



The Impact of Arts and Cultural Engagement on Population Health

Findings from Major Cohort Studies in the UK and USA
2017 – 2022



This report summarises findings from a series of longitudinal studies conducted between 2017 and 2022 that examined the relationship between arts and cultural engagement and health and wellbeing outcomes using UK and US cohort studies. The research was conducted by the Social Biobehavioural Research Group at University College London through funding from several grants, including a Wellcome Fellowship for Dr Daisy Fancourt [221400/Z/20/Z], an ESRC grant [ES/T006994/1], an award from Arts Council England [INVF-00404365], and a consortium of funding from the USA, including the National Endowment for the Arts [1862896-38-C-20], Bloomberg Philanthropies, and the Pabst Steinmetz Foundation, which was made possible through our close partnership with the Centre for Arts in Medicine at the University of Florida.

Questions about this report may be directed to:

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

Citation: Fancourt D, Bone JK, Bu F, Mak HW, Bradbury A. The Impact of Arts and Cultural Engagement on Population Health: Findings from Major Cohort Studies in the UK and USA 2017 – 2022. London: UCL; 2023 March.

Contents

Introduction: The arts and health	3
Methodology	5
I. Children and young people	9
Developmental and social behaviours	9
Health behaviours	12
Underlying mechanisms	12
II. Mental health	19
Mental health and wellbeing in adults	19
Mental health and wellbeing in older adults	25
III. Healthy ageing	31
Cognition and dementia	31
Morbidity and mortality	35
IV. Access to the arts	41
Socio-economic and demographic barriers	41
Geographical barriers	45
Health barriers	46
Summary and implications	49
Looking ahead	51
References	53



Introduction: The arts and health

In the last two decades, there has been increasing interest from health and arts professionals, researchers, and policymakers in how engagement with the arts can influence population health, which has led to a growing evidence base.

In response, the World Health Organization commissioned our research team, the [Social Biobehavioural Research Group](#) at University College London, to summarise the evidence for the health benefits of the arts and to examine the state of current research. Through a scoping review, we collated over 3,000 studies from the last two decades that identified clear roles for the arts in preventing physical and mental health conditions, promoting good health, and helping to manage and treat illness (1). The studies we identified were diverse in methodology, including pilot studies, case studies, cross-sectional surveys, community-wide ethnographies, and randomized controlled trials from diverse disciplines.

However, most evidence came from relatively small-scale intervention studies (tens or hundreds of people) conducted at fixed time points. They were usually bespoke arts programmes, often with specific clinical aims and which focused on narrow samples with short-term follow-ups of typically less than one year. What was lacking was longitudinal research examining whether engagement in the arts also had long-term health benefits, as well as larger-scale research exploring whether these health outcomes could be seen at a population level.

Filling the research gap: Analyses of population cohorts

Since 2017, we have been filling this research gap by using data from representative cohort studies that track thousands of randomly sampled individuals from a population over decades. These cohort studies are the bedrock of research in many scientific disciplines, providing rich data on people's demographics, behaviours, finances, attitudes and opinions, and health. Notably, many of these cohort studies contain questions on people's arts and cultural engagement. This presents a unique opportunity to explore the relationship between arts and health across the life course. But prior to 2017, the data from these questions was rarely used.

“

We found significant evidence for the role that arts and cultural engagement can play in protecting and improving health over the lifespan.”

We have examined over a dozen cohort studies from the UK and the USA and found significant evidence for the role that arts and cultural engagement can play in protecting and improving health over the lifespan. This

report summarises our findings between 2017 and 2022, which we have grouped into three topics: children and young people, mental health, and healthy ageing.

The size and scope of the cohort studies have meant we can ask questions that have not been explored in the field of the arts in health before. For example, we have demonstrated how arts and cultural engagement has a preventative association with depression incidence; how cultural engagement is related to a lower risk of dementia diagnosis; how reading during childhood is related to positive health behaviours in adolescence; how protective associations exist between cultural engagement and chronic pain and frailty; and how social and cultural behaviours are related to biological markers of mental and physical health.

In our analyses, we have applied cutting-edge statistical techniques to understand these relationships and to take account of factors such as demographics, socio-economic position, and other health conditions that would otherwise lead to false findings. We have also uncovered inequalities in people's ability to access the arts, and we have identified barriers that may prevent people from benefitting from these activities, which we have outlined in the fourth section of this report.

“

The arts can be a pillar of population health.”

Most significantly, our findings suggest that the same types of associations seen between arts engagement and health outcomes in short-term, small-scale intervention studies are also apparent over time and at a population level. This evidence helps to answer questions that policymakers, health professionals, and arts practitioners have had about the long-term impact of the arts, and it demonstrates that the arts can be a pillar of population health. Our research presents an opportunity to reimagine how arts provision can be used in the prevention of poor health and the treatment and management of illness.

Our findings have also opened multiple avenues of research and we have since built a portfolio of further projects: behavioural science studies to understand who engages in the arts and what barriers they face; clinical trials to test new arts and social prescribing programmes for specific clinical outcomes; theoretical work to understand the complex interplay and mechanisms between arts and health outcomes; and an expansion of our longitudinal research from the UK and USA to other parts of the world. Our work has been recognised internationally and the World Health Organization has designated us the first WHO Collaborating Centre for Arts and Health; a distinguished platform through which we will continue to advance knowledge and develop policy for the arts in health globally.

To read a commentary from our team that summarises key findings from this report and offers implications and recommendations for the state of healthcare in the UK, [visit Creativity, Culture & Capital](#).

None of this work would have been possible without the support of our research partners and funders, participants, and other supporters. We are hugely grateful to them all.

