



RESEARCH ARTICLE

REVISED **What are the active ingredients of ‘arts in health’ activities? Development of the INgredients iN ArTs in hEalth (INNATE) Framework [version 2; peer review: 2 approved]**

Katey Warran , Alexandra Burton , Daisy Fancourt 

Research Department of Behavioural Science and Health, Institute of Epidemiology & Health Care, University College London, 1-19 Torrington Place, London, WC1E 7HB, UK

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Abstract

Background: There is a scarcity of research concerning what it is about arts engagement that may activate causal mechanisms leading to effects on health and wellbeing: their active ingredients. Further, the limited studies that do exist have tended to be relevant to specific contexts and types of art forms. The aim of this study was to carry out a comprehensive mapping of potential active ingredients, construct a shared language, and propose a framework and toolkit to support the design, implementation, and evaluation of arts in health activities.







Methods: Drawing upon Rapid Appraisal techniques and collaborating with 64 participants working in arts in health, we engaged in a three-phase process: 1) scoping review to inform the development of an initial framework; 2) consultation on the initial framework; and 3) analysis and construction of the INNATE framework.



Results: The study identified 139 potential active ingredients within the overarching categories of *project*, *people*, and *contexts*. *Project* components relate directly to the content of the arts activity itself, intrinsic to what the activity is. The *people* category denotes how people interact through engagement with the activity and who is involved in this interaction, including activity facilitation. *Contexts* relates to the activity setting comprising the aggregate of place(s), things, and surroundings. Aligning with complexity science, ingredients may interconnect or feed into one another to prompt mechanisms, and may not be experienced as distinct by participants.

Conclusions: Our mapping exercise is the most extensive to date. In relation to arts in health activities, the INNATE framework can support with: design and implementation, such as co-producing an intervention to meet the needs of a particular

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population; evaluation, such as facilitating the comparison of different interventions and their efficacy; and replication, scalability, and sustainability through enabling detailed reporting and articulation of what an arts in health activity entails.

Keywords

Active ingredients, components, arts and culture, arts interventions, arts in health

Corresponding author: Katey Warran (k.warran@ucl.ac.uk)

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REVISED Amendments from Version 1

This new version of our article makes several clarifications. First, we have explained that we focused on our participants' expert knowledge as generalists in our focus groups, rather than discussing personal life stories or individual subjectivities, elucidating why we have not included demographic information for participants. However, to provide a richer picture of the activities which were discussed with participants, we have now additionally included geographic information in our table about the activities our participants were involved in. We have also emphasised in our abstract that our participants were those working in the field of arts and health.

Second, we have further clarified in this revision how a practitioner could use our framework to evaluate their own practice, stating that we have intentionally chosen not to delve into individual practitioner complexities regarding what may 'improve' their practice. This remains for practitioners to explore through using our framework.

Finally, we have augmented our limitation regarding focusing on active ingredients as viewed from the perspectives of those designing and delivering arts in health interventions, rather than those participating. We have explained that we advocate for the use of our framework in coproduced projects, including those with lived experience in the cocreation of arts in health activities, also explaining that it remains for future research to explore further what ingredients activity participants may perceive to be important for their health outcomes.

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

Background

Over the last 20–25 years there has been a rapid increase in research exploring the benefits of arts and cultural activities for health and wellbeing^{1,2}. The research conducted highlights the impact that these activities can have in supporting with the management and treatment of mental and physical health conditions, as well as preventing ill health and increasing health promoting behaviours². In seeking to understand how this impact is achieved, there has been increasing interest in understanding the mechanisms of action behind these impacts.¹ Over 600 mechanisms have been identified, including those that involve psychological, biological, social, and behavioural processes³. What remains less clear is what it is about arts and culture that triggers these mechanisms: what the components or active ingredients are that initiate the mechanisms of action that, in turn, affect mental and physical health outcomes.

¹ Similar to the roots of 'active ingredients', the term 'mechanisms of action' also stems from pharmacological research to describe how a drug exerts an effect – it's underlying processes. However, its use has become increasingly widespread within the study of complex interventions to understand how these interventions affect health. This has recently included the study of the mechanisms by which leisure activities (which includes arts activities) affect health framed within complexity science, leading to the development of the Multi-level Leisure Mechanisms Framework³. This framework informed our understanding of 'mechanisms of action' adopted for this study.

Active ingredients

The term 'active ingredients' has its origins in pharmacological research for describing the elements of a pharmacologic intervention responsible for its therapeutic action⁴, and is often used interchangeably with 'intervention components' or 'interacting components'^{5,6}. Over the past two decades, research into 'active ingredients' has also become increasingly popular within non-pharmacological health research seeking to identify the 'what' rather than the 'how' of interventions⁷. Much of this non-pharmacological work on active ingredients has occurred within the fields of behavioural science (which focuses on human behaviours) and implementation science (which focuses on promoting 'the systematic uptake of research findings and other evidence-based practices into routine practice'⁸). Such work has involved the identification of active ingredients involved in interventions designed to change human behaviour and support the adoption of clinical programmes, leading to the publication of rich taxonomies and frameworks^{7,9}. These frameworks have been used to map how different ingredients lead to mechanisms of action and to compare similar interventions to understand why some are more effective than others^{10–12}. It has also become increasingly commonplace for the reporting of active ingredients involved in non-pharmacological clinical trials to be mandatory in journals. This has led to the development of the Template for Intervention Description and Replication (TIDieR) checklist which prompts the user to consider materials (physical or informational), procedures (activities or processes), people, and environment to describe an intervention¹³, all of which could be considered 'active ingredients'.

Whilst such work has proved valuable across multiple domains of health sciences, the linearity implicit in these kinds of implementation frameworks (i.e., that you can separate out components, describe them, and think of them as distinct from mechanisms and outcomes) has been argued to be theoretically reductive elsewhere, particularly in the social sciences. For example, linear frameworks are considered unable to articulate tacit social factors such as structural forces that shape interactions (e.g., Bourdieu's field theory; 14) or the co-construction of meanings at an intersubjective or group level. In relation to the latter, Acord and DeNora¹⁵ have argued that the meanings of arts encounters emerge within interactions. There is no simple cause and effect relationship whereby an art object causes an outcome, but rather it is the result of a 'matrix of social relations and things' where an object enables, as opposed to causes, forms of activity (p. 228). In this sense, any change (i.e., a health impact) that emerges is produced within a complex situation of engagement and meaning making¹⁶. Similarly, Tan¹⁷ drawing on Deleuze and Guattari's concept of 'assemblage' has posited that experiences are afforded and affected by assemblages viewed as 'encounters with a collection of animate and inanimate things', theorising that there may be a 'network of elements' that prompt a range of experiences and opportunities for activity participants (p. 81). On this view, health and wellbeing outcomes are afforded by these elements

and their relations^{17,18}. This aligns with research suggesting that arts activities are holistic and complex adaptive systems¹⁹.

