Using the experience sampling method to examine the psychological mechanisms by which participatory art improves wellbeing

Structured abstract

Aims: To measure the immediate impact of art-making in everyday life on diverse indices of wellbeing ('in the moment' and longer term) in order to improve understanding of the psychological mechanisms by which art may improve mental health.

Methods: Using the Experience Sampling Method, 41 artists were prompted (with a 'beep' on a handheld computer) at random intervals (ten times a day, for one week) to answer a short questionnaire. The questionnaire tracked art-making and enquired about mood, cognition and state of consciousness. This resulted in 2495 sampled experiences, with a high response rate in which 89% of questionnaires were completed.

Results: Multi-level modelling was used to evaluate the impact of art-making on experience, with 2495 'experiences' (experiential-level) nested within 41 participants (person-level). Recent art-making was significantly associated with experiential shifts: improvement in hedonic tone; vivid internal imagery; and the flow state. Further, the frequency of art-making across the week was associated with person-level measures of wellbeing: eudemonic happiness and self-regulation. Cross-level interactions, between experiential and person-level variables, suggested that hedonic tone improved more for those scoring low on eudemonic happiness, and further that, those high in eudemonic happiness were more likely to experience phenomenological features of the flow state and to experience inner dialogue while art-making.

Conclusions: Art-making has both immediate and long-term associations with wellbeing. At the experiential-level art-making affects multiple dimensions of conscious experience: affective, cognitive and state factors. This suggests that there are multiple routes to wellbeing (improving hedonic tone, making meaning through inner dialogue and experiencing the flow state). Recommendations are made to consider these factors when both developing and evaluating public health interventions that involve participatory art.

Keywords: Experience sampling methodology, wellbeing, participatory art, positive affect, flow state, inner dialogue, eudemonic happiness.

Introduction

The health benefits of participatory arts are increasingly recognised, with a growing evidence base.[1,2,3] Nevertheless, it is important to improve understanding of the mechanisms by which art-making may improve health and wellbeing in order to both build supporting explanatory models and to improve the efficacy of public health interventions. The current paper focuses on art-making as a personal resource in everyday life and its associations with psychological indices of wellbeing (both 'in the moment' and longer term), in order to explore the psychological mechanisms by which art-making promotes wellbeing in this context. It does so using a novel protocol in the arts and health – experience sampling methodology (ESM).

Involvement in participatory arts appears to improve wellbeing broadly defined (e.g., on the Warwick-Edinburgh Wellbeing Scale).[4,5] Specific health outcomes have also been reported, including reduced depression, stress and anxiety and improved immune system functioning.[6,3] Further benefits of art-making include increased positive affect, self-esteem, and improved social skills and working memory.[1, 6, 7, 8, 9] Various models have been proposed to explain why and how participatory arts may improve wellbeing.[10] For example, early models to explain the effects of expressive

writing on wellbeing proposed that art enables catharsis, whereby disclosing once

inhibited affective content reduces stress and improves immune system functioning.[11]

This is somewhat supported by recent findings that involvement with music both

improves hedonic tone and immune system functioning.[12] Subsequent models

emphasised cognitive factors, since expressive writing appeared to be most effective

when a narrational restructuring of experience occurred through art-making.[13,14]

Further, since health benefits have occurred without catharsis or the cognitive

restructuring of stressful experiences, but when expressing positive thoughts, it has

been proposed that self-regulation is a key component. Art may enable one to practice

confront and control emotions, or orient oneself to meaningful goals, for example.[15] A

further, and perhaps neglected variable, is the state of consciousness that art might

facilitate. For example, the 'flow state', a state of deep absorption, may improve

wellbeing by providing temporary distraction from debilitating experiences or

thoughts, or through the self-affirming nature of the experience itself and associated

feelings of accomplishment.[16,17,18] Given the breadth of explanations for a link between

art-making and health, the current study carefully selected indices of affect, cognition,

self-regulation and state of consciousness, in order to evaluate changes in these

following art-making in daily life.

While there have been calls for more randomised controlled trials to strengthen the evidence base,[2] as well as pleas to consider qualitative research in the 'hierarchy of evidence',[19] other methodologies may make unique contributions to the evidence base and theory building. The experience sampling method enables snapshots of everyday experience to be randomly sampled and reported upon by participants. Repeated observations are made and thus experiential patterns over time can be assessed (rather than measuring wellbeing at two, potentially arbitrary, points in time, as is typical in pre- post evaluation designs). Experiences are randomly selected, the aim being to collect a representative sample of the participants' typical conscious experiences. It has the advantage of enabling art-making, and its immediate impact, to be studied within the context of everyday life, rather than in experimental conditions that lack ecological validity and complexity. Since experience is reported on immediately, in real-time, problems with retrospective recall of experience are reduced, as are problems with demand characteristics.[20] The ESM has been profitably used in previous public health research, for example, to examine predictors of pain, smoking and psychotic symptoms in daily life.[21,22,23] In relation to creative behaviour, previous work using the ESM has reported that participants feel more happy and active following creative activities.[24] The current study expands upon this by including further indices of wellbeing, and with a specific focus on the arts.