To learn more about our research and impact, visit www.sbbresearch.org

Methodology

The strength of our longitudinal research lies in our use of nationally representative samples from cohort studies. These datasets are extremely valuable assets in the UK's and USA's research infrastructure. They are based on questionnaires that have rigorously assessed samples of tens of thousands of individuals, collecting data from multiple aspects of their lives for decades. Notably, many of these cohort studies have included dozens of questions on arts and cultural engagement. But prior to our work, these variables had received scant attention. The benefit of these cohort studies is that they have allowed us to conduct large-scale, long-term analyses of the relationship between arts and health to identify impacts at the societal level and consider the importance of the arts for population health.

In the UK, we have mainly relied on the British Birth Cohort Studies (1946, 1958, 1970, and the Millennium cohort), the English Longitudinal Study of Ageing (ELSA), the UK Household Longitudinal Study: Understanding Society (UKHLS), and the Taking Part Survey (TPS). We have also supplemented these with our own large-scale datasets collected with the BBC: the *Great British Creativity Test and Feel Good Test*. In the USA, we have used the General Social Survey (GSS), the Health and Retirement Study (HRS), the Wisconsin Longitudinal Study (WLS), the Early Childhood Longitudinal Study (ECLS), the National Education Longitudinal Study (NELS), the National Longitudinal Study of Adolescent to Adult Health (AddHealth), and the Panel Study of Income Dynamics (PSID).

We have explored the links between arts engagement and a range of health outcomes across different life stages:

- **Children and young people:** psychological, emotional, and behavioural problems, smoking, drugs, and alcohol use
- **Adults:** general wellbeing, life satisfaction, and mental health problems such as depression or anxiety
- **Older people:** cognitive function, dementia incidence, frailty, chronic disease, and biological markers of mental and physical health

We have measured arts and cultural engagement in many different ways across datasets. Our work has included (i) explorations of “the arts” using an umbrella approach incorporating all assets and activities related to arts and culture;



(ii) more specific analyses of categories of engagement such as active arts participation (e.g. playing instruments, arts, crafts, sewing, photography, painting, and model-making); receptive arts consumption (e.g. music listening, TV watching, and reading for pleasure); cultural engagement (e.g. visiting libraries, museums, galleries, theatres, cinemas); and heritage engagement (e.g. visiting monuments, historic sites, and listed buildings); and (iii) analyses of particular activities (e.g. reading for pleasure). For some papers, we have also explored broader types of complementary community engagement, such as any type of group participation, leisure activity, volunteering, or other non-work involvement in one's local community.

Statistical Approaches

As cohort data analysis is observational, rather than involving experimental manipulation of events, determining causality is never entirely possible. However, the size and variety of the cohort studies have helped us to carefully isolate relationships between

the arts and health using advanced statistical techniques that enable us to identify and mitigate against the effects of factors that could "confound" (or distort) associations and lead to spurious results.

These techniques have included:

- (i) careful identification of potential "confounders" using diagrams called "**directed acyclic graphs**" so that these confounders can then be adjusted for within statistical models;
- (ii) "**fixed effects models**" that compare individuals against themselves so that the effects of time-constant confounding factors (things that do not typically change over time such as gender, ethnicity, socio-economic position, past life experiences, etc.) are automatically factored in even if they are not measured in the datasets;
- (iii) **negative control studies** that compare arts interventions with other interventions that are similarly socially and demographically patterned but not expected to be associated with the outcomes being measured; and





(iv) “**inverse probability of treatment weighting**”, which applies a smaller “weight” to individuals with a high probability of engaging in the arts and a higher weight to those with a low probability of doing so. This means we can imagine and analyse a scenario in which the population engages equally in the arts. We have also used statistical methods to ‘mimic’ conditions in randomised controlled trials. For example, “propensity score matching” has allowed us to match people with very similar socio-demographic backgrounds who have experienced various levels of arts engagement (‘treatment’ and ‘control’ groups).

A challenge we have faced is defining arts engagement given the questions available in the datasets. In some studies, we have analysed data from participant responses to individual questions about specific arts activities. In others, we have created indices that combine answers from questions on multiple types of activities under umbrella terms that we have defined in advance, such as ‘cultural engagement’ or ‘active arts participation’. In further studies, we have allowed the

data to ‘suggest’ clusters or patterns of arts and cultural activities that reflect natural behaviours. Across studies, we have sometimes focused on behaviours at specific points in time (e.g., ‘over the past year’), whereas in others we have looked at changes in behaviours over several years or tracked trajectories of engagement over years or decades. These different approaches have allowed us to answer a broad range of research questions and given us vital new information not just on the benefits of specific frequencies of engagement but also on how a variety of types of engagement and life patterns of engagement are related to different health outcomes.

To ensure our findings were not context-specific or driven by particular conditions within the UK or the studies themselves, we have expanded to include US cohorts with different patterns of arts engagement and health conditions. We have also used multiple statistical techniques to explore the same research question (known as ‘triangulation’) to balance out the strengths and weaknesses of different techniques and make sure our analyses converge on the same finding. Additionally, we have continually linked our observational findings back to that coming from intervention studies to see if our large-scale, long-term analyses find the same patterns as those from rigorous causal trials.

Not every research question on arts and health can be conducted using existing cohort data and epidemiological analysis. So where our longitudinal data have uncovered new research questions for us to explore further, we have run other types of studies, including gathering new quantitative and qualitative data through surveys, interviews, experiments, and trials. We provide more details in our “Research Spotlights” in this report.



I. Children and young people

In both the UK and the USA, we have examined how engaging in arts and cultural activities at home and in school during childhood might influence health and behavioural issues during adolescence.