However, implementation science does not sit at odds to these theorisations when combined with approaches from complexity science, incorporating an understanding of real-world, complex and dynamic systems (see 20, p. 7). Interventions that are considered ‘complex’ (such as an arts intervention) can be difficult to standardise in their design and delivery because of the wide range of *interconnected* components involved in prompting multiple mechanisms^{5,6}. Indeed, as complexity science theorises, there may be multiple ingredients, mechanisms and multiple simultaneous causal strands required for an intervention to be effective²¹, and ingredients and mechanisms may be indistinguishable for participating individuals due to their interdependence on another⁵. Further, and in line with the social sciences, complexity science acknowledges emergent outcomes and relationality²². For example, whilst identifying and articulating components is important, the agents and artefacts themselves may be considered ‘secondary to the relationships between these components’²². That is, they may combine or work together to coproduce health outcomes or create new phenomena as a result of their interactions.

Applying a hybrid of factors simultaneously from both complexity science and implementation science involves methodological pluralism which has been argued to be compatible with pragmatism²³. This means a move away from linearity and the identification of active ingredients as objective components (as they may be considered within positivism) and focusing on applied research and multiple forms of knowledge creation²³. Taking this dual lens, the metaphor of ‘active ingredients’ can still be seen to have much to offer to our understanding of what *mix* of components (or interconnections between them) may be needed by arts activities to activate different mechanisms of action that can improve health and wellbeing, whilst acknowledging that this process is not simple or linear⁵. Articulating ingredients can become not just a tick-box exercise but part of an in-depth exploration into the inner workings of an arts activity using a flexible and adaptive approach²². Indeed, several studies have explored the identification of active ingredients in view of how they may need to combine together or work within a dynamic system to better understand how to optimise complex interventions. This includes interventions in the context of playgroups²⁴, paediatric rehabilitation programmes²⁵ and physical activity interventions¹¹.

The active ingredients of arts activities

The endeavour to define how the qualities of arts activities lead to certain kinds of experiences in itself is not new. The definitions of what ‘art’ is and its characteristics can be traced back to Plato and have since been a continuing theme of philosophical debate²⁶. However, as work into the design and delivery of arts programmes to support health and wellbeing has proliferated, there have been increasing calls for

more attention around identifying the ingredients of these programmes that help to achieve a health impact. Indeed, a recent review of culture on referral programmes (also known as arts on prescription or social prescribing programmes) noted that ‘there is a lack of exploration into the arts and cultural programmes themselves’²⁷. A number of studies have explored the components of activities such as art therapies²⁸, including dance/movement therapy²⁹, and music therapy³⁰, the visual arts³¹, and documentary media³². Such work differs from that of defining ‘art’ more generally as it focuses on those ingredients considered relevant to achieving a health impact (i.e., those that are ‘active’) rather than all components of the arts activity. However, such work has generally described ingredients on a project-by-project basis, meaning they are only relevant for specific art forms. Whilst this can help develop appreciation of the nuances and specifics of each art form, it also means that the language used between art forms can vary, resulting in difficulties comparing findings from different studies and articulating if and how specific arts projects align or differ from one another. Recently, there have been attempts to draw some of the most common ingredients together^{2,33}, and to group them into higher order themes such as ‘participants’, ‘environment’, and ‘quality of art activity’ that could apply across arts interventions more broadly¹⁷. However, we still lack a comprehensive framework mapping all the potential active ingredients of arts in health programmes.

Such a mapping exercise is needed to advance theory, research and practice. Theoretically, an integrative mapping exercise of potential active ingredients across disciplines encourages interdisciplinary learning, whereby knowledge of important components in one discipline may augment and explain those of another, thereby breaking down disciplinary barriers. Moreover, in view of the limited knowledge currently available, it seems likely that there are many active ingredients that are yet to be identified. From a research perspective, a comprehensive mapping could provide a unified approach to describing ingredients and allow the direct comparison of different arts interventions to identify where activities align or differ. This could, in turn, develop the understanding of how and why certain arts activities may activate certain causal mechanisms. From a practice perspective, mapping ingredients can support in the design, implementation, and evaluation of arts interventions; for example, by helping practitioners to consider which ingredients to include within an intervention to achieve particular health outcomes or to assess how closely the delivery of an intervention matches original plans.

Considering the evidence above we therefore set out to 1) carry out the most comprehensive mapping of ingredients in arts in health activities to date, developing them into a new theoretical framework (the INNATE Framework), and 2) cocreate a usable toolkit to support with the design, implementation, and evaluation of arts in health activities.

Methods

Drawing on the principles of implementation science and complexity science, we aimed to synthesise active ingredients in the literature across art forms with new empirical data, carrying out a collaborative and comprehensive mapping exercise to develop a new framework. Rapid Appraisal was adopted as a methodological approach because it is not tied to a particular epistemology, is team-based, and is iterative, whereby active ingredients can be identified and developed throughout the analytic process³⁴. We engaged in a three-phase process of: 1) a scoping review to inform the development of an initial framework; 2) a consultation on the initial framework; and 3) analysis of consultation responses and construction of the INNATE framework.

Across these phases, we focused specifically on ‘arts in health’ activities. Here, our definition of ‘arts’ includes activities involving participation in arts and other creative activities, as well as engagement with culture and heritage.² Our definition of ‘arts in health’ was interventions that are designed and delivered either in healthcare contexts (e.g., a music programme delivered in a peri-operative setting), as part of healthcare referral schemes (e.g., a referral to a community choir by a healthcare professional), or with specific health or wellbeing outcomes in mind (e.g., an online dance intervention for chronic pain).³

Phase one: Scoping review

Our research began with a scoping stage to ‘map and categorise’ relevant literature to examine the ‘landscape’ of our area

² The definition of ‘art’ is subject to ongoing debates and cross-disciplinary conflicts³⁵. However, despite conceptual complexities, a number of cross-cultural characteristics have been recognized as fundamental to art, such as the presence of an art object which provides meaningful, imaginative, and emotional experiences². For this study, we defined art in terms of the *kinds of activities* that provide these experiences (as opposed to conceptual or abstract concepts of ‘art’). In relation to health research, these activities include: i) performing arts activities such as singing, dancing and acting; ii) visual arts participation including drawing, painting and crafts; iii) digital arts activities including photography, animation and film-making; iv) literary arts such as reading and creative writing; v) cultural engagement such as going to museums, galleries and concerts; and vi) heritage engagement, such as visiting monuments and stately homes². Within these categories there are a diverse range of different types of arts engagement that transcend cultural boundaries, covering both active engagement with the arts, such as participatory arts programmes, and receptive engagement, such as audiences viewing art objects².

