritual well-being of both adults and older adults (22). This study served as inspiration for a series of local intervention studies. These studies utilized artmaking, storytelling, and creative heritage spaces as therapeutic tools, demonstrating effectiveness in enhancing psychological resilience and quality of life, as well as reducing loneliness among a spectrum of general population groups including community dwelling youths, older adults, informal family caregivers, and professional care workers (23–25). This body of research highlights the importance of further investigation and expansion of art-based interventions utilizing a variety of creative mediums and spaces. This expansion is crucial for extending mental health promotion to larger populations and communities, both locally and internationally. Potential mechanisms underlying the effectiveness of participatory art-based approaches could be explained by the Conceptual Framework for the Roles of the Arts and Humanities for Human Flourishing (26). The model posits that engagement in art encompasses four key dimensions of immersion,

embeddedness, socialization, and reflectiveness which supports human flourishing.

Mindfulness, self-compassion, and art-based interventions have independently demonstrated their efficacy in enhancing psychological well-being. However, the confluence of mindfulness and self-compassion within the realm of art-based interventions has yet to be fully explored. In recent years, a global movement coined "Slow Art" has emerged in the field of arts and health promotion. Given its promising potential for fostering meaningful engagement with art, the Slow Art movement, as a gallery-based intervention has gained a significant foothold in numerous museums worldwide (27–32). "Slow Art" aims to foster a deeper esthetic experience for art viewers, thereby enabling them to realize the benefits that the arts have to offer (32). This is especially important given the fact that research has shown that the typical visitor to an art gallery only spends 27 to 33 s observing a single artwork (33). According to Phyl Terry, the founder of Slow Art Day, there exists a lack of knowledge and disconnection among some when it comes to appreciating art. By intentionally slowing down the pace of art appreciation, this deliberate approach allows for a renewed engagement with the artwork, enabling individuals to develop a deeper connection with artistic expressions (34). As such, the slow art experience is characterized by a unique approach to art appreciation which involves an immersive encounter between the viewer and the artwork, thereby encourages prolonged periods of focused attention and contemplation (35, 36). This experience is inherently intertwined with mindfulness, where individuals are required to be fully attentive to the artwork, cultivating an attitude of non-judgmental awareness and openness which has beneficial effects on one's psychological well-being (37). Although limited, there is a growing body of literature that examines the relationship between "Slow Art" and self-compassion. Engaging in "Slow Art" nurtures social connectedness (38) which is linked to the sense of shared humanity inherent in self-compassion (8). Promoting common humanity is crucial to booster well-being in the wake of the COVID-19 pandemic as many suffered in isolation during lockdowns and social distancing. The incorporation of self-compassion to the experience of "Slow Art," which has empirically been proven to improve well-being (39, 40), could further enhance social connectedness and potentially create a safe and nurturing environment for participants to explore their thoughts, emotions, and respond to their experiences with kindness. This study is a first-of-its-kind to integrate self-compassion in "Slow Art."

National Gallery Singapore (Gallery) is committed to audience development and growth. It applies an Audience Engagement Framework in creating and evaluating its arts activities with communities (41). This framework maps out areas of growth for its audience participants across four dimensions as described in Table 1. Recognizing the vast mental health concerns that accompany COVID-19, the Gallery had developed its own Slow Art program in 2020 with the aim to provide interested individuals with a meaningful platform for social connection, conversation, and art appreciation through an online visual art experience. The Slow Art program utilizes artwork from The Care Collection (42), a collaboration between the Gallery and Singapore Art Museum (SAM) to curate a collection of artworks thematically organized for program that supports the well-being of participants. The 60-min single-session Slow Art Online program focuses on one artwork through a series of guided observation exercises followed by facilitated group reflections. Since its launch in April 2020, National Gallery Singapore's Slow Art series of program has reached close to 950 participants, and results from over 360 feedback surveys show an average satisfaction score of close to 90%. Despite such success, no formal evaluation has been conducted to assess the effectiveness of the Gallery's Slow Art program for mental health promotion, and this is reflective of the international Slow Art community as there is a scarcity of empirical research to date that examine Slow Art's efficacy and mechanisms in fostering participants' well-being.

The current study builds on the expertise of Gallery and the Action Research for Community Health Laboratory of Nanyang Technological University Singapore (NTU), in developing and piloting an enhanced version of the Gallery's Slow Art Online program, namely "Slow Art Plus" for mental health promotion. In practice, the NTU clinical research team has worked closely with the Gallery's team in reviewing, refining, and co-creating the existing Slow Art program with an infusion of mindfulness and self-compassion practices with reflective and creative expressions that align with The Care Collection and the foundational construct of self-care. Adopting a participatory action research paradigm (43), perspectives and inputs from all relevant stakeholders including the staff, docents, and volunteers of the gallery, as well as NTU mindfulness trainers, and self-compassion experts were elicited to support intervention development. This approach helps to secure support, ownership, active involvement, and the long-term sustainability of the program. The specific objectives of the study are in four-folds:

1) To develop a standardized 90-min single-session Slow Art Plus program that integrates: (a) slow looking; (b) mindfulness meditation; (c) self-compassion activities; (d) reflective-creative expressions; and (e) dyadic sharing, to form a holistic mental health promotion intervention.
2) To assess the effectiveness of Slow Art Plus for reducing participants' perceived stress (primary outcomes).
3) To assess the effectiveness of Slow Art Plus for enhancing participants' self-awareness, self-care capacity, psychological resilience, and quality of life (secondary outcomes).

TABLE 1 Audience engagement framework by National Gallery Singapore.

Cognitive Dimension 1: Visual Literacy & Critical Thinking	**Social Dimension 1:** Social Relations	**Personal Dimension 1:** Confidence, Autonomy & Fulfillment	**Cultural Dimension:** Attitude and Commitment to Art
Cognitive Dimension 2: Creativity & Innovation	**Social Dimension 2:** Civic Responsibility	**Personal Dimension 2:** Resilience	
Cognitive Dimension 3: Knowledge of Art History and Art Theory			

4) To assess the acceptability of the standardized Slow Art Plus protocol for large scale implementation in Singapore and greater Asia.

2 Materials and methods

2.1 Research design

A single-site, open-label, waitlist Randomized Control Trial (RCT) design comprising two arms: (i) treatment group and (ii) waitlist control group, was adopted to evaluate the efficacy of Slow Art Plus in reducing stress while promoting self-awareness and self-care. A waitlist RCT design is valuable as it allows for a controlled comparison between the intervention group and the wait-list control group, while providing control group participants with access to the intervention promptly. A mixed method approach to data collection including quantitative assessments and an embedded qualitative focus group was utilized for a holistic evaluation of the program and implementation processes. This research protocol was registered on ClinicalTrials.gov (NCT05803226).

2.2 Sampling

The proposed sampling frame comprised 200 participants openly recruited from the community and via social media platforms. Inclusion criteria included individuals with the ability communicate in English as the sessions and assessments were implemented in English, as well as to provide informed consent. Exclusion criteria included individuals who were suffering from depression or other major mental health conditions. Mental health conditions were considered an exclusion criterion due to its potential role as a confounding factor for the outcomes of psychosocial well-being. The exclusion was also made to prioritize the well-being of these individuals as there were moments of introspection, reflection, and sharing life stories which may increase the risk of emotional distress. Prospective participants were invited to disclose any formal mental health diagnoses before completing the registration process. Sample size was based on power calculations. With 80% power to detect an effect size of 0.4 (25) based on the primary outcome of stress, as measured by the Perceived Stress Scale (44) in the current study, at 5% level of significance (two-tailed test), a total of 200 participants were required.