Developmental and social behaviours

We found that daily reading for pleasure at age 7 was associated with lower levels of hyperactivity, inattention, and better prosocial behaviour such as empathy or helping others at age 11 (n=8,936) (2). Notably, these results were found even when we used statistical methods to imitate controlled trial conditions to account for other factors that may have explained the association (see propensity score matching in the “Methodology” section). Factors that we ‘matched’ between the ‘daily reading’ and ‘non-daily reading’ samples included gender, ethnicity, parental marital status, parental educational levels, parental employment status, mother’s mental health, levels of mother-child closeness, mother-

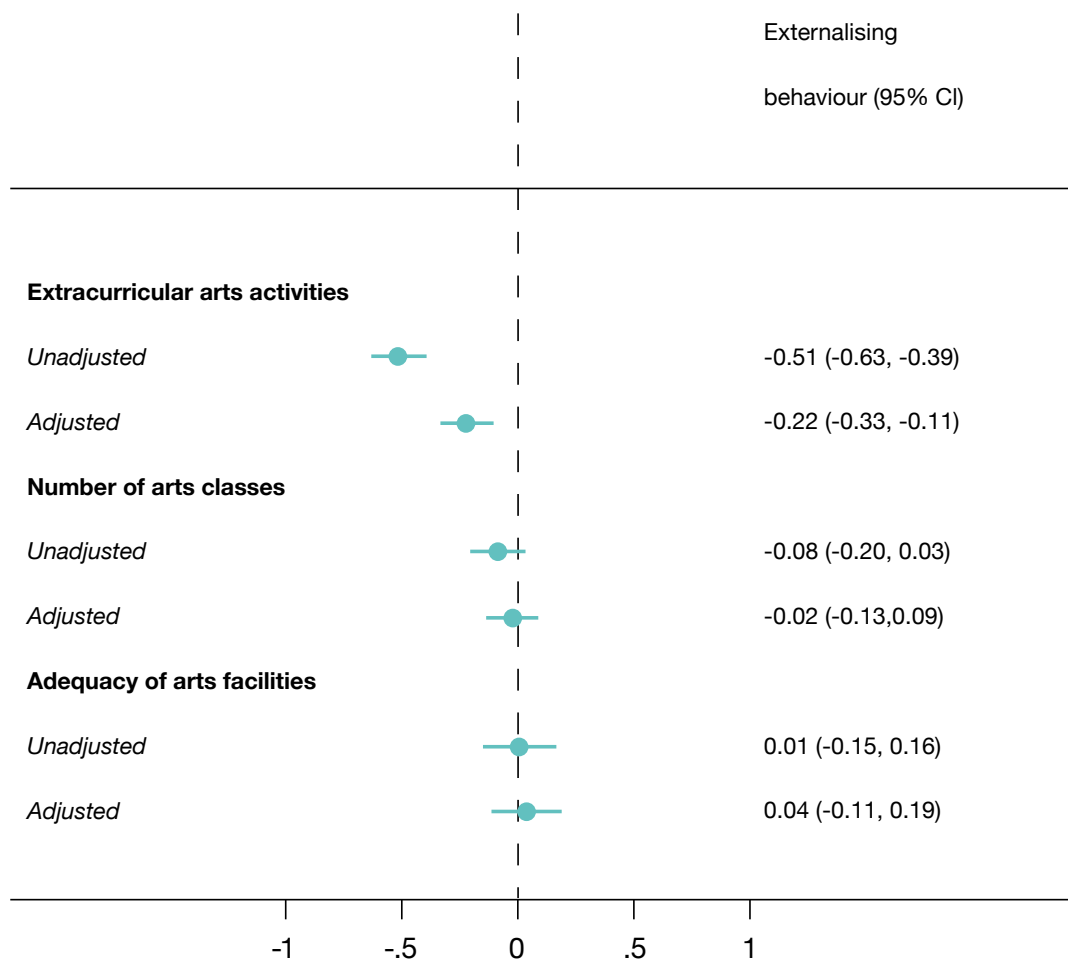
child frequency of reading together, and children’s baseline behaviours. In addition to reading, we found similar beneficial associations with behaviours for other arts activities such as dance, music or art lessons, or performing arts programmes. Among children in the USA (n=8,586), taking part in a higher number of extracurricular arts activities at age 10 or 11 was associated with fewer externalising behaviours such as hyperactivity or inattention at age 13 or 14. Again, these results were found even when taking account of demographic and socio-economic factors as well as factors relating to each child’s school and its level of overcrowding, ethnic composition, location, and safety of the area. However, unlike extracurricular activities, the same relationship was not found for in-school curricular arts activities (3).



“

Taking part in a higher number of extracurricular arts activities at age 10 or 11 was associated with fewer externalising behaviours such as hyperactivity or inattention at age 13 or 14.”

Figure 1: Individual-level associations of extracurricular and school-based arts engagement in 5th grade with externalising behaviours in 8th grade



Source: Fluharty M, Bone J, Bu F, Sonke J, Fancourt D, Paul E. Associations between extracurricular arts activities, school-based arts engagement, and subsequent externalising behaviours: Findings from the Early Childhood Longitudinal Study [Internet]. PsyArXiv; 2021 [cited 2022 Jun 30]. Available from: <https://psyarxiv.com/gdk3t/>

Similarly, using samples from two cohorts (n= 10,610 and n= 15,214), we found that if adolescents aged 11 to 21 were more engaged in a book club, drama club, band, cheerleading/dance, chorus/choir, orchestra, or newspaper they had fewer behavioural problems, such as antisocial or criminal behaviours. This remained the case one to two years later (4). We also looked at other behaviours including social support and loneliness but found less conclusive results. There was no relationship with loneliness, and while adolescents who engaged in these activities were more likely to report high levels of social support from their peers, this was not consistently the case after adjusting for demographic and

socio-economic factors (n=11,060). This suggests that the relationship between arts engagement and behavioural problems may be stronger than associations with some other behaviours (5).

Additionally, in another study, we explored how arts engagement might influence “flourishing”, a positive mental health state in which individuals feel good and function well in individual and community life. Flourishing can be measured in terms of emotional, psychological, and social wellbeing. We explored whether changes in arts engagement were associated with changes in flourishing and which domains of wellbeing were driving these associations.