The current study aimed to improve understanding of the immediate psychological benefits of art making, following intrinsically motivated moments of art-making in everyday life. Artists were prompted, at random intervals, ten times a day, over the course of one week, to report on their art-making activity as well as their current state, including mood (positive and negative affect), cognition (e.g., focus, rationality), self-esteem and state of consciousness (e.g. the flow state). In addition long-term wellbeing measures were included to test whether these were also associated with art-making. These were chosen to reflect the diversity of the wellbeing construct, and the diversity of routes to wellbeing suggested by previous research. They included: subjective feelings of wellbeing,[25] such as eudemonic happiness (feeling that one's life has purpose and is meaningful);[26] factors thought to be fundamental to wellbeing (social connection, feelings of competence and autonomy);[27,28] and factors indicative of healthy self-functioning (self-efficacy and self-regulation).[29,30] It was hypothesized that following art-making participants would be more likely to be in a state characterized by positive affect, the flow state, daydream-like cognition and self-esteem and that these experiential shifts would predict long-term wellbeing.

Methods

Participants

41 artists (31 female), aged between 22 and 66 (mean age = 37.82) were recruited in Bristol, through opportunity sampling (for example, notices in online artistic communities). Artists were self-defined as such, but were required to regularly engage in the arts, to have been doing so for at least one year and to be making art during the sampling week. Disciplines included the visual arts (n = 32), creative writing (n = 4), film-making (n = 1) and performance art (n = 4). Since improvements in wellbeing (e.g., mood and the flow state) have been reported across different forms of creative activity (e.g. writing, visual arts and performance) participants were studied as a homogenous group.[6, 12, 16, 17, 18, 24] In order to remunerate participants for their time and effort, each was paid £70.[31,32]

Design

This was a multi-level, repeated-measures design, with 2495 sampled experiences (level one – 'the experiential-level') nested within 41 participants (level two – 'the person-level'). The criterion variable was art-making, with predictor variables at both the 'experiential-level' (measures of mood, cognition and state of consciousness) and

'person-level' (indices of general wellbeing). To minimise order effects questions, at both levels, were presented in a random order.

Materials

Personal data assistants (PDAs) and software: Zire 72 PDAs, by Palm, were programmed with the revised Experience-Sampling Program.[33]

Experience sampling questionnaire (ESQ): The ESQ consisted of 23 questions, chosen to measure diverse elements of conscious experience. 12 Items were selected from the Phenomenology of Consciousness Inventory (PCI),[34] a well-validated questionnaire with independent dimensions that have been found to reliably distinguish between a variety of states of consciousness.[35,36] Items were selected to measure the following dimensions, as indicated in the table below: altered state (4 items: body image, perception, time, meaning), imagery (2 items: amount and vividness), attention (2 items: direction and absorption), self-consciousness (1 item); internal dialogue (1 item); rationality (1 item) and volitional control (1 item). An additional item was added, as used in previous ESQs,[37] to measure self-esteem, since this is a reported outcome of participatory arts:[7] "I felt good about myself".
Two further items, commonly used to measure the challenges and skills components

of the flow state ('conditions for flow')[20] were taken from the Short Flow Scale (SFS).[38] Although mood is included in the PCI, the short Positive Affect Negative Affect Scale (PANAS)[39] was used instead since this is a more established measure. Participants were also asked to report on what they were doing and with whom (3 items) as is standard in experience sampling questionnaires[20] and to track the time spent making art (1 item). A slider, with scores ranging from 0 to 100 was used as the response scale for most items (from 'strongly agree' to 'strongly disagree' for state items, and 'no time' to 'all of the time' for time spent making art). Mood was assessed using adjectives, which were presented as a checklist to be selected if relevant. The initial contextual questions were open-ended and completed with text responses. The complete ESQ is detailed in Table 1.

Table 1: The Experience Sampling Questionnaire

1	When you were beeped, where were you?
2	When you were beeped, who were you with?
3	When you were beeped, what was the main thing that you were doing?
4	Since you were last beeped how much time have you spent making art?
	At the time of the beep:
5	… I was feeling |Happy|Sad|Satisfied|Low-spirited|Inspired
6	… I was feeling |Tense|Nervous|Relaxed|Calm|Upset
7	… I was feeling |Active|Sluggish|Sleepy|Energetic|Alert|Attentive
8	… I was feeling |Hostile|Ashamed|Determined|Angry|Annoyed|Afraid
9	… I felt my body greatly expanded beyond the boundaries of my skin (PCI)
10	… time seemed to greatly speed up or slow down (PCI)
11	… the world around me became extremely different in colour or form (PCI)
12	… I experienced very profound and enlightening insights of certain ideas or issues (PCI)