³ There is no universal definition of ‘arts in health’ and there are a number of related concepts that are often used in different contexts to designate similar activities, such as arts for health, arts and health, and arts therapies, to name a few examples. We have specifically chosen to use arts *in* health to denote ‘the use of the arts as a way of supporting individual health or healthcare systems’³⁶. This is in contrast to ‘arts and health’ which may be used more broadly to indicate any bringing together of the arts with health, going beyond a focus on health outcomes, or ‘arts for health’ which has connotations of advocacy³⁶. Our definition also includes arts therapies within it, viewing these activities as aligned with the aim of drawing on the arts to support health through the production of art work in healthcare³⁷. Further, we consider ‘health’ to encompass health prevention, promotion, management, and treatment, drawing on the World Health Organisation’s understanding of health as ‘a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity’³⁸.

of study^{39,40}, cataloguing ingredients already identified and laying the groundwork for phase two. We drew on methods identified by Arksey and O’Malley³⁹ to:

1. *Identify our research question* which we formulated as ‘what are the active ingredients of arts in health activities?’
2. *Identify the relevant literature*. We created a table of key word searches (see Additional File 1, table 1.1⁴¹) and used these to search databases including Google Scholar, PubMed, ScienceDirect, Web of Science, Scopus, and UCL Explore. We included grey literature and sought to include a range of methodologies and populations.
3. *Chart the data*. We read through the literature sourced and extracted any findings which we identified as key active ingredients in view of our definition of this term, as outlined in the introduction. We then listed the active ingredients that had been identified in an excel spreadsheet, noting the author(s) of the research, the arts activity studied, and the key ingredients identified (see Additional File 1; table 1.1⁴¹).
4. *Collate and summarise*. Through mind mapping using the software Keynote, we categorised the ingredients we had identified into three emergent categories: project, people, and contexts. Next, we used these headings to reorganise the active ingredients in our spreadsheet for use in the next phase of the project. As many of the studies were framed within different disciplinary contexts and/or employed theory to conceptualise ingredients, DF (PhD, an Associate Professor with a background in psychobiology and epidemiology) and KW (PhD, a Research Fellow with a background in qualitative social science) discussed and refined the language and concepts together as a first step to embedding these ingredients within the context of implementation science. We also added definitions and examples next to each of the active ingredients to ensure clarity of expression.

Phase two: Consultation

The initial mapping spreadsheet from phase one was developed into a more accessible worksheet (see Additional File 2⁴¹) and shared with 64 participants prior to them taking part in one of 10 semi-structured focus groups. The focus groups lasted 90 minutes each, were conducted between December 2020 and March 2021 online using Microsoft Teams, and were facilitated by one female researcher (KW). The number of participants ranged from 5 to 8 per group. Participants included people who design and/or deliver arts and cultural activities who were able to consider how their activities may contribute to health and wellbeing outcomes, as well as those involved in relevant research or arts programme management (See Table 1 for participant details, with further information in Additional File 3; table 3.1⁴¹). Participants were approached by email and recruited via the MARCH Research Network, one of eight national mental health research networks funded by UK Research and Innovation (UKRI) focused on social,

Table 1. Job role and arts/cultural activities engaged in of focus group participants.

Number of participants	64
Job role	
Artist/cultural practitioner	37
Arts/cultural manager or administrator	14
Researcher/Academic	8
Healthcare professional	2
Other	3
Setting that arts/cultural activity normally takes place*	
Community setting	50
Public health setting	26
Arts/cultural venue	35
Education setting	31
Online/digital setting	41
Criminal justice setting	1
Religious setting	1
Other health or care setting	2
Other	4
Geographic location where arts/cultural activity normally takes place*	
London	20
Scotland	14
North West of England	13
Yorkshire and the Humber	13
East of England	12
South East of England	11
South West of England	9
West Midlands	7
East Midlands	6
North East of England	5
Wales	5
Outside of the UK	4
Northern Ireland	2

*NB. Participants could select all that applied for these questions

cultural and community engagement, and through the professional networks of the research team. Recruitment began in December 2020 and continued through to the end of the data collection period at the beginning of March 2021. Participants

were provided with an information pack ahead of attending a focus group which included: an explanation of the rationale for the research, a brief outline of what implementation science is, a logic model linking the arts to health outcomes (building on the model presented in the 2019 World Health Organisation (WHO) Health Evidence Network Synthesis Report²), and the questions that would be asked in the focus group. They were also informed that the groups would be led by KW. During each focus group, the worksheet was used as a prompt for questioning, discussing the suitability of the language used for each active ingredient, as well as identifying any missing ingredients. Importantly, the purpose of the discussion was to collectively identify active ingredients through drawing on our participants' expert knowledge as generalists, rather than discuss personal life stories or individual subjectivities. Extensive notes of the discussion were taken by the facilitator (KW) and transcripts were generated automatically by Microsoft Teams. All focus groups were audio recorded. The topic guide is included in Additional File 3; 3.2⁴¹.

Phase three: Analysis and construction of the INNATE Framework

Data collection (phase two) and analysis were carried out in parallel over an intensive 12-week period, with the worksheet updated after each data collection point, until we had reached saturation by the final focus group where no new ingredients or substantial changes to existing ingredients were identified. To do this, RAP sheets (Rapid Assessment Procedures; see example in Additional File 3; table 3.3) were used to systematically document and synthesise emergent findings throughout the study^{42,43}. The RAP sheet consisted of a table with thematic headings of interest, whereby summaries of findings were inserted into the columns by the facilitator (KW) after each focus group, with the summaries created through triangulation of reading researcher notes and listening and reading relevant sections of focus group audio and rough transcripts respectively. Every week, the core research team (DF & KW) met to discuss the emergent findings and to review and modify the worksheet as needed based on the empirical data, alongside updating the mapping Excel spreadsheet. Where there were disagreements over particular ingredients in the focus groups, we resolved issues through a combination of revisiting the literature and discussions both within and across different focus groups and team meetings until consensus was reached. At the end of the focus groups, we developed a visual model (Figure 1) and all identified ingredients were refined through final input from the co-investigators of the MARCH Network and feedback from focus group participants.