In young adults aged 18 to 28 in the US (n=3,333), increases in arts engagement were associated with increases in flourishing, measured every two years over a period of 14 years (Fig 2A). This was the case whether adolescents began engaging daily or weekly after not engaging at all. The association was

predominantly driven by increases in social wellbeing (meaning that young adults felt like an integral part of a positive community), and smaller increases in psychological wellbeing (meaning young adults felt increasing autonomy and personal growth) (Fig. 2B) (6).

Figures 2A and 2B: Association between changes in arts engagement and changes in flourishing

Figure 2A

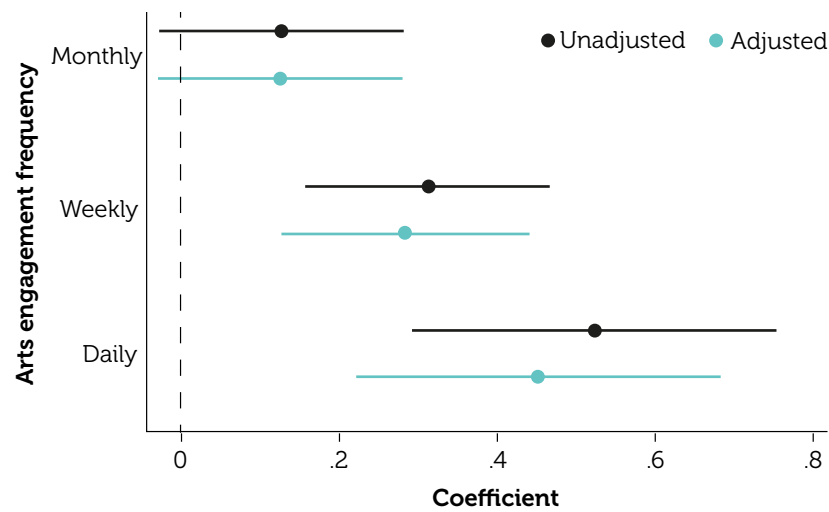
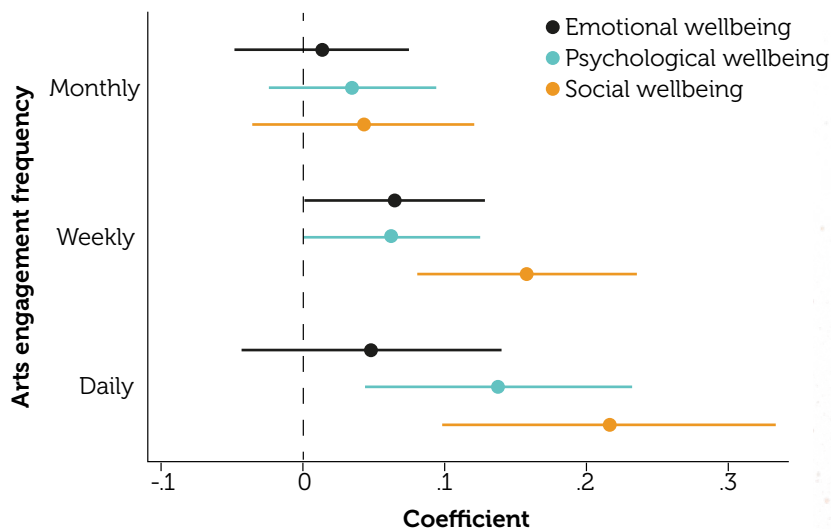


Figure 2B



Figures include data from waves between 2005 and 2019 from the Panel Study of Income Dynamics Transition into Adulthood Supplement. Fixed effects regression was used to estimate the association between changes in arts engagement and changes in flourishing (2A) and each domain of flourishing separately (2B).

Source: Bone, J.K., Bu, F., Sonke, J.K. et al. Longitudinal Associations Between Arts Engagement and Flourishing in Young Adults: A Fixed Effects Analysis of the Panel Study of Income Dynamics. *Affec Sci.* 2022.

Health behaviours

Behavioural benefits of the arts extend to health behaviours. We found that reading for pleasure was associated with healthier behaviours in adolescence, including decreased odds of cigarette and alcohol use and greater fruit consumption at age 14. However, it also corresponded with lower levels of physical activity (7). Demographic factors and child development explained some of the associations, as did child mental health, family relationships, and peer influence. We also found associations between arts engagement and substance use such as alcohol, marijuana, and tobacco. If teenagers between the ages of 12 and 19 participated in arts groups, they were less likely to use substances concurrently (n=6,965). However, longitudinally, the associations diminished during the 14-year



follow-up. This may mean that the arts are a “perishable commodity” for this age group and consistent engagement may be required for lasting benefits (8).

Underlying mechanisms

All of this evidence highlights the key question of what, mechanistically, it is about arts engagement during childhood and adolescence that could lead to behavioural benefits. We have been undertaking substantial theoretical work to identify different psychological, biological, social, and behavioural mechanisms that could link arts engagement with health outcomes (see Research Spotlight 1).