13	… I experienced no or very few images (PCI)
14	… my imagery was as clear and vivid as objects in the real world (PCI)
15	… my attention was completely inner-directed (vs. outer-directed) (PCI)
16	… I was distracted and unable to concentrate on anything (PCI)
17	… I lost consciousness of myself (PCI)
18	… I was silently talking to myself a great deal (PCI)
19	… my thinking was clear and understandable (PCI)
20	… I relinquished control and became passive and receptive to what I was experiencing (vs. wilfully controlling what I was experiencing) (PCI)
21	… I felt just the right amount of challenge in what I was doing (SFS)
22	… I knew what I had to do each step of the way (SFS)
23	… I felt good about myself

Orientations to Happiness Questionnaire.[40] This is a psychometrically validated,[40,41] 18-item questionnaire, that measures three different types of happiness: hedonic (the pursuit of pleasure), eudemonic (the pursuit of meaning) and engagement (the pursuit of the 'flow' state). Example questions are, respectively: "For me, the good life is the pleasurable life"; "My life has a lasting meaning"; and "Whether at work or play, I am usually 'in a zone' and not conscious of myself".

Basic Psychological Needs Scale.[27] A 21-item, psychometrically validated scale,[42,43,44] that measures factors thought to predict wellbeing based on self-determination theory: relatedness, feeling meaningfully connected with other people (for example, "People in my life care about me"); autonomy, feeling that one's choices in life are self-determined (for example "I feel like I am free to decide for myself how to live my life");

and competence, feeling a sense of capability and mastery in daily activities (for example, "I have been able to learn interesting new skills recently").[28]

General Self-Efficacy Questionnaire[29] is a psychometrically validated,[45,46] ten-item measure of a person's belief in their capacity to cope with adversity, accomplish goals, persevere and recover from setbacks. An example item is "I am confident that I could deal efficiently with unexpected events".

Self-Regulation Scale.[30] This psychometrically validated,[47,48,49,50] ten-item scale measures a person's ability to regulate their attention and emotion. An example item is: "If an activity arouses my feelings too much, I can calm myself down so that I can continue with the activity soon".

Procedure

The study was advertised as "aiming to learn more about the fluctuations of conscious experience in daily life", especially in relation to the creative process. Participants were given a link to a website where they could learn more about the study and register their interest in taking part. They could also, anonymously, through the generation of a unique cross-referencing code, complete the battery of psychometric measures online (*Self-Regulation Scale, General Self-Efficacy Questionnaire, Basic Psychological Needs Scale* and the *Orientations to Happiness Questionnaire*)[29]. This code could be re-

created to link this data with the experience sampling data. The researcher contacted

participants through their preferred method and described the study to them further,

answered any questions and arranged a time to meet them. At this meeting care was

taken to establish a good rapport with participants and to explain clearly how to take

part. Participants were given the PDA to practice with. It was ensured that they

understood the questions on the ESQ, could hear the PDA's signal, and were

comfortable with using it. They were given a protective case and a charger for the PDA,

as well as the researcher's contact details in case they needed assistance during the

week. Participants were able to choose seven consecutive days when they would like

to participate and the sampling time frame was set to suit their sleeping patterns. This

time frame spanned twelve consecutive hours of each day. The PDA was programmed

to signal participants ten times per day, at random times, to complete the ESQ. Each

ESQ was time stamped and response times for answering each question were

recorded. If a participant failed to respond to the signal within three minutes the PDA

reverted to 'sleep mode' until the next stimulus. Participants could not use the PDA

other than to complete ESQs when signalled – the program 'locked' the PDA.

Participants carried the PDA with them for a week-long period and met with the

researcher at the end of this period. They then discussed their experience of taking

part with the researcher and returned the equipment, following which they were remunerated for their participation.

Results

Screening the data and analysis

Participants responded to 89% of the beeps and all participants provided adequate response rates (ranging from 64% to 97%).[20] ESQs that all had the same response (e.g. the default setting of 50 on the sliding scales) and responses completed in less than one second were deleted, following best-practice recomendations.[31]

Because the data is nested, multi-level modelling was used in order to account for the lack of independence of data at the experiential-level.[51] Following standard recommendations, within-person predictor variables were centred around individual mean scores, while between-person variables were centred around grand mean scores.[52,53]

The residuals for 'time spent art-making' were significantly positively skewed. Hence, a gamma regression model, which allows the normality assumption to be violated, was

selected.[54] Age, gender and the stimulus number (time) were included as predictors in multi-level models, the latter to control for potential autocorrelation.[55]

Experience sampling data: Associations between art-making and conscious experience

Participants described themselves as in the process of art making 'right now' 9.4% of the time (235 occasions). The mean response (on a scale from 0 to 100) to having recently been art-making (since the 'last beep') was 25.18 (SD = 32.96), and participants reported making art in-between beeps 69.4% of the time. As such the sampled experiences reflect a range of 'artistic' and 'non-artistic' moments.