Ethical statement

The study was approved by the UCL Research Ethics Committee (Project ID: 19105/001), and all focus group participants provided written informed consent. Participants were made aware that the research aimed to identify and explore the different components that make up arts and cultural activities, and that their personal information would remain confidential. They were also informed that their focus group responses would be anonymised. Participants consented to the results

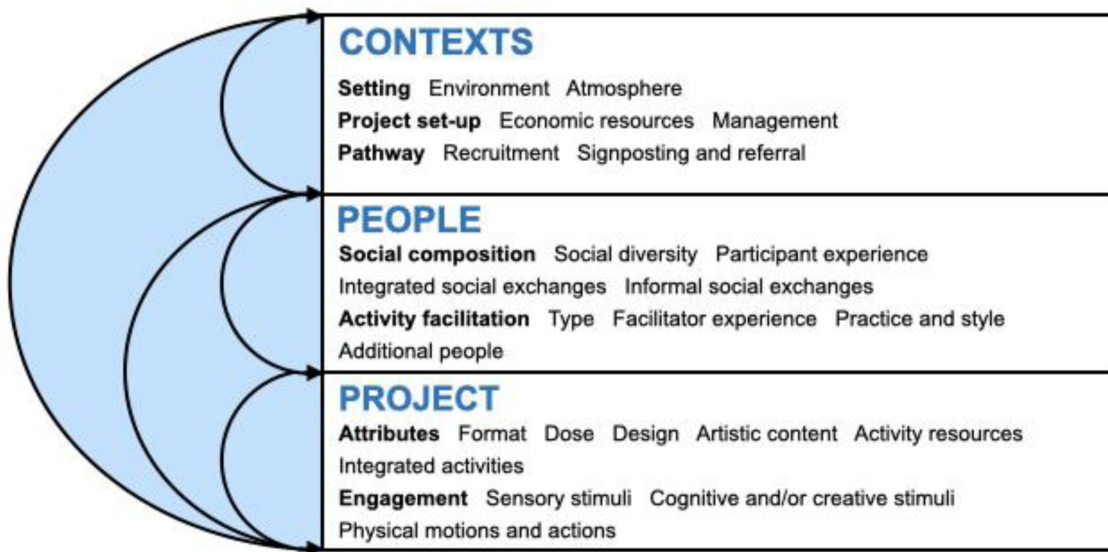


Figure 1. The INNATE Framework: active ingredient categories and subcategories, showing interconnections and feedback loops.

of the study being submitted for publication in peer-reviewed academic journals and were provided with an option to receive the final report after publication.

Results

We identified and refined 139 active ingredients of arts in health activities that may prompt mechanisms of action that affect health and wellbeing across three thematic categories: project, people, and contexts. We also developed a visual model (see Figure 1) to show how ingredients may overlap, interconnect, and feed into one another. The model and summary of the active ingredients' categories are provided below, with the full lists of ingredients with definitions included in Additional File 4⁴¹.

Project

Active ingredients in the project category relate to the *attributes* (qualities and characteristics) of an arts or cultural activity, as well as the kinds of stimuli involved in prompting *engagement* with that activity. These are the components that relate directly to the content of the activity itself, intrinsic to describing what the activity is (Table 2).

The *attributes* encompass both logistical and artistic characteristics. The former includes the *format* of the activity (such as whether it is an in-person or virtual engagement), the *dose* of the activity received (relating to how much and how often participants are exposed to the activity), and the *design* (or structural plan) of the activity (which may or may not be adaptable). The latter includes the *artistic content* (relating to the genre, type of activity, and themes or subjects drawn upon), as well as the *activity resources* used or employed (whether physical, conceptual, or informational). In addition, the attributes

relate to any *integrated activities* (non-arts programmes or experiences) that form part of the project, including psychosocial support such as Cognitive Behavioural Therapy (CBT) or meditation, allied therapies such as physiotherapy or occupational therapy, health education programmes, or spiritual or holistic practices.

Engagement denotes active ingredients relating to stimuli prompted by the activity. This includes *sensory stimuli* (vision, auditory, olfactory, gustatory, and tactile), *cognitive or creative stimuli* (e.g., mental processes, images and pleasurable experiences), and *physical bodily motions or actions* that are integrated into their content (e.g., awareness of the body, movements or physical exercises).

People

Active ingredients in the people category denote *social composition*, relating to how people interact through engagement with the activity and who is involved in this interaction, as well as the *activity facilitation*, concerning the people who lead, guide, or facilitate the participant-facing aspects of the activity (Table 3).

The *social composition* of an activity refers to the people involved in an activity and components of the activity that involve social interaction. This is characterised by *social diversity* (who is present and their attributes), and *participant experience* (whether those involved have previous experience of engaging with the activity, health conditions or contexts, their own lived experience, or already know others engaging). Social exchanges within this category can be part of or *integrated* into the activity (social interactions that are dimensions of the activity or structured social time) or *informal* (unstructured social time such as refreshment breaks).

Table 2. Categories and subcategories of active ingredients in the 'project' category.

CATEGORIES	SUBCATEGORIES
Attributes <i>Qualities and characteristics of the activity</i>	
Format <i>Relating to the arrangement, style and type of activity</i>	Mode
	Synchronicity
	Activity level
Dose <i>The amount of activity(ies) received by participants</i>	Frequency
	Duration
	Maintenance
Design <i>Relating to a structural plan for the activity which may or may not be adaptable</i>	Structure
	Guiding
	Project approaches
	Personalisation
	Challenge
	Goal orientation
	Feedback
Artistic content <i>Relating to the artistic dimensions of the activity</i>	Genre
	Multi-modality
	Activity type
	Themes
Activity resources <i>Physical, conceptual or informational materials used/ employed in the delivery of the activity</i>	Activity consumables
	Props
	Products
	Performances
Integrated activities <i>Activities that are integrated within the arts/cultural activity(ies)</i>	Psychosocial support
	Allied therapies
	Health education
	Spiritual or holistic practice
	Socially-engaged practice
Engagement <i>Stimuli prompting active involvement in the activity</i>	
Sensory stimuli <i>Objects, actions, materials or experiences that activate the senses as part of the activity</i>	Vision (sight)
	Auditory (hearing)
	Olfactory (smell)
	Gustatory (taste)
	Tactile (touch)
Cognitive and/or creative stimuli <i>Objects, actions, materials or experiences that activate cognitive processes as part of the activity</i>	Involvement of the imagination
	Emotional stimuli
	Cognitive stimuli
	Aesthetic engagement
	Pleasure
	Participant choice
Physical motions and actions <i>Physical, bodily motions or actions employed as part of the activity</i>	Proprioception (kinaesthesia)
	Movement
	Physical exercises

Table 3. Categories and subcategories of active ingredients in the 'people' category.

CATEGORIES	SUBCATEGORIES
Social composition <i>Relating to how people interact through engagement with the activity and who is involved in this interacting</i>	
Social diversity <i>The people involved in the activity</i>	Presence of others
	Shared attributes
	Distinct attributes
	Personal attributes
Participant experience	Activity experience
	Health experience
	Lived experience
	Relationship to others
Integrated social exchanges <i>Social exchanges (face to face or digital) between participants that are part of or integrated into the activity</i>	Shared focus
	Shared activity
	Social exchanges
	Structured social time during activity
	Structured social time outside activity
Informal social exchanges <i>Social exchanges (face to face or digital) between participants that are not planned as part of the activity</i>	Unstructured social time during activity
	Unstructured social time outside activity
Activity facilitation <i>Relating to the people who lead or guide the outward facing aspects of the activity (i.e. not the administrative aspects but the activity facilitation)</i>	
Type <i>Relating to the kind of leadership employed to deliver the activity</i>	Facilitator(s)
	Co-production
	Number
	Professionalisation
	Training
Facilitator experience <i>Approaches and/or experiences that a facilitator may bring to an activity</i>	Consistency
	Activity experience
	Health experience
	Lived experiences
Practice and style <i>The manner in which the activity is delivered</i>	Relationship to others
	Technique
	Personal attributes
	Values-directed focus
	Outcomes-directed focus
	Person-centred focus
	Autonomy-directed
	Equality, diversity and inclusion
	Safety
	Tailoring
Additional people <i>Staff or other people that support or co-lead the activity</i>	Presence of volunteers
	Presence of healthcare professionals
	Presence of others