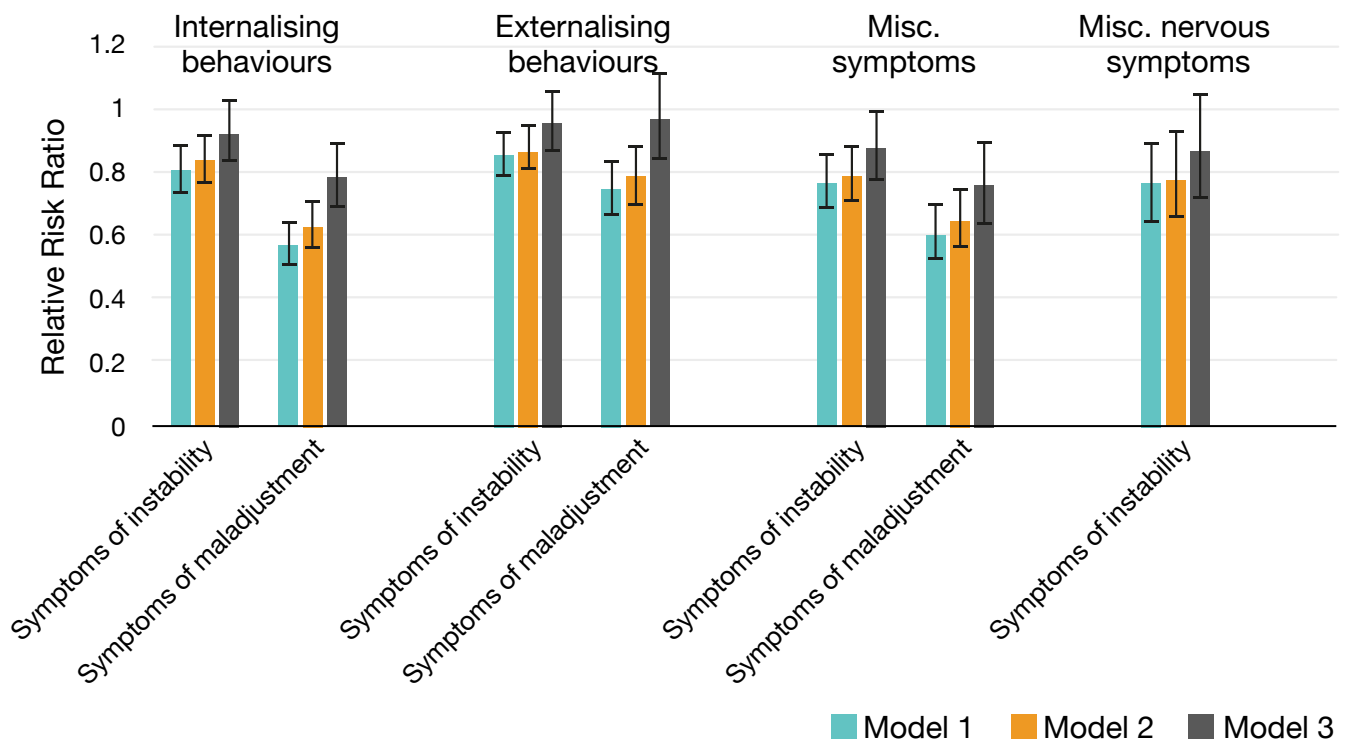
One potential explanation is that arts engagement enables children to develop their imagination, creativity, and problem-solving abilities, which may then have further benefits in other areas of their lives. For example, we investigated whether children aged 7 who had demonstrated *creativity* when undertaking arts activities had fewer internalising behaviours, such as being depressed or unforthcoming

or tending to write off adults (n=11,225). ‘Creativity’ is conceptually hard to define and measure, but we chose to focus on reports from teachers about the degree of originality, creativity, or imagination that children showed when engaging in activities like free writing, telling a story, crafts, painting, drawing or drama. Those children who were showing greater creativity, according to their teachers, had a lower risk of behavioural instability (22%), social and behavioural maladjustment (31%), and instability and maladjustment in internalising behaviours (26% and 36% respectively) in adolescence. The risk was even lower if children were showing substantial levels of creativity. Academic ability explained some of the relationship but on the whole it was independent of social, demographic, educational, parental, and personality factors (9). This suggests

that it might not just be a case of engaging in the arts but rather about building creative skills through engagement that leads to beneficial effects. This could also explain why our earlier paper did not find consistent benefits for school-based versus

extra-curricular engagement: children who engage outside of school are likely to already have an interest or passion in the arts, leading to a stronger activation of this particular 'creative' mechanism.

Figure 3: Association of creative imagination with symptoms of social and behavioural instability or maladjustment



Model 1 adjusted for social, demographic and educational covariates (sex, social class, school attendance and educational stability). Model 2 additionally adjusted for family covariates (family mental illness, parental interest in schooling and parental time reading with the child) and child personality. Model 3 additionally adjusted for academic ability.

Source: Fancourt D, Steptoe A. Effects of creativity on social and behavioral adjustment in 7 to 11 year old children. *Ann N Y Acad Sci.* 2019 Feb;1438(1):30–9.

Another mechanism that we explored was whether arts engagement helps to improve traits such as self-esteem and self-control, which can themselves affect lifelong development and wellbeing. In an analysis of children aged 11 (n=6,209), we found that listening to or playing music,

drawing, painting, making things, or reading for enjoyment were associated with higher self-esteem after we matched for identified confounders. The relationship was even stronger if parents also participated in the activities with their children (10) (Fig. 3). Relatedly, in a study of young people aged

“

Greater arts and cultural engagement amongst adolescents was associated with higher self-control, suggesting that the arts could help young people to regulate their emotions, thoughts, and behaviours.”

12-27 years (n=10,610), greater arts and cultural engagement amongst adolescents was associated with higher self-control, suggesting that the arts could help young people to regulate their emotions, thoughts, and behaviours (4). Indeed, a further analysis of adolescents aged 14-18 (n=15,214) exemplified this. We found associations between arts engagement and fewer positive *perceptions* of antisocial or criminalised behaviours (4), illustrating how engagement could support individual mechanisms that regulate our thoughts and behaviours.