Art-making was significantly predicted by a range of affective, cognitive and state factors (as indicated in Table 2). In terms of mood, art-making was significantly associated with positive affect (active, determined, attentive, inspired, alert) (γ = .182, p < .001), rather than negative affect (afraid, nervous, upset, hostile, ashamed), which was non-significant (γ = -.078, p = .200). In terms of cognition, art-making was significantly associated with vividness of internal imagery, both visual (γ = .005, p < .001) and auditory (inner dialogue) (γ = .004, p = .004), but not with attention (e.g. being focused) or thinking style (e.g. structured, clear cognition). Finally, art-making

was significantly associated with conditions required for the flow state (γ = .005, p < .001) and with an altered state of consciousness (altered perception of time, enlightening insights, the world becoming different in colour or form and an altered awareness of one's body) (γ = .001, p = .032) in addition to reduced self-consciousness (γ = .003, p = .05). Art-making was not significantly associated with changes in self-esteem (feeling good about oneself). Overall, this suggests that art-making was a positive experience, associated with positive affect, the flow state and rich internal imagery.

Table 2: Parameter Estimates for Multilevel Model of Level One Stimulus Variables as Predictors of recent Art-making

Experiential variables	Associated ESQ items	Estimates (and p-values)
Flow	21 & 22	.005 (<.001) ***
Altered experience	9,10, 11, 12	.001 (.028) *
Self-consciousness (reduced)	17	.003 (.050) *
Imagery	13,14	.005 (<.001) ***
Attention (inward)	15	<.001 (.949)
Distractibility	16	<.001 (.943)
Clarity of cognition	19	-.002 (.299)
Volitional control	20	-.002 (.211)
Internal dialogue	18	.003 (.004) **
Self-esteem	23	.002 (.379)
Positive affect	5,6, 7, 8	.165 (<.001) ***
Negative affect	5,6, 7, 8	-.106 (.057)

Estimates are unstandardized multi-level regression coefficients.

*** $p \leq .001$, ** $p \leq .01$, * $p \leq .05$

Art-making as predicted by person-level wellbeing measures

In order to assess whether the frequency of art-making across the week was associated with long-term wellbeing, person-level predictors were added to the model. Art-making was significantly associated with eudemonic happiness (finding meaning in life) ($\gamma = .073$, $p = .011$) and self-regulation (being able to organise oneself in order to meet goals) ($\gamma = .005$, $p = .042$). Other wellbeing predictors were not significantly associated with art-making (as indicated in Table 3).

Table 3: Parameter Estimates for Multilevel Model of Level Two person-level Variables as Predictors of Art-making

Wellbeing variables	Estimates (and *p*-values)
Engagement (happiness)	-.016 (.588)
Hedonic (happiness)	.019 (.487)
Eudemonic (happiness)	.073 (.011) *
Autonomy	-.023 (.344)
Relatedness	-.002 (.256)
Competence	-.002 (.953)
Self-efficacy	-.011 (.600)
Self-regulation	.005 (.042) *

Estimates are unstandardized multi-level regression coefficients.

*** $p \leq .001$, ** $p \leq .01$, * $p \leq .05$

Cross-level interactions between experiential-level and person-level measures

By adding cross-level interactions to the model it was tested whether the relationship between experiential states and art-making differed significantly between people according to their wellbeing levels (eudemonic happiness and self-regulation). As

indicated in Table 4, this led to four significant interactions, represented in Figures 1-4.

Participants with low scores on eudemonic happiness experienced a greater improvement in hedonic tone following art-making ($\gamma = -.016$, $p = .002$) (as indicated in Figure 1). Participants with high levels of eudemonic happiness were more likely to experience inner speech when art-making and less likely to experience inner speech in other contexts in daily life ($\gamma = -.001$, $p = .002$) (as indicated in Figure 2). Similarly, participants with high eudemonic happiness were more likely to experience altered states while art-making ($\gamma < .001$ $p = .031$), as indicated in Figure 3. Finally, those scoring low on self-regulation experienced more inner speech, especially when making art ($\gamma = -.001$, $p = .024$) (as indicated in Figure 4). Collectively, these cross-level interactions suggest both that conscious experience following art-making differs according to levels of wellbeing and that conscious experience while art-making may predict long-term wellbeing. However, these analyses were exploratory and are thus interpreted with caution.

Table 4: Cross-level interactions between significant person-level and experiential-level predictors of art-making

Wellbeing variables	Experiential variables	Estimates (and *p*-values)
Eudemonic (happiness)	Positive affect	-.016 (.002) **
	Imagery	<.001 (.496)
	Inner dialogue	-.001 (.002) **
	Flow	<.001 (.648)
	Altered experience	<.001 (.031) *
	Self-consciousness	<.001 (.117)

Self-regulation	Positive affect	-.004 (.384)
	Imagery	<.001 (.784)
	Inner dialogue	-.001 (.024) *
	Flow	<.001 (.553)
	Altered experience	<.001 (.526)
	Self-consciousness	<.001 (.792)

Estimates are unstandardized multi-level regression coefficients.