2.3 Procedures

Participant recruitment was carried out over a 2-month period from September to October 2022 with 12 consecutive and overlapping rounds. Each round involved approximately 20 participants, with 10 randomly assigned to the intervention group and 10 to the waitlist control group. Each round lasted for 3 days. Open recruitment for community-dwelling adults were conducted through event posters strategically placed at the Gallery as well as e-posters disseminated through social media platforms such as Facebook and Instagram. For each recruitment round, prospective participants indicated their interest in the study through an online registration form on Qualtrics. Following this, a designated member of the research team screened prospective participants for eligibility and contacted them regarding the research study and scheduling, and addressed any questions they had about the study.

Consenting participants completed an electronic informed consent form and were invited to complete an electronic baseline assessment prior to Day 1 of the program [T1]. Upon completion of the baseline assessment, successfully recruited participants were randomly allocated into the treatment group ($n = 10$) or waitlist control group ($n = 10$). Participants in the treatment group participated in the 90-min Slow Art Plus program on Day 2 and completed a post-intervention assessment immediately after the program [T2]. One day later, participants in the treatment group completed a follow-up assessment on Day 3 [T3]. Concurrently, participants in the waitlist control group completed a second baseline assessment on Day 2 [T2]. Thereafter, they participated in the same 90-min Slow Art Plus program and completed a post-intervention assessment immediately after the program on Day 3 [T3]. As this was a 90-min, single-session intervention, a three-day timeframe for evaluation was deemed appropriate to assess impact. Moreover, due to the dynamic nature of the outcome variables such as perceived stress (45), a one-day period was deemed suitable for the waiting period.

Additionally, participants in selected rounds were invited to take part in a semi-structured acceptability focus group study immediately after T3 assessments. These groups were chosen based on the availability of activity rooms at the gallery for the focus group interviews, which was a logistical consideration. Each participant received an SGD$20 (Approximately USD$15) monetary incentive upon completing all 3 assessments, and those who were invited to participate in the focus group study received a further SGD$20 incentive. Study procedures are shown in Figure 1.

2.4 Randomization

Simple randomization was employed for each recruitment round. This process involved utilizing an allocation sequence derived from a computer-generated list of random numbers ranging from 1 to 20. Upon obtaining informed consent and baseline assessment, participants were randomly assigned a unique number from the sequence. Participants whose numbers corresponded to the first 10 slots in the sequence were allocated to the immediate intervention group, whereas participants whose numbers corresponded to the last 10 slots were allocated to the waitlist control group.

2.5 Intervention design

The Slow Art Plus program involved a full 90-min in-person engagement, one that was built upon the original 60-min online Slow Art program with the added layers of mindfulness and self-compassion practices, as well as a curated series of response art activities that foster symbolic dialogs and emotional esthetic experiences between participants and the selected artwork in the physical spaces of the gallery. Each Slow Art Plus session comprised of 6–12 participants and was led by one facilitator.

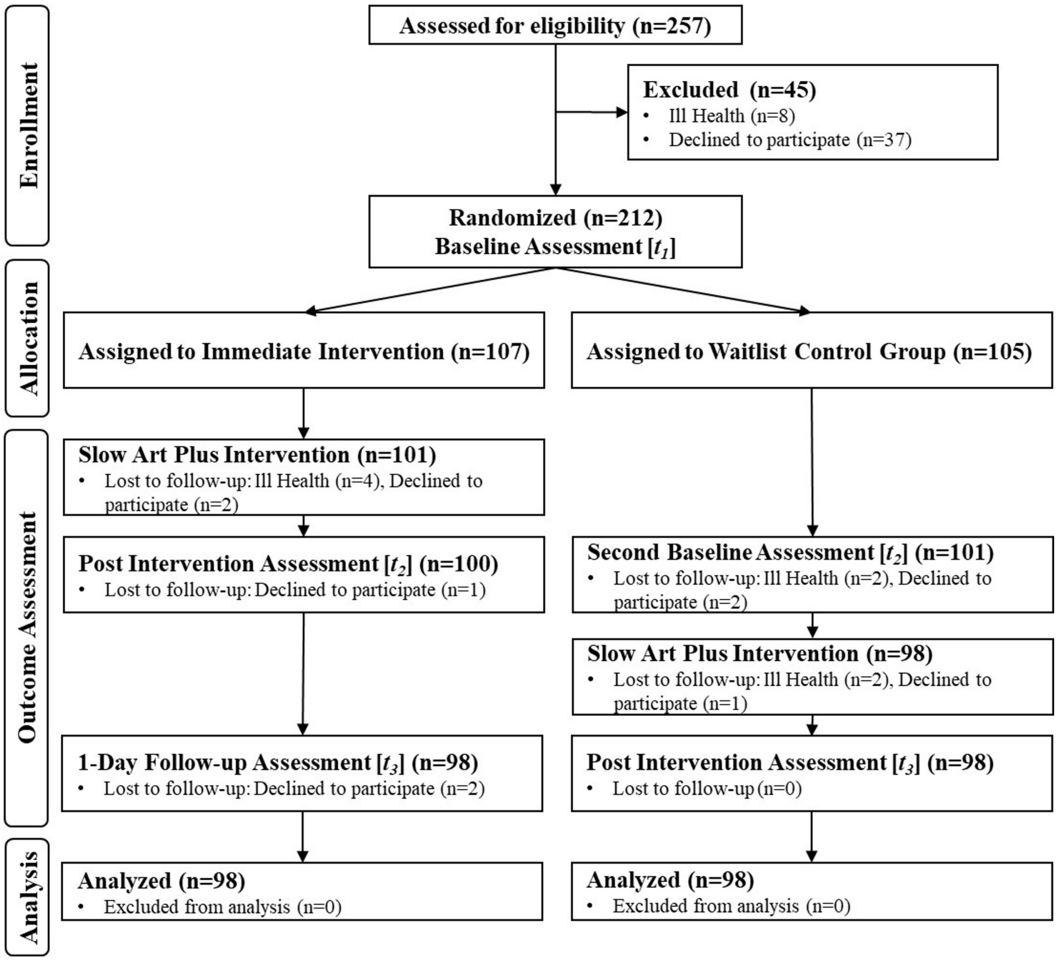

FIGURE 1
CONSORT study flow.

The first 10-min of the session involved an introduction of the program and its ground rules, as well as a brief psychoeducation on the intersection of slow art, mindfulness, and self-compassion practices. This was followed by a 10-min brief check-in and mood-setting exercise involving all participants to introduce themselves and share one act of self-kindness in the past week. Thereafter, the facilitator led a 10-min mindfulness meditation on affectionate breathing, allowing participants to attain a state of calming openness with greater somatic and emotional clarity for slow-looking. This was followed by a set of 30-min slow looking activity with one selected artwork (title and description concealed), including: (a) crafting a title with a one sentence description that captures the viewers' emotional response to the artwork with a focus on loving kindness, (b) creating a soundscape or a music playlist that resonates with the viewers' response and the imagined stories behind the artwork, and (c) sketching a response art to the selected artwork which allows perspective widening by facilitating dialog between the viewer, the art, and the artist. Thereafter, a 10-min dyadic sharing took place with participants, followed by a 4-min group conversation where each dyad had 1 min to share their joint collective experience to the bigger group, moderated by the facilitator. Artwork reveal and sharing of its self-care implications were provided and lasted 6 min. The final segment of the session involved a check-out and closure activity with a brief supportive touch meditation which lasted for 10 min. A breakdown of the Slow Art Plus Protocol is provided in Table 2.

Specifically, the inclusion of both passive and active art engagement activities was informed by past literature; where the appreciation of artworks elicited an emotional and intellectual exchange (46), whilst the active engagement of sketching an artwork encouraged creative control (47). The addition of the music playlist creation activity provided an additional layer of cognitive stimulation, evoking memories and emotions (48). Furthermore, the amalgamation of mindfulness and self-compassion activities deepened the engagement with the artwork as well as one's emotionality and awareness in the immediacy of the esthetic experience. Altogether, the scaffolding of these multi-modal intervention elements provided participants with an immersive and holistic experience for self-discovery and self-care.