Figure 4: Children’s arts and cultural engagement and self-esteem

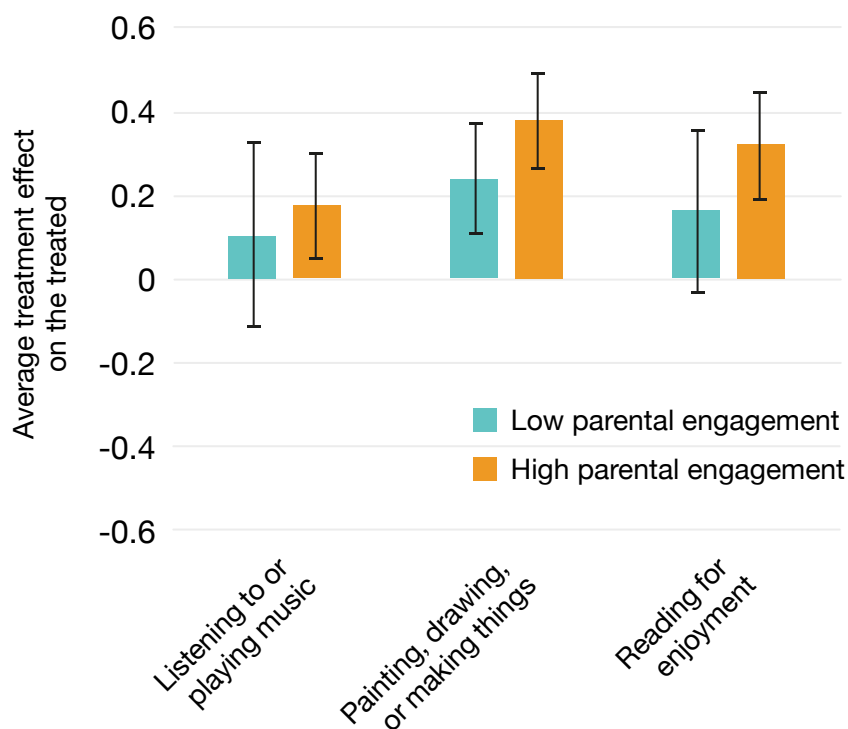


Figure 4 includes data from the Millennium Cohort Study Sweeps 4 & 5. Sweep 4 [2008] age: 7; Sweep 5 [2012/13] age 11. A propensity score matching technique was used to estimate the average treatment effect on the treated (ATT). ATT can be interpreted as the change in the outcome (which was standardised with a mean of 0 and a standard deviation of 1) for a change in the exposure. The outcome was children’s self-esteem, and the exposures were their engagement in arts and cultural activities (most days vs never or less often than once a month).

Source: Mak HW, Fancourt D. Arts engagement and self-esteem in children: results from a propensity score matching analysis. *Ann. N.Y. Acad. Sci.* 2019: 1-10.

A third mechanism we explored was whether *ability* in the arts affects whether adolescents experience benefits. We measured behavioural difficulties at age 10 and again at age 16 and found that arts ability at age 10 was significantly and inversely associated with behavioural difficulties at age 16 (N=7,700). This suggests that cultivating arts skills among children may positively influence later behaviours. Demographics, socio-economic position, child academic abilities, child mental health, and maternal mental health were also connected to ability and behavioural outcomes, but they only explained some of the association (11). However, although our previous work had highlighted a relationship between arts *engagement* and self-esteem, we did not find a consistent relationship between arts *ability* and self-esteem. While one study of children aged 7-11 (n=6,209) found no moderating role of ability in music, art, or reading on the relationship between engagement and self-esteem, another study of children aged 10 followed up at age 16 (n=4,991) found that

arts ability was only related to self-esteem amongst children with high educational ability (11). This suggests that even though ability in the arts may have behavioural benefits, it is not a necessary outcome from arts engagement to activate other beneficial mechanisms that could impact health outcomes.

Overall, in the dozen studies we have conducted on childhood and teenage arts engagement, our findings suggest significant longitudinal associations with health, wellbeing, and behavioural outcomes throughout adolescence as well as some evidence of the underlying mechanisms that explain the association. There is much research still to be done to explore other health outcomes, to unpack the mechanisms involved, and to identify differential effects that depend on the specific activity or context in which it is received. Yet, this research offers promising results suggesting that the arts could have an important role in protecting and supporting the health and development of young people.



Complexity science: Mapping active ingredients and mechanisms of action

The arts are complex activities, so we are developing new theoretical models to understand how and why the arts affect us. We use the principles of complexity science to conceptualise relationships between the *components* of arts activities (called “active ingredients”) and *processes* that these components activate (called “mechanisms of action”) that lead to health outcomes. The underlying theoretical basis of complexity science is that in dynamic systems, outcomes result from non-linear, non-static, interacting parts and processes in which no single active ingredient nor mechanism has a causal influence on health

but all together enable an outcome. We have conducted the most comprehensive mapping exercises to date on both active ingredients and mechanisms of action for arts activities.

In tandem with our longitudinal epidemiological studies, this work helps to explain how a relationship exists between arts and cultural engagement and improved health outcomes through a complex adaptive systems approach. Our frameworks are intended to allow further investigation into the pathways through which arts activities might exert their effects.

Active ingredients

The term ‘active ingredients’ is traditionally used in pharmacological research to describe the elements required for therapeutic action. They can be considered the components that may activate mechanisms in arts activities that lead to health and wellbeing outcomes. We have mapped **139 active ingredients**,

collecting them under broader categories of *project, people and context* (12). These relate to the content of activities, how participants engage in activities and with each other, and the settings of activities. They have an extensive range of subcategories. For example, the active ingredients of the project can relate to the format, dose, design, content, resources, activities, sensory and cognitive stimuli, and physical motions and actions of the activity. People factors includes the social diversity of the group, integrated and informal social exchanges, the style of the facilitator and what they bring to the activity, and additional people involved in leading or organising the activity. The context includes the environment, atmosphere, economic resources, management, participant recruitment processes, and referral to other resources.

“

We have conducted the most comprehensive mapping exercises to date on both active ingredients and mechanisms of action for arts activities.”

With these active ingredients identified, researchers have extensive opportunities to examine them further and understand why some have different influences on health, how they may evolve over time, and how they may interact. In addition, arts practitioners can use our research to design and tailor arts activities to include different active ingredients for different groups to lead to better health outcomes and support the sustainability and scalability of arts programmes. [Read our published work on active ingredients.](#)



Mechanisms of Action

We have also identified over **600 mechanisms of action** through which arts and other leisure activities can affect health outcomes. These mechanisms are drawn from multiple fields including psychology, psychiatry, occupational therapy, ecology, anthropology, behavioural science, sociology, neuroscience, philosophy, biology, medicine, medical humanities, epidemiology, geography, economics, and others. We've grouped them according to psychological, biological, social, behavioural, and health behaviour processes, and we've developed the "Multi-level Leisure Mechanisms Framework" to demonstrate how they interact at individual (micro), group (meso), and societal (macro) levels.