*** $p \leq .001$, ** $p \leq .01$, * $p \leq .05$

Figures 1-4: Associations, with line of best fit, between art-making and experiential-level predictors according to high and low scores on person-level predictors

Figure1: Association, with line of best fit, between art-making and positive affect according to high and low scores on eudemonic happiness

[Insert Figure 1]

Figure 2: Association, with line of best fit, between art-making and inner dialogue according to high and low scores on eudemonic happiness

[Insert Figure 2]

Figure 3: Association, with line of best fit, between art-making and altered experience according to high and low scores on eudemonic happiness

[Insert Figure 3]

Figure 4: Association, with line of best fit, between art-making and inner dialogue according to high and low scores on self-regulation

[Insert Figure 4]

Data on the X-axis for the variable "Since you were last beeped how much time have you spent making art?" ranges from 0 = "no time" to 100 = "all of the time". Data on the Y-axes represent person-centred scores on each variable, where 0 = individuals' mean scores, and deviations from this are represented by – (below average) and + (above average) scores.

Discussion

The current research was innovative in that it was the first study to apply the ESM to the understanding of art and health, enabling the inclusion of diverse indices of wellbeing.[56] Multi-level modelling suggested that art-making was associated with a phenomenological profile characterised by positive affect, vivid imagery and the flow state, and accordingly with multiple psychological mechanisms. Further, art-making was associated with specific facets of long-term wellbeing: eudemonic happiness; and self-regulation. Cross-level interactions suggested that the experiential-level may impact upon long-term indices of wellbeing. For example, participants with high levels of eudemonic happiness were more likely to report phenomenological features of the flow state while art-making, supporting the view that the health benefits of art-making are not merely fleeting.

Subsequent to art-making, participants reported being in a more positive mood, replicating recent findings that creative activities boost hedonic tone in everyday life.[24] An important theoretical point is that rather than reducing negative affect (for example, through catharsis), art-making in the current study was only significantly associated with increases in positive affect, suggesting that art may improve, rather than repair, hedonic tone, in this context. It must be noted that positive affect on the

PANAS conflates both hedonic tone and excitement (positive arousal), which other mood scales distinguish between,[57] and as such, it could be questioned whether this finding denotes an increase in excitement or happiness. Nevertheless, the results support affective models for the role of the arts for wellbeing – art-making may increase feelings of positive affect, which are an essential component of wellbeing.[10] Further, exploratory cross-level analyses suggested that participatory art may be a particularly useful resource (improving hedonic tone) for those with low levels of eudemonic happiness (even though they are less likely to make art).

Art-making was associated with changes in cognition. During or following recent art-making, participants were more likely to report experiencing vivid imagery and inner dialogue, cognitive features indicative of daydreaming.[58] The role of such cognitive features in relation to wellbeing requires further exploration. Previous research suggests that particular types of cognition, while art-making, are associated with health outcomes, such as the use of 'causality words' (e.g. 'because') and 'insight words' in expressive writing (indicative of reinterpretation and meaning-making).[59] Indeed, inner speech is thought to be crucial to making sense of everyday life and developing a sense of self.[60] Potentially, imagery and internal dialogue during art-making could promote wellbeing through the development of healthy internal representations, which are perhaps externalised and explored through the medium of

art.[61] Interestingly, in the current study, high eudemonic happiness was associated with more inner dialogue when making art (and less inner dialogue when not making art). This does support the role of cognitive content (inner speech) as a contributory factor to eudemonic happiness, which is facilitated in the context of art-making. However, the type and content of this inner imagery is not discernible in the current study in order to further examine its potential role.

Recent art-making significantly predicted features of the flow state, complete absorption in one's current activity.[16] Art-making was associated with both the 'conditions for flow', participants reporting that challenges and skills were balanced, and experiential features of the flow state: entering an altered state of consciousness (e.g., losing awareness of time); and reduced awareness of self. Although flow in the context of art-making has been described qualitatively,[16,26,62] this has not been replicated experimentally.[18] The current study provides important empirical support for the role of the flow state as a route to wellbeing through art-making, supporting research on the import of flow in other contexts to wellbeing (e.g. the workplace).[63] That expressive writing did not facilitate flow in previous research[18] may be because the conditions for it were not met (having sufficient skills to meet the challenge provided, and having sufficient challenges to prevent boredom). In order to produce optimal wellbeing (by providing opportunities for flow) when designing arts for health

interventions, a careful consideration of participants' skill-sets should be made, enabling the provision of suitable challenges across a course.[64] For example, in educational settings, the flow state is more likely to arise when each student is given a task slightly ahead of their current skill-set, and when they are given choice within this task.[64]

Finally, art-making in everyday-life was associated with finding happiness through meaning in life (rather than through hedonism) and self-regulation (rather than variables associated with self-efficacy, autonomy or relatedness). Low levels of eudemonic happiness are a significant risk factor for depression,[40,65] and high levels are associated with finding meaning, purpose and personal growth, suggesting that eudemonic happiness is essential to wellbeing.[26] It is important to note that the current sample had a high level of skill and expertise in the arts, and worked independently, rather than in formal art classes. Hence, other factors (such as developing competence though learning artistic skills and relationships with others) may be more important in intervention studies with less experienced artists in a social setting. Further, the direction of these relationships between art-making and wellbeing is not known. As such, the experiential-level data and cross-level interactions are potentially more meaningful, since these analyses focus on changes during or directly following art-making.