2.5.1 Choice of artwork

Family (reworked into Family and One) is a wooden sculpture created by Singapore's pioneer sculptor Chong Fah Cheong. The sculpture is made of five carved wooden planks which lean against each other to form an interlocked coil. Initially titled *Family*, Chong

TABLE 2 Slow art plus protocol.

Activity	Time
1 Introduction and Psychoeducation on Slow Art, Mindfulness & Self-Compassion	10 min
2 Participant Check-in & Sharing of 1 act of Self-Kindness	10 min
3 Mindfulness Meditation on Affectionate Breathing[a]	10 min
4 Slow Looking at 1 selected Artwork with 3 standardized activities: a) Crafting an Artwork Title with viewers' emotional response description b) Developing a Soundscape or Music Playlist that resonates with viewers' emotional response. c) Sketching a Response Art to facilitate symbolic dialog & emotional esthetic	30 min
5 Dyadic Sharing and Group Conversation	14 min
6 Artwork Reveal and Sharing of its Self-Care implication	6 min
7 Check-out and Closure with a Supportive Touch Meditation	10 min
Total	90 min

[a]Affectionate breathing is a technique that regulates emotions by focusing on the breath and fostering a compassionate connection with oneself.

Theme: Growth

Chong Fah Cheong
Family (reworked into Family and One)
1985
Teak
35.0 x 137.5 x 122.0 cm (as a whole)
Collection of National Gallery Singapore

Location (when pilot was conducted): DBS Singapore Gallery 2

FIGURE 2
Sculpture chosen for the slow art plus intervention.

reworked this sculpture into *Family and One* by adding a fifth plank with rounded edges and a distinct organic form. This additional plank stood out from the original four, expanding on the notion of family. *Family (reworked into Family and One)* presents the viewer with a visual idiom of support, teamwork, and togetherness. Its title links directly to the theme of 'family' and all its associated experiences. By reflecting on the sculpture, the viewer is invited to think about supportive loved ones, along with how one can also be a supportive loved one to others. Refer to Figure 2 for more information.

Buddhism, Procession in Front of One of the Face Towers of the Bayon and *Brahminism, Meditating Forest Hermit in Front of a Linga* are a pair of oil paintings made by George Groslier. This pair of paintings was likely intended by Groslier to be a commissioned work for the Throne Hall of the Royal Palace of Cambodia with the subjects being Buddhism, Brahmanism, and the relation between the two. The first painting (Buddhism) presents the viewer with the theme of community and celebration. The figures in the painting are participating in a religious ceremony which pays homage to their respective gods. Colorful flags and ornate grand statues add to the grandiosity of this festive experience, under the sunny and clear sky. In contrast, the second painting (Brahminism) presents the viewer with a somber, dark atmosphere of solitude. A single, solitary hermit meditates amidst the ruins of a temple, surrounded by the quiet of the forest. Spirituality, nature, and aging are reflective themes that can be derived from observing this painting. As a pair, the paintings present the viewer with both the celebratory and solitary aspects of life. The social and the personal come to the fore as one contemplates the meaning of life with all its myriad forms of experience. They also present the viewer with different ways of life, as led by others from different cultures, in different parts of the world. Refer to Figure 3 for more information.

2.6 Outcome measures

Primary outcomes include participants' reported levels of perceived stress, of which was assessed by a modified version of the Perceived Stress Scale (PSS) (44). The PSS comprises 10-items rated on a 5-point Likert scale and clustered into 2 subscales of perceived helplessness (e.g., "In the past couple of days, how often have you felt nervous and stressed today"), and perceived self-efficacy (e.g., In the past couple of days, how often have you felt that things were going

Theme: Connection/Interdependence

George Groslier
Le Bouddhisme, cortège devant l'une des tours visages du bayon
(Buddhism, Procession in Front of One of the Face Towers of the Bayon) (left)

Le Brahmanisme, ermite forestier en méditation devant un linga
(Brahminism, Meditating Forest Hermit in Front of a Linga) (right)

c. 1914
Oil on canvas
180 x 100.5 cm (each)
Collection of National Gallery Singapore

Location (when pilot was conducted): UOB Southeast Asia Gallery 4

FIGURE 3
Paintings chosen for the slow art plus intervention.

your way"). The PSS possesses strong internal validity, reliability, and cross-cultural applicability.

Secondary outcomes include participants' self-awareness, self-compassion, psychological resilience, and quality of life. First, self-awareness was assessed by the Five Facet Mindfulness Questionnaire Short Form (SF-FFMQ) comprising 20 items clustered into 5 subscales: (i) observe, (ii) describe, (iii) act with awareness, (iv) non-judging of inner experience, and (v) non-reactivity to inner experience (49). Second, self-care capacity is assessed by the Self-Compassion Scale - Short Form (SCS-SF) comprising 12 items clustered into 3 subscales: (i) self-kindness- self-judgment, (ii) common humanity- isolation, (iii) mindfulness- over-identification (50). Third, psychological resilience was assessed by the Ego-Resilience Scale-11 (ER-11) comprising 11-items clustered into 3 subscales: (i) active engagement with the world, (ii) repertoire of problem-solving strategies, and (iii) integrated performance under stress (51). Fourth, quality of life was measured by the Single-Item Quality of Life Scale (SI-QOLS) (52). Finally, spiritual well-being was assessed by the 12-item functional assessment of chronic illness therapy-spiritual well-being scale (FACIT-SP-12) which were clustered into 3 subscales of meaning, peace, and faith (53). All secondary outcome measures including the SF-FFMQ, SCS-SF, ER-11, SI-QOLS, and FACIT-SP-12 possessed strong internal validity, reliability, and cross-cultural applicability. Demographic information including age, sex, ethnicity, and socio-economic status were collected from participants at baseline.

To assess acceptability of the Slow Art Plus program, three acceptability focus groups were conducted with the aim to elicit: (a) experiences of the intervention, (b) feedback on intervention components, (c) information on intervention effectiveness, (d) facilitators and barriers to sustained engagement in the program, (e) factors to promote future participation to a wider audience. A semi-structured interview guide was developed with questions including, "What was your experience like with the Slow Art Plus program?," "How has the program components (e.g., slow looking, mindfulness meditation, self-compassion activities, reflective-creative expressions, dyadic sharing, gallery space, facilitation) influenced your overall experience?," and "What did you find most/least helpful about Slow Art Plus?." All focus groups were conducted by a member of the research team and was recorded and transcribed verbatim for analyses. In addition, participant's written responses of their experience of the slow art plus study as well as satisfaction scores were collected at the end of the post-session assessment with the quantitative measures. An example of the prompts includes "What did you appreciate about this program?," "What could be improved about this program," "Have you observed any changes in yourself during or after the program? Please elaborate on your experience," and "Do you have any thoughts, comments, or feedback that you would like to share?"

2.7 Data analysis

The quantitative data were managed and analyzed using the IBM Statistical Package for the Social Sciences (SPSS) v25 statistical analysis software (Armonk, NY, United States). The immediate intervention and waitlist control groups were compared on the primary outcomes of perceived stress and secondary outcomes of mindfulness, self-compassion, psychological resilience, spiritual well-being, and quality of life. Firstly, a mixed model analysis of variance (ANOVA) was conducted to analyze intervention effects between the immediate intervention group and control group at T1 and T2 for each outcome variable. For measures with statistically significant interactions, follow-up tests for simple main effects using a one-way ANOVA for group effects or a repeated measure ANOVA for time effects were conducted. Only significant simple main effects were reported in the manuscript for brevity. Secondly, maintenance effects of the intervention were performed using repeated measure

ANOVA with the immediate intervention group at T2 and T3 with baseline assessment (T1). *Post-hoc* pairwise comparisons were conducted for significant findings with Bonferroni corrections to reduce the likelihood of false positives. Assumptions testing was conducted to check for any violations of assumptions for outliers, normal distributions, homogeneity of variance and sphericity. There was a violation of normality for stress, quality of life, self-compassion, and spiritual well-being. As ANOVA tests are robust against normality assumption violation (54), the reporting of the results was kept consistent using parametric tests. Mann–Whitney U test and Friedman test with follow-up Wilcoxon Signed-Rank Test were conducted for variables that violate the normality assumption and can be found in the supplementary resources. To assess multicollinearity among the independent outcome variables, a Pearson correlation analyses was conducted. The results indicated no evidence of multicollinearity between the variables ($r < 0.9$). A high correlation was observed for the perceived stress scale and one of its subscales of perceived helplessness ($r = 0.95$–0.96). While a MANOVA could have been an alternative approach to manage multiple outcome variables, ANOVAs were employed instead of MANOVAs due to the exploratory nature of the study which sought to investigate the intervention's effects on individual outcome variables rather than their interrelationships (55). Nonetheless, a supplementary mixed MANOVA and repeated MANOVA analysis were conducted and the findings from these analyses were consistent with the results obtained from the ANOVAs, providing further support for the current analysis. In case of any violation of the test of sphericity while conducting the tests, the Greenhouse–Geisser correction was used. Baseline demographic information, recruitment, and dropout rates, as well as the appropriate means, F ratio, p value and effect size estimates for the ANOVA analyses were reported.