Activity facilitation focuses specifically on people who are ‘in the room’ (whether in-person or digitally) actively delivering the activity. This overarching category is broken down into four sections. *Type* denotes if an activity involves facilitation and, if so, what form this takes (e.g., who and how many people facilitate, lead, or guide an activity and the consistency of this facilitation). *Facilitator experience* relates to the approaches and experiences that a facilitator may bring to an activity (e.g., prior experience leading similar activities, working with specific populations, lived experience, previous relationships to activity participants, and specific traits that affect how they approach facilitation). One’s experience may also intersect with the *practice and style* in which the activity is delivered (such as whether facilitator(s) use particular techniques or have personal attributes that affect how they facilitate or express foci relating to values, outcomes, tailoring, equality, or participant preferences and safety). The *additional people* of an activity may support, co-lead, or just be present at an activity (e.g., volunteers, healthcare professionals or observers).

Contexts

Active ingredients in the contexts category relate to the activity *setting* comprising the aggregate of place(s), things, surroundings and feelings that make up the situation and *project set-up*, such as the structure, processes and/or systems which surround the delivery of the activity (Table 4).

The setting of the activity is characterised by the activity *environment* (i.e., the location, access and functional and

aesthetic components) and *atmosphere* (the character, feel, or mood of the place or situation of the activity). The project set-up includes both the management of the activity itself, as well as the unique pathways into and out of the activity that participants may follow. This comprises *economic resources* (charges for participation, project funding, and project resources) and project *management* (such as affiliation, branding, collaboration and patient and public involvement). Related to this, *recruitment* (including formal and informal referrals) and *signposting and referral* (e.g., to other arts activities, to medical or psychosocial services, or to welfare or caring support) denote the pathways into or out of the activity.

Discussion

This study embarked upon an empirically grounded mapping exercise to identify the active ingredients of arts in health activities. Through this process, the study identified 139 potential active ingredients within the overarching categories of *project, people, and contexts*, presented as a framework for design, implementation, and evaluation to support those delivering arts and cultural activities.

Comparison to previous research

Some of the ingredients presented here were identified in our scoping review (see Additional File 1; table 1.2), which we refined through phases two and three of our study. As we aimed to provide language that would be relevant to a range of arts in health activities, in some cases, this meant translating context-specific or theory-laden language into general terms

Table 4. Categories and subcategories of active ingredients in the ‘contexts’ category.

CATEGORIES	SUBCATEGORIES
Setting <i>The aggregate of place(s), things, surroundings and feelings that make up the situation of the activity</i>	
Environment <i>The circumstances, objects, and conditions which make up the surroundings of the activity</i>	Location
	Basic features
	Attractiveness
	Situation
	Time and day
	Access
	Privacy
Atmosphere <i>The character, feeling, or mood of a place or situation where the activity takes place</i>	Comfort
	Belonging
	Familiarity
	Ambiance
	Organisation

CATEGORIES	SUBCATEGORIES
Project set-up <i>The structure, processes and/or systems which surround the outward facing delivery of the activity</i>	
Economic resources <i>Relating to economic resources connected to the activity and its delivery</i>	Participant charges
	Project funding
	Fees
	Longevity
Management <i>Relating to the person, people, group(s) or company(ies) in charge of organising the activity</i>	Environmental sustainability
	People
	Affiliation
	Branding
	Collaboration
Pathway <i>Relating to the participant(s)' route into or out of the activity</i>	Patient and Public Involvement
	Recruitment <i>How participants find out about or are enrolled into the activity</i>
	Formal referral
	Informal referral
	Choice
	Advertising
Signposting and referral <i>Signposting to services, resources, support, or advice beyond the activity itself</i>	Inter-sector signposting
	Health-sector signposting
	Social signposting
	Other-sector signposting
	Safeguarding referral

(e.g., ‘therapist’ into ‘facilitator’; ‘daily session’ into ‘dose’), and aggregating or excluding ingredients through our iterative focus group procedure, based on the consensus of our participants. The worksheet created through this study (see Additional File 2) also provides a similar reporting format to the TIDieR framework¹³, but focuses specifically on ingredients relevant to arts in health, enabling greater nuance. Our framework is a substantial advance on previous conceptualisations and toolkits because it comprehensively maps ingredients relevant to all arts in health activities, providing bespoke prompts in a worksheet for use in this field.

Some active ingredients presented in this framework have also been conceptualised in relation to other psychosocial interventions for health. For example, a scoping review of therapeutic playgroups for children identified peer support and facilitator training as important to a family-centred approach, echoing ingredients within the ‘social composition’ and ‘leadership’ sections presented in this framework²⁴. Ongoing research funded by

the Wellcome Trust has identified safety, trust, positive connection, and co-designed spaces as active ingredients for supporting neighbourhood connections for young people’s mental health, echoing ingredients in our people and contexts categories⁴⁴. Further, a meta-analysis of interventions employed to increase physical activity amongst aging adults identified 20 intervention components, including commitment, classes at set times, feedback on performance, goal setting, health education information, and social support⁴⁵. Whilst the language here is tailored to physical activity, some dimensions of these components can be viewed as similar to our identified ingredients of dose, feedback, goal orientation, integrated activities (e.g., health education) and social exchanges. These are just a few examples but serve to highlight that there may be some active ingredients of arts and culture present in other interventions.

However, our research highlights certain ingredients that may be unique to arts and culture. The notion of there being something

distinctive about arts activities has been proposed before. Arts engagement has been described as having an ethereal or indescribable quality, such as in the context of group singing interventions which have been viewed as ineffable⁴⁶, with the arts intervention itself considered a ‘complicated situation’¹⁶. Whilst recognising that articulating what is ‘in’ arts and culture is notoriously difficult, we have captured some of these core ‘artistic’ ingredients across a range of components that may combine together to explain differences between the arts and other psychosocial activities. For example, artistic content (which can be multi-modal), activity resources, sensory stimuli, cognitive stimuli, stimuli prompting aesthetic engagement or pleasurable experiences, facilitators drawing upon artistic practice, and the attractiveness of the environment were all identified. Whilst some of these may be present individually in other interventions, the essence of the ‘artistic’ experience may also emerge via the specific combination of these and other ingredients provided through an arts activity, such as individuals engaging in cognitive processes such as problem solving within the context of multisensory engagement⁴⁷. In this sense, the simultaneous presence of many of these ‘artistic’ ingredients and their interactions with one another present a way of differentiating the arts from other interventions (e.g., from psychological interventions such as counselling or from social activities such as group sports).