Despite the encouraging findings, there are a number of limitations with the current study. This study worked with practicing artists and findings may not be generalizable to other groups. Future research could include control or comparison groups in order to assess the benefit of art-making in different samples (e.g. artists versus non-artists or specific clinical groups). Further, since the artists in this study were self-defined there was variation in what this meant in practice. In future work it may be useful to focus on artists working within specific disciplines and with similar levels of expertise. In addition, the experience sampling questionnaire used a collection of items that had not been used before to repeatedly measure conscious experience in everyday life, hence further consideration of its usefulness and validity in this context would be appropriate. Further, since the ESM is observational and analyses are correlational the causal relationship between variables is unclear (e.g., between art-making and mood). Experimental research could usefully build upon these findings to test causal models, and event-triggered ESM designs, which ask participants to complete ESQs at specific points in time (e.g., before and after art-making) could help to track patterns over time more effectively (enabling causal patterns to be inferred). Finally, the current study did not examine the impact that the arts may have on physical health[6,12]. An extension of the ESM to measure biomarkers (e.g., heart rate variability)[66] in everyday life may be informative in this regard.

Conclusions

Measuring participants' state of consciousness during or immediately following art-making is a useful tool for assessing the impact of art-making on wellbeing. Positive affect, vivid imagery and the flow state, were all associated with art-making, suggesting multiple routes to well-being. Further, these experiential factors interacted with long-term eudemonic happiness, suggesting that specific states (e.g. the flow state) may predict specific health outcomes (e.g. meaning in life). It is recommended that arts interventions consider the likelihood that specific tasks will enable these state factors to be experienced by participants (in particular, whether tasks meet the conditions for flow). It is further suggested that intervention evaluations measure wellbeing using state questionnaires when possible in order to capture the immediate impact that art might have. Future research could profitably use the ESM with participants of arts for health interventions to track their longitudinal impact on wellbeing.

Declaration of conflicting interests

None

References

1. Chatterjee HJ, Camic, PM, Lockyer, B, et al. Non-clinical community interventions: a systematised review of social prescribing schemes. *Arts & Health*. Epub ahead of print 18 June 2017. DOI: 10.1080/17533015.2017.1334002.
2. Clift S. Creative arts as a public health resource: moving from practice-based research to evidence-based practice. *Perspectives in Public Health*, 2012; 132(3): 120-127.
3. Stuckey HL and Nobel J. The connection between art, healing, and public health: A review of current literature. *American journal of public health*, 2010; 100(2): 254-263.
4. Baker C, Loughren EA, Ellis L, et al. *Wiltshire Artlift Move on groups evaluation final report*. Cheltenham: University of Gloucestershire, 2017.
5. Baker C, Crone D, Loughren E, et al. Artlift: Impact on patient mental well-being change of an arts-on-referral programme: *The European Journal of Public Health*, 2015: 25(suppl_3), ckv175-207.
6. Baikie KA and Wilhelm K. Emotional and physical health benefits of expressive writing. *Advances in Psychiatric Treatment* 2005; 11(5):338-46.
7. Bungay H and Clift S. Arts on prescription: a review of practice in the UK. *Perspectives in Public Health* 2010; 130(6): 277-281.
8. Burton CM, King LA. The health benefits of writing about intensely positive experiences. *Journal of Research in Personality* 2004; 38(2):150-63.
9. Klein K and Boals A. The relationship of life event stress and working memory capacity. *Applied Cognitive Psychology* 2001; 15(5):565-79.
10. Sloan DM and Marx BP. Taking pen to hand: Evaluating theories underlying the written disclosure paradigm. *Clinical Psychology: Science and Practice* 2004; 11(2):121-37.
11. Pennebaker, JW. Writing about emotional experiences as a therapeutic process. *Psychological science* 1997; *8*(3): 162-166.
12. Fancourt D, Williamon A, Carvalho, LA, et al. Singing modulates mood, stress, cortisol, cytokine and neuropeptide activity in cancer patients and carers. *ecancermedicalscience*, 2016; *10*.
13. Kaufman JC and Sexton JD. Why doesn't the writing cure help poets? *Review of General Psychology* 2006; 10(3):268-282.
14. Ullrich PM and Lutgendorf SK. Journaling about stressful events: Effects of cognitive processing and emotional expression. *Annals of Behavioral Medicine* 2002; 24(3): 244-250.
15. *King LA. The health benefits of writing about life goals. Personality and Social Psychology Bulletin 2001; 27: 798–807.*
16. Csikszentmihalyi, M. *Flow and the psychology of discovery and invention*. New York: Harper Collins, 1996.
17. Drake JE and Winner E. Confronting sadness through art-making: Distraction is more beneficial than venting. *Psychology of Aesthetics, Creativity, and the Arts* 2012; *6*(3): 255-261.
18. Fink L and Drake, J. E. (2016). Mood and flow: Comparing the benefits of narrative versus poetry writing. *Empirical Studies of the Arts*, *34*(2), 177-192.
19. Gilroy, A. (2006). *Art therapy, research and evidence-based practice*. Sage.