The qualitative data were analyzed using framework analysis which involved both inductive and deductive approaches to systematically examine the data for conceptual themes and theme categories that illuminate program acceptability. Framework analysis is a valuable tool in health policy research as it addresses specific research questions with pre-defined issues to explore, contributing to evidence-based decision making (56). The analysis involved several steps of (a) data familiarization and line-by-line coding to delineate the central concepts that emerged from the interviews; (b) the formation of themes and sub-themes by combining codes that were conceptually similar; and (c) axial coding to develop and refine possible theme-categories. The preliminary themes were reviewed by the NTU research team, and subsequently presented to the larger research team during regular meetings for further discussion and revision. This process ensured that the qualitative findings were reliable and that there was agreement among researchers in their interpretation of the data. In the final stage, all major categories, themes, and sub-themes were defined and operationalized with supporting quotes from interview transcripts. This led to the development of an overarching framework that highlighted the well-being impact and lessons gleaned from the implementation processes of the Slow Art Plus program. Research rigor and trustworthiness were ensured by adopting strategies such as prolonged engagement with the data, peer debriefing, maintenance of an audit trail, thick descriptions of data, negative case analysis, as well as triangulation of data, investigator, and theory.

3 Results

3.1 Participant demographics

A total of 225 participants were successfully recruited with 196 participants completing the study. Participants' age ranged between 18 and 85 years ($M = 45.9$, $SD = 16.6$), with 71% being women participants and predominantly of Chinese ethnicity (88%). Most participants did not have a chronic illness (87%) and nor were receiving any counseling services (92%). There were no significant differences for all demographic measures between the immediate intervention and waitlist control group. Please refer to Table 3 for the full participants' demographics.

3.2 Quantitative analysis

3.2.1 Between-group analysis: mixed model ANOVA

For the primary outcome of perceived stress, although there was a decrease in perceived stress scores, there were no significant interaction effects between group and time. Similarly for the secondary outcomes of mindfulness, resilience, quality of life, and self-compassion, there were no significant interaction effects. However, there was a significant group and time interaction for spiritual well-being, $F(1, 194) = 10.99$, $p = 0.001$, $\eta_p^2 = 0.054$. Follow-up simple main effect for group analysis revealed that there were no differences between the intervention group and waitlist control group at T1 (baseline), but a marginally significant difference at T2 (immediate intervention/s baseline assessment), $F(1,194) = 3.66$, $p = 0.06$, $\eta_p^2 = 0.019$. Additionally, simple main effect for time analysis indicated that there were differences in the intervention group ($F(1, 97) = 25.04$, $p < 0.001$, $\eta_p^2 = 0.205$), but not the waitlist control group.

Significant interaction effects were also observed in the peace ($F(1, 194) = 7.08$, $p = 0.008$, $\eta_p^2 = 0.035$) and faith ($F(1, 194) = 7.07$, $p = 0.009$, $\eta_p^2 = 0.035$) subscales of the spiritual well-being scale. Follow-up simple main effect for group analysis revealed that there were no differences at T1 between the intervention group and control group for both subscales. However, there was a significant difference between the groups at T2 for the peace ($F(1,194) = 6.11$, $p = 0.014$, $\eta_p^2 = 0.031$) but not the faith subscale. Significant simple main effect of time was reflected in the peace ($F(1, 97) = 12.77$, $p = 0.001$, $\eta_p^2 = 0.116$) and faith ($F(1, 97) = 24.72$, $p < 0.001$, $\eta_p^2 = 0.203$) subscales for the intervention group, but not the waitlist control group.

Although there were no significant interaction effects on the overall mindfulness scale, there was a significant interaction effect observed in the describing ($F(1, 194) = 5.96$, $p = 0.016$, $\eta_p^2 = 0.030$) and nonreacting to inner experience ($F(1, 194) = 6.45$, $p = 0.012$, $\eta_p^2 = 0.032$) subscale. Follow-up simple main effect for group analysis revealed that there were no differences at T1 and T2 between the intervention group and control group for both subscales. Simple main effect of time analysis revealed a significant difference in the intervention group for the describing ($F(1, 97) = 4.95$, $p = 0.028$, $\eta_p^2 = 0.049$) and nonreacting to inner experience ($F(1, 97) = 7.59$, $p = 0.007$, $\eta_p^2 = 0.073$) subscale, but not the waitlist control group. Details of the mixed model ANOVA can be found in Table 4. A further exploration of the intervention's effects over time in the intervention group is reported in the next section.

TABLE 3 Participant demographic information.

Demographic characteristic	Immediate Intervention	Waitlist Control
	(*n* = 98)	(*n* = 98)
	Mean (*SD*) or *N* (%) or range	
Age in years, Mean (SD)	47.67 (15.70)	44.06 (17.33)
Age range	21 to 76 years	18 to 85 years
Female	70 (71.4)	69 (70.4)
Male	28 (28.6)	29 (29.6)
Artwork Viewed		
Artwork 01 – *Buddhism, Procession in Front of One of the Face Towers of the Bayon,* and *Brahminism, Meditating Forest Hermit in Front of a Linga*	53 (54.1)	51 (52.0)
Artwork 02 – *Family (reworked into Family and One)*	45 (45.9)	47 (48.0)
Marital Status		
Single/Divorced/Widowed	48 (49)	64 (65.3)
Married	50 (51)	34 (34.7)
Education		
PSLE, GCE 'N/O/A', Nitec or Higher Nitec	7 (7.1)	18 (18.4)
Polytechnic Diploma	12 (12.2)	10 (10.2)
Professional Certificate	4 (4.1)	2 (2.0)
Bachelor's Degree	49 (50.0)	43 (43.9)
Postgraduate Degree	26 (26.5)	25 (25.5)
Ethnicity		
Chinese	86 (87.8)	87 (88.8)
Malay	2 (2.0)	1 (1.0)
Indian	2 (2.0)	6 (6.0)
Others (Austronesian, Bulgarian, Caucasian, European, Filipino, Indonesian, Sinhalese, and Vietnamese)	8 (8.2)	4 (4.1)
Employment Status		
Full-time Employed	36 (36.7)	34 (34.7)
Part-time Employed/ Self-Employed	16 (16.3)	15 (15.3)
Unemployed/Retired/ Student/ Other	46 (46.9)	49 (49.9)
Presence of Chronic Illness		
No	84 (85.7)	86 (87.8)
Yes	14 (14.3)	12 (12.2)
Receiving Counseling Services		
No	89 (90.8)	92 (93.9)
Yes	9 (9.2)	6 (6.1)

3.2.2 Within-group analysis: repeated measures ANOVA

For the primary outcome, participants reported a significant reduction in perceived stress ($F(1.86, 180.19) = 14.52$, $p < 0.001$, $\eta_p^2 = 0.130$) over time. Post-hoc analyses indicated a significant decrease in stress one day after completing Slow Art Plus (T3) (MD = −2.55, 95% CI [−3.92, −1.19], p < 0.001). This finding was also mirrored in the perceived stress subscales where participants reported a reduction in perceived helplessness ($F(2, 194) = 14.81$, p < 0.001, $\eta_p^2 = 0.132$; MD = −1.86, 95% CI [−2.75, −0.96], $p < 0.001$) and lack of self-efficacy ($F(1.85, 178.99) = 7.40$, $p = 0.001$, $\eta_p^2 = 0.071$; MD = −0.69, 95% CI [−1.34, −0.05], $p = 0.031$) one day after the intervention (T3).