Implications for future research

The ability to specify ingredients according to a detailed framework should aid in the comparison of different arts in health activities; for example, comparing two similar interventions (e.g., an experimental group taking part in a dance for Parkinson’s programme within a randomised controlled trial and a control group taking part in an exercise for Parkinson’s programme). Such comparisons could support more detailed reporting within process evaluations, aiding the interpretation of study findings. In other instances, the framework may help in identifying changes to an intervention as a study evolves. As an example, we have demonstrated how the worksheet could be used to compare the active ingredients of an in-person activity with a version adapted for an online format in the Additional File 5⁴¹. In multi-site studies that involve the delivery of the same intervention in different locations, the framework could be used to tailor interventions and highlight adaptations that are essential to meet local needs. Identifying ingredients after a multi-site study has already been delivered may also highlight changes to ingredients that happened organically, bringing to the fore reasons why it might be difficult to combine findings from across sites. Such specificity in reporting could improve the replication of studies.

Second, the specification of precise active ingredients may facilitate research exploring how ingredients activate specific causal mechanisms linked to health outcomes. This is an important step in being able to design activities that aim to modulate specific mechanisms and outcomes. Nonetheless, it should be remembered that arts activities are complex interventions. Whilst active ingredients have been presented in our tables as separate components, these ingredients may overlap or feed into one another, working together to prompt causal mechanisms.

Our research identifies a large range of active ingredients that may need to work together to influence health outcomes. The combination of these ingredients may lead to more than the sum of the individual parts⁴⁸. Thus, studies that attempt to manipulate specific ingredients in isolation from one another may risk altering other ingredients in an activity⁴⁹ and may not be able to reliably manipulate specific mechanisms²¹. Research exploring the interconnection between ingredients and mechanisms needs to take a pluralistic lens, considering how the removal or substitution of one ingredient affects other ingredients, and look more broadly at the effect of this on multiple mechanisms and outcomes to notice unanticipated changes.

Additionally, active ingredients may vary not just at an activity level but also for individuals taking part in an activity. For example, pre-existing friendships between activity participants (the active ingredient of ‘relationship to others’) may only be present for some participants. The effects of such ingredients on causal mechanisms may be affected (moderated) by the broader context. Whilst some of these factors are captured within the ‘contexts’ theme, we cannot view arts in health activities as existing in isolation from the broader macro environment⁵⁰. Individuals’ participation in the arts is affected by their own life histories and wider societal historical, political, economic, temporal and spatial factors⁵¹. Complex interventions are recognised as existing in a state of equilibrium rather than stasis⁵². So ingredients that have the ability in the current context to activate specific causal mechanisms may not continue to have such potency as contexts evolve⁵³. For example, the psychological impact of engaging in digital arts activities when they were novel technologically is likely very different to the same experience now when such activities are ubiquitous. Research needs to acknowledge these wider factors.

Finally, this framework was developed with a specific focus on the active ingredients of arts in health interventions. However, it may also have a relevance to research seeking to understand how more ubiquitous engagement in arts and culture as part of daily life (not for specific health purposes) can nonetheless still lead to health and wellbeing outcomes. Future work is encouraged that explores the validity of applying this framework to such contexts.

Implications for practice

The INNATE framework may support in the design and evaluation of arts in health interventions with a specific target health outcome. By presenting a clear way of thinking about ingredients, it could be used to provoke discussions on how an activity should be established and run to be optimised for different participant groups. For example, it could aid project planning and practice-based evaluation by helping practitioners identify intervention inputs and mechanisms. Further, given that there are well-recognised differences in language between and across art forms, disciplines, and sectors (e.g., arts, health and social care), the framework may help to establish common terminology between multi-disciplinary teams as interventions are designed. However, users should be cautioned against feeling that every ingredient needs to be present in an

activity. The presence of more ingredients does not necessarily imply stronger effects on health. Additionally, the specific combination of ingredients is likely as important as the presence or absence of individual ingredients.

Second, engaging in identifying ingredients for an existing intervention can prompt processes of reflexivity. Reflexivity denotes ongoing self-reflective processes on one's research or practice as a form of 'critical self-awareness'^{54,55}. This process is becoming increasingly employed by arts practitioners as a mode of reflective enquiry^{54,55}, drawing on its longer history of use within arts therapies⁵⁶. Whilst our framework does not make normative assertions about which active ingredients are 'right' in any given context, the person using the worksheet, such as a practitioner, could use the worksheet to evaluate their own practice. Many of our focus group participants reported how the prompts in the worksheet facilitated these kinds of reflexive processes, whereby contemplating which ingredients were present in their activities enabled reflection on what works and why, thereby improving activity delivery and evaluation.

Limitations

This study has a number of strengths; it presents a new theoretical framework for identifying the active ingredients of arts in health, constructs a shared language for identifying active ingredients, and has developed a worksheet that can be used in practice, all of which can support in advancing the design, delivery, and evaluation of arts in health interventions. However, it also has several limitations.

Firstly, although we used a wide range of search terms in our literature search, the diversity of language currently used to explore 'ingredients' means we may have missed specific papers. Similarly, our focus groups involved people from a broad range of artforms, but arts and cultural engagement is diverse. Therefore, it is possible that certain ingredients were omitted from our mapping exercise. Additionally, we focused on the ingredients as viewed from the perspectives of those designing and delivering arts in health interventions rather than those participating. We advocate for the cocreation of arts in health activities with participants, such as with those with particular lived experiences, and the worksheet we have created could be used as part of coproduction processes. However, it remains for future research to explore further what ingredients activity participants may perceive to be important for their health outcomes. Much like in cooking, the ingredients as added by the chef will be different to those tasted by the diner; ingredients within arts and cultural interventions are 'dynamic systems' and not 'static states' and are modified by their presence alongside one another, the context in which they are presented and the experiences of the individual engaging^{3,49}. Extending this culinary metaphor, we must be cautious about oversimplifying the concept of active ingredients to a 'recipe': this framework focuses on key ingredients but it is not an exhaustive list. Specific nuances in the design and delivery of an activity and subtle shifts in the processes of engagement and the pathways that individuals take into and out of engaging over time are often critical to the way an arts activity is

experienced by and impacts on individuals. However, from an implementation perspective - the lens from which this study was designed and conducted - being able to articulate the larger ingredients presented here is a major step forwards in how we discuss arts in health interventions and will be critical to the work seeking to expand and sustain arts in health programmes. INNATE is presented here as a framework that will expand and evolve over time.