20. Hektner JM, Schmidt JA and Csikszentmihalyi M. *Experience sampling method: Measuring the quality of everyday life*. Thousand Oaks, CA: Sage, 2007.

21. Businelle MS, Ma P, Kendzor DE, et al. Predicting quit attempts among homeless smokers seeking cessation treatment: an ecological momentary assessment study. *Nicotine & Tobacco Research*, 2014; 16(10): 1371-1378.

22. Hartley S, Haddock G, e Sa DV, et al. An experience sampling study of worry and rumination in psychosis. *Psychological medicine* 2014; 44(08): 1605-1614.

23. Kratz AL, Kalpakjian CZ and Hanks RA. Are intensive data collection methods in pain research feasible in those with physical disability? A study in persons with chronic pain and spinal cord injury. *Quality of Life Research* 2014; 26(3), 587-600.

24. Silvia PJ, Beaty RE, Nusbaum EC, et al. Everyday creativity in daily life: An experience-sampling study of "little c" creativity. *Psychology of Aesthetics, Creativity, and the Arts*, 2014; 8(2): 183-188.

25. Peterson C, Park N, Seligman ME. Orientations to happiness and life satisfaction: The full life versus the empty life. *Journal of Happiness Studies* 2005; 6(1): 25-41.

26. Swindells R, Lawthom R, Rowley K, et al. Eudaimonic well-being and community arts participation. *Perspectives in public health* 2013; *133*(1): 60-65.

27. Gagné M. The role of autonomy support and autonomy orientation in prosocial behavior engagement. *Motivation and Emotion*, 2003; *27*(3): 199-223.

28. Ryan RM and Deci EL. *Self-determination theory*. *Rochester: University of Rochester,* 2010.

29. Schwarzer R and Jerusalem M. Optimistic self-beliefs as a resource factor in coping with stress. In: Hobfoll SE and De Vries MW (eds) *Extreme stress and communities: Impact and intervention*. Netherlands: Springer, pp. 159-177.

30. Schwarzer R, Diehl M and Schmitz GS. *Self-Regulation Scale,* http://www.fu-berlin.de/gesund/skalen (1999, accessed 24 January 2012).

31. Conner TS and Mehl MR. *Handbook of research methods for studying daily life.* New York: Guilford Press, 2012.

32. Scollon CN, Chu K and Diener, E. Experience sampling: Promises and pitfalls, strengths and weaknesses. *Journal of Happiness Studies,* 2003; 4(1): 5-34.

33. Barrett DJ, Barrett LF. ESP, the experience sampling program, http://www.experience-sampling.org (2007, accessed 15 March 2012).

34. Pekala RJ. *Quantifying consciousness: an empirical approach*. New York: Plenum Press, 1991.

35. Hove MJ, Stelzer J, Nierhaus T et al. Brain network reconfiguration and perceptual decoupling during an absorptive state of consciousness. *Cerebral Cortex*, 2016; 26(7): 3116-3124.

36. Macdonald DA and Friedman HL. Assessment of humanistic, transpersonal, and spiritual constructs: State of the science. *Journal of Humanistic Psychology* 2002; 42(4):102-125.

37. Barrantes-Vidal N, Chun CA, Myin-Germeys I. et al. Psychometric schizotypy predicts psychotic-like, paranoid, and negative symptoms in daily life. *Journal of Abnormal Psychology* 2013; *122*(4): 1077-1087.

38. Engeser S and Rheinberg F. Flow, performance and moderators of challenge-skill balance. *Motivation and Emotion* 2008; 32(3): 158-172.

39. Thompson ER. Development and validation of an internationally reliable short-form of the positive and negative affect schedule (PANAS). *Journal of Cross-Cultural Psychology* 2007; 38(2): 227-242.

40. Peterson C, Park N and Seligman ME. Orientations to happiness and life satisfaction: The full life versus the empty life. *Journal of happiness studies* 2005; 6(1): 25-41.

41. Chen LH, Tsai Y and Chen, M. Psychometric analysis of the Orientations to Happiness Questionnaire in Taiwanese undergraduate students. *Social Indicators Research* 2008; 98: 239-249.