For the secondary outcome, there was a statistically significant change over time indicated in the mindfulness ($F(2, 194) = 12.56$, $p < 0.001$, $\eta_p^2 = 0.115$) as well as the observing ($F(2, 194) = 12.28$, $p < 0.001$, $\eta_p^2 = 0.112$), describing ($F(1.81,176.26) = 7.15$, $p = 0.001$, $\eta_p^2 = 0.069$), acting with awareness ($F(1.89, 182.88) = 6.06$, $p = 0.003$, $\eta_p^2 = 0.059$) and nonreacting to inner experience ($F(2, 194) = 7.57$,

TABLE 4 Between-group analysis using mixed model ANOVA.

Variables	Immediate intervention ($N = 98$)		Waitlist control ($N = 98$)		Group effect[a]		Time effect[a]		Group x time interaction[a]	
	T1	T2	T1	T2	*f* ratio	η_p^2	*f* ratio	η_p^2	*f* ratio	η_p^2
	Means (*SD*)	Means (*SD*)	Means (*SD*)	Means (*SD*)						
Primary Outcome										
Perceived Stress (PSS-10)	15.10 (6.35)	14.64 (6.75)	15.06 (6.70)	14.13 (7.25)	0.094	<0.001	3.807	0.019	0.436	0.002
Perceived Helplessness	9.58 (4.19)	8.96 (4.41)	9.41 (4.60)	8.64 (4.95)	0.170	0.001	7.013*	0.035	0.074	<0.001
Lack Of Self-Efficacy	5.52 (2.68)	5.68 (2.89)	5.65 (2.85)	5.49 (2.82)	0.007	<0.001	<0.001	<0.001	1.015	0.005
Secondary Outcome										
Mindfulness (SF-FFMQ)	67.35 (8.50)	67.45 (8.68)	67.51 (8.93)	66.56 (8.91)	0.095	<0.001	0.946	0.005	1.457	0.007
Observing	14.91 (2.92)	14.99 (2.89)	14.63 (2.65)	14.69 (2.83)	0.578	0.003	0.239	0.001	0.005	<0.001
Describing	13.56 (2.81)	14.05 (3.15)	13.63 (3.16)	13.37 (2.91)	0.582	0.003	0.527	0.003	5.959*	0.030
Acting With Awareness	13.49 (2.84)	12.86 (2.81)	13.58 (3.11)	13.32 (3.26)	0.469	0.002	8.791*	0.043	1.147	0.008
Nonjudging To Inner Experience	12.52 (3.00)	12.14 (3.25)	12.55 (3.52)	12.30 (3.48)	0.045	<0.001	2.714	0.014	0.102	0.001
Nonreacting To Inner Experience	12.87 (2.31)	13.41 (2.34)	13.11 (2.56)	12.89 (2.47)	0.196	0.001	1.102	0.006	6.448*	0.032
Psychological Resilience (ER11)	3.05 (0.43)	3.06 (0.41)	2.98 (0.50)	2.96 (0.48)	1.903	0.010	0.217	0.001	0.556	0.003
Integrated Performance Under Stress	3.02 (0.63)	2.97 (0.59)	2.95 (0.64)	2.92 (0.57)	0.586	0.003	1.084	0.006	0.089	<0.001
Active Engagement with The World	3.15 (0.56)	3.17 (0.52)	3.01 (0.59)	3.00 (0.58)	4.321*	0.022	0.007	<0.001	1.023	0.005
Repertoire Of Cognitive, Social and Personal Problem-Solving Strategies	2.96 (0.56)	2.97 (0.56)	2.97 (0.59)	2.95 (0.55)	0.005	<0.001	0.034	<0.001	0.306	0.002
Quality of Life (SI-QOLS)	5.22 (1.19)	5.35 (1.18)	5.17 (1.21)	5.15 (1.15)	0.615	0.003	0.632	0.003	1.240	0.006
Self-Compassion (SCS-SF)	3.27 (0.55)	3.30 (0.53)	3.37 (0.68)	3.33 (0.69)	0.534	0.003	0.009	<0.001	1.986	0.010
Self-Kindness, Self-Judgment	3.33 (0.65)	3.33 (0.59)	3.41 (0.79)	3.37 (0.80)	0.388	0.002	0.219	0.001	0.285	0.001
Common Humanity, Isolation	3.24 (0.62)	3.29 (0.65)	3.31 (0.72)	3.30 (0.74)	0.241	0.001	0.223	0.001	0.582	0.003
Mindfulness, Over-Identification	3.24 (0.70)	3.30 (0.67)	3.38 (0.80)	3.31 (0.77)	0.677	0.003	0.027	<0.001	2.781	0.014
Spiritual Well-being (FACIT-SP-12)	32.22 (9.10)	35.00 (7.81)	32.15 (9.77)	32.65 (9.29)	0.948	0.005	22.77**	0.105	10.99**	0.054
Meaning	11.88 (3.40)	12.44 (2.82)	11.80 (3.15)	11.88 (3.01)	0.597	0.003	4.467*	0.023	2.486	0.013
Peace	10.56 (3.56)	11.72 (3.04)	10.47 (3.51)	10.59 (3.37)	1.928	0.010	10.81**	0.053	7.083*	0.035
Faith	9.79 (4.63)	10.84 (4.37)	9.89 (4.68)	10.18 (4.58)	0.187	0.001	22.48**	0.104	7.065*	0.035

*$p < 0.05$, **$p < 0.001$; [a]df: 1,194.

$p = 0.001$, $\eta_p^2 = 0.072$) subscales. There was also a significant change over time observed for the active engagement with the world (ER11 subscale; F(2, 194) = 5.85, $p = 0.003$, $\eta_p^2 = 0.057$) and self-compassion (F(2, 194) = 4.32, $p = 0.015$, $\eta_p^2 = 0.043$). Lastly, there were statistically significant differences in the spiritual well-being (F(1.89, 182.84) = 15.22, $p < 0.001$, $\eta_p^2 = 0.136$) as well as the meaning (F(2,

194) = 4.33, $p = 0.014$, $\eta_p^2 = 0.043$), peace ($F(1.83, 177.79) = 7.99$, $p = 0.001$, $\eta_p^2 = 0.076$), and faith ($F(1.69, 164.06) = 15.77$, $p < 0.001$, $\eta_p^2 = 0.140$) subscales.

Post-hoc pairwise comparisons revealed that immediately after the session (T2), there was an increase in spiritual peace (FACIT-SP-12 subscale; MD = 1.16, 95% CI [0.37, 1.96], $p = 0.002$). A reduction in acting with awareness (SF-FFMQ subscale; MD = −0.63, 95% CI [−1.21, −0.05], $p = 0.028$) was also observed immediately after the session but returned to baseline levels the next day (MD = 0.65, 95% CI [−0.16, 1.14], $p = 0.005$). Furthermore, there was a significant improvement in nonreacting to inner experience (SF-FFMQ subscale; MD = 0.54, 95% CI [0.063, 1.02], $p = 0.021$) and spiritual well-being (MD = 2.78, 95% CI [1.42, 4.13], $p < 0.001$) including the meaning (MD = 0.56, 95% CI [0.01, 1.12], $p = 0.047$) and faith subscales immediately after the session (T2) and the effect was maintained 1 day after Slow Art Plus (T3). Lastly, 1 day after the intervention (T3), participants reported further improvements in overall mindfulness (MD = 2.84, 95% CI [1.20, 4.47], $p < 0.001$) including the observing (MD = 0.90, 95% CI [0.39, 1.41], $p < 0.001$) and describing (MD = 0.74, 95% CI [0.24, 1.23], $p = 0.001$) subscales, active engagement with the world (ER11 subscale; MD = 0.11, 95% CI [0.02, 0.20], $p = 0.009$), and overall self-compassion (MD = 0.11, 95% CI [0.01, 0.21], $p = 0.030$). Detailed findings from the repeated measure ANOVAs can be found in Table 5.