Second, the inclusion of an ingredient in this framework does not imply that it has the potential to lead to health outcomes. We focused on ingredients common in arts in health activities but, due to limitations of existing research, it is not currently clear whether all of these have the potential to influence causal mechanisms or health outcomes. Some may be vital ingredients for specific outcomes, whilst others may play a role in facilitating specific mechanisms or provide important context within which the vital ingredients can be experienced, and others may have little or no effect. Our research does not recommend one specific ingredient over another, rather outlining the range of ingredients to be considered when designing and implementing arts in health activities. Future research is encouraged to identify which ingredients and their combinations are most important for specific mechanisms and outcomes.

Third, within different disciplinary silos and sectors, the language used for certain ingredients will sit more comfortably than for others. We recognise that the concept of 'active ingredients' is a metaphorical device that is used within particular healthcare contexts and may be viewed as too narrow by those implementing arts and cultural activities across other disciplines and sectors. However, our framework is not intended to replace vocabularies unique to different art forms or sectors, nor will every active ingredient be relevant to every kind of intervention. Rather, in view of the wide range of people from different sectors who work in the field of arts in health and the diversity of activities delivered, it is hoped that it can be used to support dialogue across domains, acting as a 'common dictionary'.

Finally, in this paper, we have separated out active ingredients from mechanisms of action³. This could falsely give the impression that in the real world, ingredients exist separately from the mechanisms they activate in a simple, linear model. However, the concept of 'active ingredients' is a theoretical tool to support with implementation, rather than markers of an objective reality, and the boundaries between some of our active ingredients and mechanisms may be viewed differently within other disciplines. The INNATE framework presented here is designed to be used in conjunction with an understanding of how ingredients activate mechanisms of action that lead to health outcomes. Specifically, the Multi-level Leisure Mechanisms Framework³ proposes a model for how active ingredients in arts interventions can affect health outcomes via different categories of mechanisms of action, all situated within a complexity science framework that considers micro-, meso-, and macro-level moderators. We encourage that the INNATE and Multi-level Leisure Mechanisms Frameworks are read and applied together.

Conclusion

This study has identified 139 active ingredients of arts in health activities, mapping out a comprehensive list of interconnected ingredients, alongside constructing a worksheet to support in the replication, evaluation, and scaling-up of interventions. Whilst recognising that no framework can capture every ingredient of a complex activity such as arts engagement and that more research is needed to explore the connections between ingredients, mechanisms and outcomes, our mapping exercise is the most extensive to date. It is hoped that our research will lay the foundation to build upon our theoretical knowledge of what it is about arts and cultural activities that enables them to affect our health.

Data availability

The raw data from this study is not being publicly archived for use by other researchers because the data contains information that could compromise the privacy of research participants. The UCL Research Ethics committee have restricted the use of the data to UCL researchers only. To discuss the conditions of this availability further, please email k.warran@ucl.ac.uk.

Extended data

OSF: ‘Supplemental materials for paper: What are the active ingredients of ‘arts in health’ activities? Development of the INgredients iN ArTs in hEalth (INNATE) Framework’. DOI [10.17605/OSF.IO/Z3QRE](https://doi.org/10.17605/OSF.IO/Z3QRE)⁴¹.

This project contains the following extended data:

- Additional file 1 – Scoping review.docx (Scoping review additional information including key word searches and results of the initial scoping review)
- Additional file 2 – Worksheet.docx (Worksheet to identify the active ingredients of arts for health activities)

- Additional file 3 – Focus groups.docx (Focus group additional information including additional details about participants, the topic guide used and an example of a RAP Sheet)
- Additional file 4 – Active ingredients of arts in health.docx (Full table of active ingredients identified including descriptions)
- Additional file 5 – Application of the worksheet.docx (Example application of the active ingredients worksheet to show how it can be used to compare the active ingredients of two interventions, including colour chart comparison)

Data are available under the terms of the [Creative Commons Attribution 4.0 International license](https://creativecommons.org/licenses/by/4.0/) (CC-BY 4.0).

Authors’ contributions

DF conceived the idea for the study, with KW and AB collaborating on its design. KW led on the empirical data collection and analysis, with weekly input at team meetings with DF. KW drafted the report with input from DF and AB.

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Gunter Kreutz 

Department of Music, Speech and Music Lab, Carl von Ossietzky University Oldenburg, Oldenburg, Germany

I am satisfied with the changes and amendments. I see little scope of improving the manuscript in the current state and congratulate the authors to an important contribution to the field, in my view.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: music psychology, music and health

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

Reviewer Report 03 May 2022

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Melissa Forbes 

Centre for Heritage and Culture and School of Creative Arts, University of Southern Queensland, Toowoomba, Qld, Australia

The article is strengthened by the revisions, and I have no further comments.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: practitioner-researcher in singing for health and wellbeing

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

Version 1

Reviewer Report 10 February 2022

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Melissa Forbes 

Centre for Heritage and Culture and School of Creative Arts, University of Southern Queensland, Toowoomba, Qld, Australia

This article presents the INNATE framework and toolkit for use in the design, implementation, and evaluation of arts in health activities. The framework is an important contribution to the field of the arts in health, as it synthesises into three categories the "active ingredients" of arts activities that lead to health and wellbeing effects - *project*, *people*, and *contexts*. These categories are useful, empirically-grounded thinking and design tools for arts in health practitioners, researchers and evaluators. They also stand as entry points for approaching and understanding the complex phenomena of arts in health activities.

I suggest including a brief description of the research participants in the abstract (e.g. "64 arts in health researchers, practitioners and managers" or similar) so it is clear to the reader from the outset who the participants were.

The background situates the contribution of the framework by explaining the use of the term "active ingredients" which has its basis in pharmacological research. The authors acknowledge, however, that within the social sciences, a linear concept such as "active ingredients" may not easily transfer to non-pharmacological interventions such as arts activities for health and wellbeing which are complex systems.

The authors might consider referencing the work of Camlin *et al.* (2020)¹ (either in the second to last or last paragraph of this section), which positions arts activities (and group singing in particular) as holistic and complex adaptive systems.

The authors conclude this section by outlining how a hybrid conceptualisation of "active ingredients"—acknowledging how these are understood in both complexity and implementation sciences—provides a useful lens to understand the mix of components that activate the mechanisms which improve health and wellbeing.

The methods and results are clearly articulated and reproducible with extended (but not raw) data included.

Figure 1 - the INNATE framework - will be of particular use in the monitoring and evaluation of arts in health programs, as it can inform the development of an initial program logic/theory of change as well as provide a conceptual frame for program evaluation upon program maturity.

The implications of the research for practice and future research, and limitations, are acknowledged and discussed thoroughly.

Reading as a practitioner-researcher, the framework's categories and sub-categories ring true and appear comprehensive. One limitation of the framework could be that it does not necessarily identify a hierarchy of ingredients. For example, might facilitator experience in the "People" category play a more fundamental role in the success of an activity than say, the environment in the "Contexts" category? Or, for argument's sake, *vice versa*? The authors do however emphasize in the section on implications for practice that not all ingredients are necessarily required for success, and that the combination of ingredients is also an important consideration.