42. Deci EL, La Guardia JG, Moller AC et al. On the benefits of giving as well as receiving autonomy support: Mutuality in close friendships. *Personality and Social Psychology Bulletin*, 2006; 32(3): 313-327.

43. Ilardi BC, Leone D, Kasser T, et al. Employee and supervisor ratings of motivation: Main effects and discrepancies associated with job satisfaction and adjustment in a factory setting. *Journal of Applied Social Psychology* 1993; 23(21): 1789-1805.

44. La Guardia JG, Ryan RM, Couchman CE et al. Within-person variation in security of attachment: a self-determination theory perspective on attachment, need fulfillment, and well-being. *Journal of Personality and Social Psychology* 2000; 79(3), 367.

45. Schwarzer R, Bäßler J, Kwiatek P, et al. The assessment of optimistic self-beliefs: comparison of the German, Spanish, and Chinese versions of the general self-efficacy scale. *Applied Psychology* 1997; 46(1): 69-88.

46. Scholz U, Gutiérrez-Doña B, Sud S, et al. Is general self-efficacy a universal construct? Psychometric findings from 25 countries. *European Journal of Psychological Assessment* 2002; 18: 242–251.

47. Diehl M, Semegon A and Schwarzer R. Assessing attention control in goal pursuit: A component of dispositional self-regulation. *Journal of Personality Assessment* 2006; 86: 306–317.

48. Gupta A and Sinha SP. Self-efficacy, learning and performance goal orientation as correlates of self-regulation. *Journal of the Indian Academy of Applied Psychology* 2002; 28: 17-23.

49. Kreutz G, Ginsborg J and Williamon A. Health-promoting behaviours in conservatoire students. *Psychology of Music* 2009; 37: 47-60.

50. Luszczynska A, Diehl M, Gutiérrez-Doña B, et al. Measuring one component of dispositional self-regulation: attention control in goal pursuit. *Personality and Individual Differences* 2004; 37: 555-566.

51. Goldstein H. Hierarchical data modeling in the social sciences. *Journal of Educational and Behavioral Statistics* 1995; 20(2): 201-204.

52. Algina J and Swaminathan H. Centering in two-level nested designs. In: Hox J and Roberts JK (eds) *Handbook of advanced multilevel analysis*. New York: Routledge, 2011, pp. 285-312.

53. Nezlek JB. Multilevel modeling analyses of diary-style data. In: Conner TS and Mehl MR (eds) *Handbook of research methods for studying daily life*. New York: Guilford Press, 2012, pp. 357-383.

54. Heck RH, Thomas SL and Tabata LN. *Multilevel and longitudinal modeling with IBM SPSS.* London: Routledge, 2013.

55. Bolger N and Laurenceau JP. *Intensive longitudinal methods*. New York: Guilford, 2013.

56. Stickley T and Hoare M. A review of the concept of Salutogenesis and its significance for promoting mental health recovery through participatory arts. *Journal of Applied Arts & Health* 2015; 6(1): 63-75.

57. Matthews G., Jones DM and Chamberlain AG. Refining the measurement of mood: The UWIST mood adjective checklist. *British Journal of Psychology* 1990; 81(1): 17-42.

58. Singer JL. *Daydreaming: An introduction to the experimental study of inner experience.* New York: Crown Publishing, 1966.

59. Pennebaker JW and Francis ME. Cognitive, emotional, and language processes in disclosure. *Cognition & Emotion* 1996; 10(6): 601-626.

60. McCarthy-Jones S and Fernyhough C. The varieties of inner speech: links between quality of inner speech and psychopathological variables in a sample of young adults. *Consciousness and cognition* 2011; 20(4): 1586-1593.
61. Lusebrink VB. Art therapy and the brain: An attempt to understand the underlying processes of art expression in therapy. *Art Therapy* 2004; 21(3): 125-135.
62. Reynolds F and Prior S. Creative adventures and flow in art-making: A qualitative study of women living with cancer. *The British Journal of Occupational Therapy* 2006; 69(6): 255-262.
63. Bryce J and Haworth J. Wellbeing and flow in sample of male and female office workers. *Leisure Studies* 2002; 21(3-4): 249-263.
64. Shernoff DJ, Csikszentmihalyi M, Shneider B et al. Student engagement in high school classrooms from the perspective of flow theory. *School Psychology Quarterly* 2003; 18(2): 158-176.
65. Wood AM and Joseph S. The absence of positive psychological (eudemonic) well-being as a risk factor for depression: A ten year cohort study. *Journal of affective disorders* 2010; 122(3): 213-217.
66. Bodin F, McIntyre KM, Schwartz JE, McKinley PS, Cardetti C, Shapiro PA, Gorenstein E, Sloan RP. The Association of Cigarette Smoking with High Frequency Heart Rate Variability: An Ecological Momentary Assessment Study. *Psychosomatic Medicine*. Epub ahead of print 21 September DOI: 10.1097/PSY.0000000000000507