3.3 Qualitative findings

Qualitative responses were collected from participants via three acceptability focus group discussions and qualitative written feedback at the end of the survey. Both data sources were analyzed using a framework analysis and a total of two themes and six subthemes were identified.

3.3.1 Theme 1: Experiences of slow art plus (n = 176; mentioned by 176 participants)

Participants in the study reported experiencing various positive impacts of the intervention including a sense of peace and calmness, enhanced self-compassion, and a broader perspective of their life experience.

Subtheme 1a: Peaceful Relaxation ($n = 85$). Participants of the study reported feeling calmer and less stressed after the session which contributed to their overall sense of well-being. For instance, one shared that '*I definitely felt more at peace, and more mindful after the program. I could stop thinking about the different stressors I had been facing for just the 90 min, which was very helpful (SAP221, 25-year-old, male)*'. Another participant shared similar sentiments, where *'I feel calmer and less stressed and more at peace with myself. There seems to be a layer of peace draped over me. I am more aware and cognizant of the need to also take care of myself, and to set aside time for my own self-reflection and exploration* (*SAP087, 22-year-old, female*)'. Some participants found the intervention to be therapeutic. For instance, one participant reported a reduction in bodily tension, where '*the stiffness in my shoulders reduced significantly. I also noticed my mind quietening (SAP275 35-year-old, female)*'.

Subtheme 1b: Self-compassion ($n = 106$). Participants demonstrated aspects of self-compassion, including mindfulness, self-kindness, and common humanity. The meditation exercises in the sessions helped participants discover insights that they could incorporate into their daily lives, as this participant mentioned, '*when you get connected to your body, you are more confident in yourself because you are aware of what's happening, it creates a more positive mindset about yourself and what is happening around you, the challenges that you have. That [mindset] helps you to overcome it positively (SAP165, 59-year-old, female)*'. Furthermore, participating in the session with others enhanced their sense of connection, as succinctly expressed by one participant, *'we get to share our thoughts with each other. It makes me feel like I'm not alone in my struggles and that we probably see the same things in life (SAP083, 30-year-old, female)*'. Participants became more aware of the importance of self-care and made more deliberate effort to prioritize it after the sessions, '*I believe it increased my level of self-care. Being a mother, I will splurge money on my children, but I tend not to splurge on myself so after this session, I love flowers so I'm going to the florist and buy myself a bouquet of flowers (SAP187, 61-year-old, female)*'.

Subtheme 1c: Widened Perspective ($n = 60$). Engaging in Slow Art Plus broadened the perspectives of participants. The self-reflective aspects of the intervention helped participants discover meaning in their life experiences, as described by one participant, '*there were many self-reflective components where I could look inwards and connect whatever I was experiencing with my inner self (SAP087, 22-year-old, female)*'. Observing the artwork from different angles encouraged participants to observe life experiences from different perspectives, as mentioned by this participant, *'not only are you looking at the layers of the art, but it also plays into part of real life as well. Everyone here has different stories and different backgrounds. Just like the art piece, there's the first perspectives and impressions of people, but you do not really know what their story is and what they have been through in their life. That's kind of a life lesson when looking at slow art (SAP117, 28-year-old, male)*'. Moreover, hearing others' interpretations of the artworks broadened their perspective, as one participant noted, '*I enjoyed the process of enjoying art as a group and hearing others' perspectives. It shows me the deep and rich thought that each individual has, and I really appreciated that (SAP12, 30-year-old, female)*'.

3.3.2 Theme 2: Insights to effective implementation (n = 134)

Participants shared insights into the aspects of the intervention that were most effective for them, as well as other factors that contributed to the overall effectiveness of the intervention.

Subtheme 2a: Valuable Components ($n = 71$). The mindfulness and self-compassion exercises, such as guided meditation, mindful breathing, and mindful movements, helped participants to relax and prioritize self-care. Some felt motivated to continue these practices in their daily lives after the session ended. This participant reflected on her experience, '*I appreciated that it allowed me to practice mindfulness – to slow down and fully immerse myself in the experience without distraction or interruption (SAP085, 21-year-old, female).* Additionally, the guided art appreciation activity encouraged observation and reflection, while the response art activity facilitated a deeper connection with the selected artwork. A participant wrote that '*naming the artwork allowed me to have a more personal connection with the artwork, and this simple act of creating something new is fulfilling (SAP070, 45-year-old, male)*'. Participants also valued the group discussion during the session, as it allowed them to share knowledge and interpretations with each other, as one participant explained, '*I realize when it comes to the group*

TABLE 5 One-way repeated measures ANOVA for the immediate intervention group ($n = 98$).

Variables	T1	T2	T3	ANOVA		T1 *vs* T2		T1 *vs* T3	
	Means (*SD*)	Means (*SD*)	Means (*SD*)	*f* ratio	η_p^2	95% CI	Mean Differences (T2 – T1)	95% CI	Mean Differences (T3 – T1)
Primary Outcome									
Perceived Stress (PSS-10)	15.10 (6.35)	14.64 (6.75)	12.55 (6.45)	14.52[a]**	0.13	(−0.78, 1.70)	−0.46	(1.19, 3.92)	−2.55**
Perceived Helplessness	9.58 (4.19)	8.96 (4.41)	7.72 (4.47)	14.81**	0.13	(−0.26, 1.50)	−0.62	(0.96, 2.75)	−1.86**
Lack Of Self-Efficacy	5.52 (2.68)	5.68 (2.89)	4.83 (2.48)	7.40**	0.07	(−0.74, 0.41)	0.16	(0.05, 1.34)	−0.69*
Secondary Outcome									
Mindfulness (SF-FFMQ)	67.35 (8.50)	67.45 (8.68)	70.18 (9.00)	12.56**	0.12	(−1.76, 1.55)	0.10	(−4.47, −1.20)	2.84**
Observing	14.91 (2.92)	14.99 (2.89)	15.81 (2.91)	12.28**	0.11	(−0.59, 0.42)	0.08	(−1.41, −0.39)	0.90**
Describing	13.56 (2.81)	14.05 (3.15)	14.30 (3.04)	7.15**	0.07	(−1.03, 0.05)	0.49	(−1.23, −0.24)	0.74*
Acting With Awareness	13.49 (2.84)	12.86 (2.81)	13.51 (3.10)	6.06**	0.06	(0.05, 1.21)	−0.63*	(−0.50, 0.46)	0.02
Nonjudging To Inner Experience	12.52 (3.00)	12.14 (3.25)	12.99 (3.27)	4.23 **	0.04	(−0.37, 1.12)	−0.38	(−1.23, 0.29)	0.47
Nonreacting To Inner Experience	12.87 (2.31)	13.41 (2.34)	13.58 (2.32)	7.57**	0.07	(−1.02, −0.06)	0.54*	(−1.21, −0.22)	0.71*
Psychological Resilience (ER11)	3.05 (0.43)	3.06 (0.41)	3.11 (0.41)	2.15	0.02	(−0.07, 0.06)	0.006	(−0.13, 0.02)	0.06
Integrated Performance Under Stress	3.02 (0.63)	2.97 (0.59)	3.00 (0.53)	0.40[a]	0.004	(−0.07, 0.16)	−0.46	(−0.12, 0.162)	−0.02
Active Engagement with The World	3.15 (0.56)	3.17 (0.52)	3.26 (0.52)	5.85*	0.057	(−0.10, 0.06)	0.02	(−0.20, −0.02)	0.11*
Repertoire Of Cognitive, Social and Personal Problem-Solving Strategies	2.96 (0.56)	2.97 (0.56)	2.98 (0.56)	0.18	0.002	(−0.11, 0.09)	0.01	(−0.12, 0.07)	0.02
Quality of Life (SI-QOLS)	5.22 (1.19)	5.35 (1.18)	5.32 (1.15)	1.06[a]	0.01	(−0.35, 0.11)	0.12	(−0.33, 0.15)	0.09
Self-Compassion (SCS-SF)	3.27 (0.55)	3.30 (0.53)	3.38 (0.55)	4.32*	0.04	(−0.12, 0.05)	0.04	(−0.21, −0.01)	0.11*
Self-Kindness, Self-Judgment	3.33 (0.65)	3.33 (0.59)	3.43 (0.65)	2.26	0.02	(−0.12, 0.11)	0.003	(−0.24, 0.04)	0.10
Common Humanity, Isolation	3.24 (0.62)	3.29 (0.65)	3.35 (0.64)	2.07	0.02	(−0.16, 0.07)	0.04	(−0.24, 0.03)	0.11
Mindfulness, Over-Identification	3.24 (0.70)	3.30 (0.67)	3.36 (0.67)	2.56	0.03	(−0.19, 0.07)	0.06	(−0.26, 0.02)	0.12
Spiritual Well-being (FACIT-SP-12)	32.22 (9.10)	35.00 (7.81)	33.94 (8.63)	15.22[a]**	0.14	(−4.13, −1.42)	2.78**	(−2.97, −0.46)	1.71*
Meaning	11.88 (3.40)	12.44 (2.82)	12.38 (3.11)	4.33*	0.04	(−1.12, −0.01)	0.56*	(−1.00, −0.00)	0.50*
Peace	10.56 (3.56)	11.72 (3.04)	11.09 (3.15)	7.99[a]**	0.08	(−1.96, −0.37)	1.16*	(−1.25, 0.19)	0.53
Faith	9.79 (4.63)	10.84 (4.37)	10.47 (4.39)	15.77[a]**	0.14	(−1.57, −0.54)	1.05**	(−1.19, −0.18)	0.68*