Whilst the metaphor "active ingredients" has a reasonable level of utility, I agree with the authors that it should be applied with caution. "Ingredients" does imply a formula, and arts interventions are complex systems. The authors acknowledge the limitations of this metaphor, and that these activities may ultimately be "more than the sum of their parts" or ingredients. The INNATE framework is undoubtedly a great leap forward in specifying the active ingredients of arts in health activities, however, it may be that human experience of such complex systems still lingers somewhat elusively beyond the reach of logical frameworks and neat categorisation.

References

1. Camlin D, Daffern H, Zeserson K: Group singing as a resource for the development of a healthy public: a study of adult group singing. *Humanities and Social Sciences Communications*. 2020; **7** (1). [Publisher Full Text](#)

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Not applicable

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: practitioner-researcher in singing for health and wellbeing

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

Author Response 22 Apr 2022

Katey Warran, University College London, 1-19 Torrington Place, UK

Thank you very much for reviewing our article. We are delighted to hear that you feel our INNATE framework is an important contribution to the field, and that our methods and results are clearly articulated. We are also pleased that you consider our implications and limitations to be discussed thoroughly.

Based on your specific recommendations, we have added that our participants were those working in the field of arts and health in our abstract (briefly because of word count), and referenced Camlin (2020) to show wider acknowledgement of viewing the arts as complex systems. Thank you for the suggestions.

As you note, yes, this is indeed true that some ingredients may be more or less salient in certain contexts than others, and that we have not put forward a hierarchy. Rather, we have provided a framework for identification of ingredients that can prompt reflexivity on which ingredients may be important to health outcomes. As you highlight, we discuss this in our discussion and explain that not all ingredients are required, and that users should be cautioned against feeling that every ingredient needs to be present in an activity. It remains for future research to explore which combinations of ingredients are needed to lead to specific health outcomes.

Thank you also for your critical reflection on the use of the metaphor 'active ingredients', recognising that we have grappled with the limitations and benefits of using this term. We are delighted that you feel that the framework is a great leap forward.

Competing Interests: No competing interests were disclosed.

Reviewer Report 25 January 2022

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Gunter Kreutz 

Department of Music, Speech and Music Lab, Carl von Ossietzky University Oldenburg, Oldenburg, Germany

The authors offer an in-depth perspective on health-related arts practices for health and wellbeing. The approach is unique as it embraces qualitative social science techniques to identify or rather unpack the multitude of facets that characterize arts interventions in this domain. The work suggests a very rich repository to construct working hypotheses for future investigations. The practitioners' views are highly valuable, the exclusive exploration of the supply side in arts-for-health interventions appears justified.

What I wonder is why questions like how experiences feedback on practitioners and how they balance personal, artistic, and social demands, whether they receive, need, or miss supervision, recognition, better salaries, etc. are only scarcely addressed. Such responses would be informative about the professionalization of delivery. There is little information in the manuscript on the "64 participants", the respective Table does not mention demographics, levels of experience, training, position (full/part-time) etc.

The target groups are talked "about", but not included in this survey. Obviously, there is a great deal of sensitivity to the clients/patients, but beyond the consideration that understanding clients/patients is important with respect to consequences for practice, not much information is given.

The authors admit in their limitations that there is a possibility of oversimplification. However, there is also a danger of overspecification, because, without the input from the demand side, the more or less important ingredients cannot be identified. A recent study has shown that experimenter-chosen music differs radically from client-chosen music in pain patients. All arguments for a "good choice" fell apart as it was clear that the majority of pain patients seemed to need something completely different.

I think that professionalization, training, and monitoring/supervision, are topics that may contain rather decisive information on the supply side. Missing out on those appears to me as a limitation.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Not applicable

Are all the source data underlying the results available to ensure full reproducibility?

Partly

Are the conclusions drawn adequately supported by the results?

Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: music psychology, music and health

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

Author Response 22 Apr 2022

Katey Warran, University College London, 1-19 Torrington Place, UK

Thank you for your review. We are delighted to hear that you feel our article offers an in-depth perspective and takes a unique approach to exploring the complexities of arts in health interventions, also facilitating future investigations. We are grateful for your critical feedback and respond to your specific comments below.

Thank you for your feedback regarding the inclusion of practitioners' experiences. The INNATE framework is intended to support with the design, implementation, and evaluation of arts in health activities. Given this focus on the delivery of activities (what you have described as the 'supply side' that you felt was justified), we feel that our inclusion of ingredient categories - which can be used to prompt reflexive processes on the more nuanced experiences of practitioners - is suitable in view of the aim of our framework. Explaining further, the worksheet is designed in a way so that the user (which could be a practitioner) reflects on the kinds of responses you have raised. For example, in the 'activity facilitation' section of the worksheet, the ingredient of 'professionalization' may prompt the user to question whether they need more supervision, or the 'fees' section in 'project set-up' category may prompt reflection on the need for better salaries. Thus, if a practitioner is affected by the different demands you mention, they will note these within our ingredient categories. Our worksheet supports with identifying these issues, rather than making normative assertions about what is the 'right' or 'wrong' way to deliver an arts in health activity. We hope that our framework will support with future research exploring how to optimise activities for improved health. We have now clarified this further in our manuscript.

Regarding the information about our participants, we interviewed individuals based on their professional capacity, not their personal capacity. Thus, we chose not to collect demographic and individual data, instead focusing on understanding what our participants viewed as the ingredients of the activities they were involved in delivering. We were interested in the content of participants' speech relating to their expert knowledge as generalists, rather than their individual subjectivities and personal experiences - we have now made this clearer in our manuscript. Nevertheless, we did also collect information relating to the geographic location in which our participants' work was being delivered. We have now added this into our table to provide a richer picture of the activities that were discussed to cocreate our INNATE framework, building on your recommendation that further information would be welcome.

In relation to your comment regarding talking 'about' our target group, we would like to

emphasise the purpose of our research. Our aim was to create a framework to support those designing, delivering, implementing, and evaluating arts in health activities (the 'supply side'). This aim was constructed very carefully as there are a lack of implementation tools available for those working in the field of arts and health to support with understanding active ingredients. Our intention was to provide a framework for those developing arts in health activities, rather than necessarily for those experiencing the activities themselves. Nonetheless, those engaging could work in partnership with those designing and delivering activities to use this framework. We advocate for the cocreation of arts in health activities, for example involving those with lived experience to codesign activities, where our framework could be used as part of a collaborative exercise.

Finally, as you note, participants may perceive there to be different active ingredients than those identified in this framework, and we have now mentioned this as a limitation of our work. Whilst our framework could be used with participants to collaboratively identify active ingredients, and the remit here was to provide a tool for those developing activities, it remains for future research to explore further the 'demand side'. There is a gap to identify research questions that are important in view of those experiencing and engaging in arts in health activities which may differ from the interests of those on the 'supply side', as we have explored here.

Competing Interests: No competing interests were disclosed.