For example, psychological processes at the individual level can include stress buffering, mood improvement, increased resilience, self-esteem, and confidence, all of which are mechanisms that could be activated by arts activities and lead to improved mental health and wellbeing. Or in terms of health behaviours, individuals may spend less time being sedentary or may gain better sleep as a result of arts engagement.

Mechanisms underlying group participation in the arts could include increased group identity (psychological processes), cohesion and cooperation (social processes), and increased collective self-efficacy (behavioural processes). At the macro-level, psychological mechanisms could be the reduction of prejudice and intolerance, the preservation of cultural traditions, and increased active citizenship.

These are only a few examples of the endless processes through which arts activities may lead to better health, and they likely contain within them multiple mechanisms that interact and activate each other, and which have different effects among people and activities. [Read more about our work in the *Lancet Psychiatry*, including our supplementary appendix listing all mechanisms we identified.](#) We have also created an online course for researchers and practitioners interested in learning more about complexity science, the arts, and health: "[Arts, Culture and Heritage: Understanding their complex effects on our health.](#)"



II. Mental health

Mental health and wellbeing in adults

How is mental health and wellbeing affected by arts and cultural engagement?

A key focus of our research has been investigating the relationship between arts and cultural engagement and mental health and wellbeing among adults. (For definitions, see Box 1).

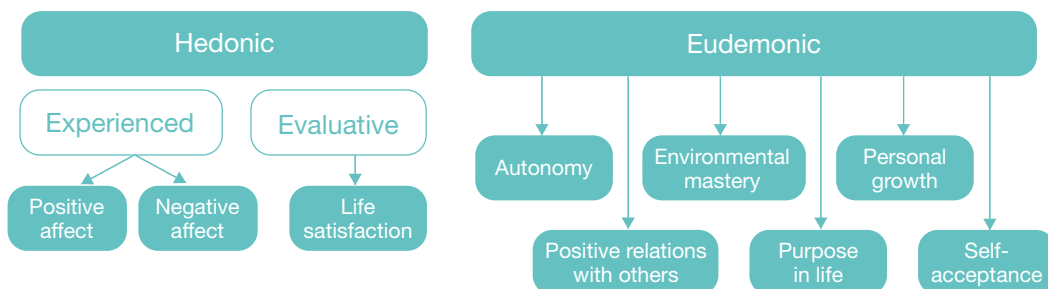
In an analysis of over 23,000 individuals, we examined activities as diverse as dance, singing, making music, writing music, drama, opera, musical theatre, carnival and street arts, circus skills, painting, drawing, printmaking, sculpture, photography, film, video making, animations, textiles, wood crafts, embroidery, knitting, reading for

pleasure, creative writing, and book clubs. We also looked at a range of cultural activities including going to the cinema, exhibitions, video or electronic art events, literature events, public art displays, carnivals, cultural-specific festivals, circuses, plays or drama, pantomimes, musicals, opera, live music performances (classical, rock, pop, or jazz), ballet, contemporary dance, or other cultural arts events. Frequent arts participation and cultural attendance were both associated with better mental health (lower mental distress) and higher wellbeing (life satisfaction) (13). Notably, these results were maintained even when we took into account all factors such as demographics, socio-economic background, personality, past medical history, past life experiences, and previous arts and cultural engagement (13).

Box 1

Mental ill health refers to the presence of symptoms, rather than the absence of them, such as depression, anxiety or stress. Wellbeing refers to whether we are getting the most from our lives and realising our potential. While related, these two concepts sit on different axes or continua, meaning that an individual can have no symptoms of mental ill health yet still not be achieving a strong state of wellbeing. Or conversely an individual may have a mental illness but still be finding meaning and purpose. Wellbeing can be further considered to consist of multiple dimensions, including “experienced” aspects of wellbeing (such as high positive affect and low negative affect), “evaluative” wellbeing (how satisfied we feel with our lives) and “eudemonic” wellbeing (the sense of meaning and flourishing we get from our lives).

Types of subjective wellbeing



We also found that arts engagement was associated with greater ability to cope with mental health problems in everyday life (“mental functioning”). But notably we didn’t find these results for cultural attendance (13). As arts engagement and cultural attendance differ in the participation required but are similar in other elements, this suggests that *participation* was key for coping. While cultural engagement may have a direct relationship with affective

symptoms such as negative feelings, stress hormones, or happiness, it may be less effective at altering psychological or behavioural factors needed to then cope with such symptoms. In contrast, arts participation *did* show a relationship with mental functioning. These results echo those that we have found from intervention studies conducted over the past few years, but at a population level (see Research Spotlight 2) (13).