*$p < 0.05$, **$p < 0.001$; [a]Greenhouse–Geisser correction was used when the data violated the assumption of sphericity.

discussion, we have different perspectives … It's good to be in a group so we can learn from one another (SAP199, 54-year-old, female)'. Participants also felt that the components of the intervention were well integrated, as summarized below: '*It was packaged nicely, the narrative flow. Because you set the stage then you go into the activity of learning how to appreciate the art. And then after that, you go into the thought process of how you would interpret a piece. I thought it was nicely put together (SAP074, 36-year-old, female)*'.

Subtheme 2b: Execution Requisites ($n = 80$). Participants also discussed aspects of the program's implementation that affected their experience. Particularly, they highlighted the crucial role of the facilitator in the intervention's therapeutic effect, noting that facilitators provided guidance and created a safe space for vulnerability: '*I personally that feel the facilitator has been very important. Our current facilitator has done a very good job of setting the context and environment, despite having all these issues that we face. Being such a good facilitator has put*

us at ease and allow some of us to open up very easily. For this kind of course, the facilitator must be very well trained, and be just as good or better than our current facilitator. Once the environment is set and the context has been fixed with the parameters, it really makes people open up. And the whole thing just went very smoothly (SAP077, 57-year-old, male)'. Participants specifically noted the facilitator's calm demeanor, presentation style, and skill in summarizing group discussions as key factors in shaping their experience. They also valued the facilitator's kind, patient, and compassionate approach, which created a sense of safety for sharing personal experiences. Additionally, participants appreciated the hospitality and professionalism of the liaison staff, which contributed to their positive experience of Slow Art Plus. Participants emphasized the importance of environmental factors in enhancing their overall experience. They preferred a private setting with minimal distractions and good acoustics to improve focus during the session. As this participant described, '*I find myself being calm at the beginning of the session and was more aware of my surroundings. But I also became increasingly stressed and annoyed by the endless motions around me and was unable to block it out like I could usually do … which disrupts this peace (SAP145, 32-year-old, female)'*. Moreover, participants highlighted the significance of logistical factors in enhancing comfort, such as having chairs with back support to alleviate discomfort during the session. Many participants found the gallery-issued stools uncomfortable for a 90-min session, and this sentiment was shared across different age groups, as one participant shared, '*I felt my back starting to hurt while sitting on the chair. Maybe changing the chair would be better (SAP007, 27-year-old, female)'*.

Subtheme 2c: Suggested Enhancements ($n = 61$). Some participants suggested that a single session might be too brief to observe lasting changes and proposed implementing multiple sessions with a variety of artworks, different mindfulness exercises, and longer group discussions. A participant expressed '*continuing over a longer term and having more than one session for each group would lead to further connectedness among participants (SAP168, 61-year-old, female)'*. On the artworks, another participant recommended '*having the process with another art piece of a different medium, allowing participants the opportunity to practice their slow art skillset (SAP084, 32-year-old, male)'*. A few participants also suggested providing take-home resources to continue practicing what they learned during the session. Additionally, some participants suggested offering light refreshments to enhance the overall experience. Finally, participants highly recommended Slow Art Plus to be a regular program in the gallery, appealing to the public through different segments (e.g., art education in schools, corporate activities, etc.) and expanding the curriculum to cater to the needs of diverse communities (e.g., caregivers, persons with health conditions or impairments, etc.). A participant suggested that '*this curriculum, self-care and mindfulness can be included in the primary school curriculum (SAP187, 61-year-old, female)'*.

4 Discussion

In line with the research objectives, a 90-min single session Slow Art Plus protocol was developed. The program's effectiveness was evaluated using a wait-list randomized control trial design, and its acceptability was assessed through qualitative inquiry. This mixed-method approach provided valuable insights into the effects and implementation of the program. Although most of the mixed-model ANOVA results showed statistically insignificant changes in the primary and secondary outcomes, they underscored Slow Art Plus's effectiveness in enhancing participants' spiritual well-being, particularly in areas such as spiritual peace, life meaning, and faith. Furthermore, the repeated measures ANOVA analyses in the intervention group revealed significant reductions in perceived stress, along with an increase in mindfulness, active engagement with the world, and self-compassion. These findings suggest the possibility of lasting effects from the program and may also suggest that more time is needed for beneficial intrapersonal outcomes to emerge.

The qualitative data, gathered through acceptability focus groups and written feedback provided a nuanced understanding of the Slow Art Plus program's impact and implementation processes. Participants reported experiencing improved peace and relaxation, which complemented the quantitative findings. They also demonstrated an increased sense of self-compassion and a commitment to prioritizing self-care, along with a broadening of perspectives. Regarding implementation components, participants found the self-compassion exercises, guided art appreciation, and group discussions to be particularly valuable. Additionally, key implementation factors such as the facilitator's skill and presence, as well as the environment—including physical comfort and distractions—were noted to have an influence on the intervention and should be considered.

4.1 Interpreting results

The current study aimed to assess the overall effectiveness of the Slow Art Plus intervention without specifically examining the effects of each individual intervention component. Although the study did not isolate the contributions of each component, insights could be drawn from existing literature on the arts and humanities, mindfulness, and self-compassion.

There is limited research on interventions that combine art appreciation with mindfulness and self-compassion practices. However, the current findings contribute to the literature on the positive effects of museum and gallery-based interventions on mental, physical, emotional, and social well-being (57–60). The positive outcomes of this intervention may be explained by the RAISE (Reflection, Acquisition, Immersion, Socialization, and Expression) mechanisms in the conceptual model of how arts and humanities engagement contributes to human flourishing (61).

For instance, Slow Art Plus provides a platform for immersive engagement with artwork, enabling participants to fully absorb the art appreciation experience. This immersion may temporarily reduce awareness of surrounding circumstances, potentially broadening individuals' experiences and contributing to their overall well-being (62). The opportunity for participants to express themselves creatively, such as through creating a playlist and response art, supported the expression of their feelings and thoughts, which has also been shown to positively impact well-being (63). Furthermore, both actively and passively engaging with the artwork could foster meaning-making among participants (47). This process of meaning-making through the arts could occur through affective, cognitive, and transpersonal symbolizing (64). In addition, the opportunities for discussion provided participants with a platform to be heard and feel accepted, affirming each person's narrative and providing insight into the life experiences of others (65). This fostered socialization and

enabled participants to form relationships and develop a shared identity (66), strengthening their sense of belonging which is known to contribute to well-being (67). Lastly, guided reflection in Slow Art Plus provided an opportunity for individuals to notice their internal- and external-focused thought (68), potentially leading to the development of new perspectives.

The mindfulness practices in Slow Art Plus provide a complementary approach to supporting well-being, with some components overlapping with arts and humanities engagement. The practice of mindfulness and mindfulness-based interventions has been empirically shown to promote self-compassion, emotional regulation, and improvements in various psychological indices (37, 69–71). The quantitative outcomes of improved mindfulness and reduced stress align with aspects of the Gallery's Audience Engagement Framework, while the outcome of active engagements with the world (a resilience subscale) adds another dimension of psychological well-being, indicating the potential for individuals to actively engage in coping with stressful situations (72). Moreover, a high correlation was observed between the perceived stress scale and the subscale of perceived helplessness, which suggests that it may be a similar construct in this study. Perceived helplessness assesses an individual's sense of control over their circumstances, emotions, and reactions (44). This correlation may indicate that the reduction in stress observed in the study was related to improvements in managing emotions and reactions, aligning with the potential benefits of mindfulness practices. The elements of mindfulness and self-compassion in Slow Art Plus helped participants non-judgmentally observe their present experiences with curiosity and acceptance, fostering a sense of calm and peace. This was reflected in both the quantitative and qualitative findings. The increased awareness of one's emotional and mental states, along with the confidence to express thoughts and opinions, as well as the integration of life experiences through reminiscence, could contribute to improved mental health (73). Contrary to the hypothesis, the quantitative findings showed a decrease in the subscale of acting with awareness immediately after the intervention, which differed from the qualitative findings. One potential explanation could be participant fatigue at the end of the 90-min program, after intense concentration and focus. Lastly, the dyadic sharing and group conversations in the program not only strengthened relationships but deepened participant's sense of common humanity, reassuring them that they are not alone in their struggles. This experience served as a gateway for them to nurture self-kindness. The findings suggested that the Slow Art Plus experience could be a helpful way to alleviate stress and strengthen one's psychological resilience.

Finally, several important implementation factors were highlighted by research participants that should be considered when implementing similar interventions. Facilitators played a crucial role in creating a conducive environment for museum and mindfulness-based interventions (74). Drawing on Carl Rogers' concept of unconditional positive regard, facilitators had the capacity to empower participants and influence psychological outcomes (75). By embodying qualities of presence, authenticity and empathy, Slow Art Plus facilitators fostered an environment conducive to self-awareness and personal growth (76). In addition, the significance of the physical and psychological space was echoed in prior research which suggested the gallery space's role in encouraging creativity, exploration, and self-expression (77). Taken together, these discussions shed light on the effects of the Slow Art Plus's effects and offer practical implementation strategies to support mental health promotion.

4.2 Limitations and implications for future projects

Firstly, in terms of research design, the use of a one-day waiting period for the control group was implemented to ensure that the questionnaires accurately represented the state of mind of the participants. However, the duration may be too short for meaningful comparisons which may have resulted in the current non-significant findings of the mixed model ANOVA. Additionally, the significant findings from the repeated measures ANOVA for the intervention group suggest that more time may be needed for the positive impact to become apparent. As a preliminary study, further research is necessary to confirm the positive impact of the program. Future investigations may consider extending the waiting period for the waitlist-control group and conducting a longer follow-up, including a one- to two-week waiting period and follow-up, to investigate maintenance effects. This could help evaluate the effects of slow looking and mindfulness activities core to the Slow Art Plus intervention protocol. In addition, incorporating multiple time points for future evaluations could provide insight into the long-term effects of the intervention. Although participants were made aware of their allocation outcomes after the baseline assessment, the blinding procedures could be improved as participants were aware of the research purpose and anticipated outcomes which may influence the research findings. To maintain blinding and reduce expectancy effects, future designs could include an active control group and an ethical narrative that maintains the integrity of the study while keeping the true objective undisclosed. Moreover, while the selection of the wait-list control groups for the focus group study was primarily a logistical consideration based on the availability of the activity rooms, it may raise concerns about bias in sampling. One possible solution could be to ensure that participants assigned to both groups are included for future studies, ensuring a more balanced distribution, and reducing the potential for bias.

Secondly, in the current analysis, the effect sizes observed for the intervention were small, indicating modest changes in measured outcomes. Additionally, the specific contributions of each component in the multi-modal intervention were not identified, suggesting that the combined effects of the intervention may not be adequately captured. This highlights the need for further investigation into the mechanisms underlying the intervention's effects and the potential synergistic interactions between its components. Additionally, the high correlation between perceived stress and the subscale of perceived helplessness suggest that they may be measuring a similar construct, potentially indicating that the reduction in stress observed in the study is related to the management of emotions and reactions.

Thirdly, in terms of sampling, it is notable that the majority of the participants were female, of Chinese ethnicity, and highly educated, which may affect the generalizability of the findings. Future research could consider using a stratified random sampling method to ensure representation across a diverse range of genders, ethnicities, and socio-economic statuses. Moreover, as the preliminary findings shows promise in reducing stress, promoting self-care, and enhancing spiritual

well-being, Slow Art Plus could be refined for specific populations which are recognized to have high stress levels such as formal and informal caregivers, healthcare professionals, and educators.

Finally, in terms of intervention design, the artwork used in the study could be expanded to apply the protocol with the gallery's expansive range of Southeast Asian artworks. Comparative evaluation between art works and modalities could be explored further as research has suggested that specific elements within different types of artworks may be more suited for slow looking (78, 79). In addition, a multi-session Slow Art Plus could be further developed and tested using a longitudinal research design to investigate the intervention's effectiveness across a longer period as suggested by some participants who expressed a desire for more sessions to explore various art and meditation techniques and to build stronger connections with other Slow Art Plus participants.

5 Conclusion

The empirical literature on the combined efficacy of museum and mindfulness-based interventions for mental health promotion are limited both in Singapore and internationally. Slow Art Plus is a unique, standardized, multimodal, single-session intervention that integrates slow-looking, mindfulness, and self-compassion practices, as well as reflective and creative expressions with Southeast Asian art. It shows promise in supporting mental health promotion for the general population and may be integrated into social prescribing programs for diverse backgrounds to improve spiritual well-being, mindfulness, self-compassion, and reduce stress. Slow Art Plus has the potential to introduce a new paradigm of mental health and self-care within the arts industry, offering vitality to individuals locally and around the world.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author. Requests to access the datasets should be directed to andyhyho@ntu.edu.sg.

Ethics statement

The studies involving humans were approved by NTU Institutional Review Board (IRB). The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants or the participants' legal guardians/next of kin.

Author contributions

AH, AT, and KP conceptualized and designed the study. AH and AT obtained funding. SM, GT-H, PC, JN, and AT was involved in the coordination and implementation of the research study. AH and KP delivered the intervention. JN, SM, PC, GT-H, and AH conducted the analysis. All authors contributed to data interpretation, as well as the writing and revision of the manuscript, contributed to the article, and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2024.1238564/full#supplementary-material

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