Figure 5: Arts and cultural engagement and mental health and wellbeing

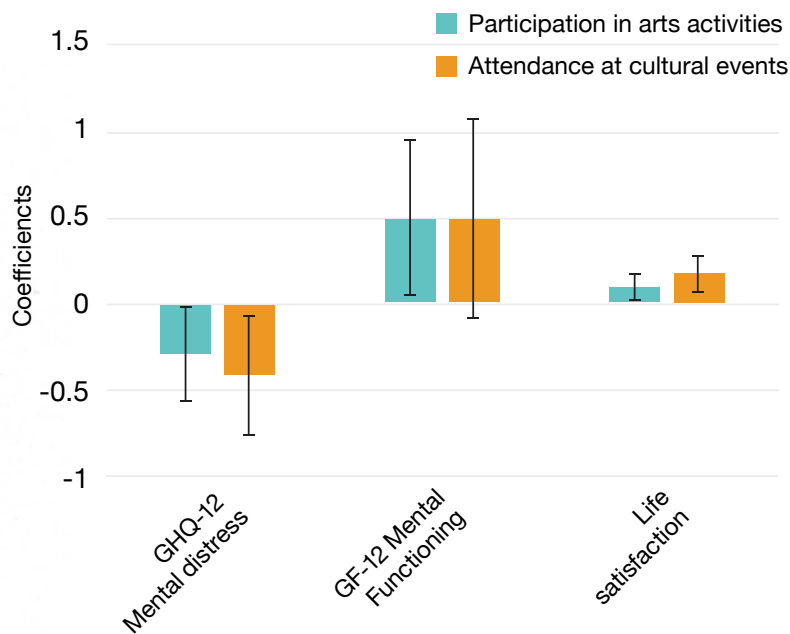


Figure 5 uses data from the UK Household Longitudinal Study Waves 2 [2010/12] and 5 [2013/15]. Fixed-effects models were used to estimate how the changes in participation in arts and cultural engagement were associated with the changes in mental health and wellbeing. The models were adjusted for all time-constant variables and important time-varying demographic factors (e.g., age and marital status), health behaviours and social support variables.

Source: Wang S, Mak HW, Fancourt D. Arts, mental distress, mental health functioning & life satisfaction: fixed-effects analyses of a nationally representative panel study. *BMC Public Health*. 2020: 20(208).

“We also found that arts engagement was associated with greater ability to cope with mental health problems in everyday life.”

How do the arts regulate our emotions?

The ability to effectively regulate our emotions is fundamentally linked to our mental health, and as we've continued to explore the mechanisms underlying arts engagement, we've also focused specifically on how the arts can help with emotion regulation 'strategies' or mental processes that allow individuals to adapt to daily life. Through gathering a new dataset of 47,924 people, we categorised dozens of strategies into a new theoretical framework (14). This shows that there are three main categories of emotion regulation strategies that arts and creative activities can activate. "Avoidance" strategies include detachment, distraction and suppression, such as the arts creating a safe space for people away from their worries, redirecting their attention from unwanted thoughts or feelings, and disengaging from things that are bothering them. "Approach" strategies include acceptance, reappraisal, discharge, and problem solving, such as engaging in the arts to come to terms with our emotions, think rationally about things in our life, vent negative feelings, and actively plan for how to solve problems. "Self-development" strategies include enhancing self-identity, self-esteem and agency, such as reaffirming our sense of self, reassuring us about our abilities, and making us feel more capable of tackling challenges. Our analyses led to **an 18-item scale and three subscales** related to "avoidance," "approach," and "self-development," strategies (14), which can be used by others to support further research. We also looked at what predicted individuals' ability to use these strategies, finding that factors such as being female, having fewer socio-economic resources, having previous training in an artistic activity, engaging regularly, and enjoying the activity were associated with a greater ability to use artistic activities to regulate emotions (15).



We have also explored whether there are differences in how the arts affect emotion regulation amongst people who engage in in-person arts activities compared to virtual or online activities. We collected data from 1,158 singers involved in a 'virtual choir', which involves singers watching videos of a conductor delivering a singing lesson, rehearsing their part in the choir through singing along to a recording, and submitting films of themselves singing their individual parts, which were then edited and collated in a network animation. We then paired these data with a further 1,158 singers involved in live choirs. Although the virtual choir was slightly less effective at regulating emotions overall, they did still have emotional benefits, in particular for 'self-development' strategies (16).

Finally, emotion regulation has been reported to be impaired in some people with mental illness, so we've extended our work on emotion regulation to consider whether there are differences in how the arts affect emotions in people with and without depression. Interestingly, we found that there was almost no difference in the overall use of emotion regulation strategies when engaging in the arts or in the types of strategies used between people with and without depression (n=11,248) (17). This helps to explain why intervention studies like the ones we have conducted find beneficial effects of the arts for mental health even amongst people with depression.

Arts in health interventions: Evidence and mechanisms

In addition to our longitudinal work, we have conducted trials and further sub-studies to explore associations between artistic activities and mental illness. In particular, we have examined the effects of group drumming and group singing among those accessing mental health services, those affected by cancer or caring responsibilities or bereavement, and women during and after pregnancy.

We have investigated both the **psychological effects of drumming** as well as the potential underlying mechanisms for improvements in mental health and wellbeing. Working with musicians and scientists from the Royal College of Music and Imperial College London, we designed a 10-week programme of group drumming workshops for people with existing mental health problems who were accessing mental health services. Participating in single drumming sessions alone led to short-term improvements in stress, tiredness, happiness, relaxation, and energy levels (18), whilst drumming over 6 to 10

weeks led to decreases in depression and anxiety and increases in social resilience, with benefits still maintained three months later (18-19). Participants also reported wider wellbeing benefits including enhanced positive emotions, increased agency, a sense of accomplishment, greater task engagement, enhanced self-awareness, and stronger social connections (20). We identified multiple mechanisms underlying these benefits. Drumming led to reductions in stress hormones and increased activation of chemical messengers in the immune system called “cytokines” (18). Over the weeks of drumming, the balance of some of these cytokines shifted from a pro-inflammatory state (associated with depression) to an anti-inflammatory state (19). As a form of non-verbal communication, drumming also allowed expression in a safe space that alleviated mental stress. The groups created a mutual experience and shared identity among participants, which gave their recovery meaning. Learning new skills, taking risks, and making mistakes was considered liberating (21).



We have also examined **group singing** among those affected by cancer. Working with the charity Tenovus Cancer Care in Wales who deliver choirs for people affected by cancer, we researched the immediate and longer-term effects of singing for patients, carers, and people who had been bereaved. Just one hour of singing was associated with benefits, including reductions in negative affect (mood), increased positive affect, decreased stress hormone levels, and increased activity of cytokines in the immune system (22). Similar positive effects on mental health also existed over longer periods of time.



Given that new mothers can be at risk of postnatal depression (PND), we have also conducted studies to examine **whether singing can influence the development or management of PND**. Working across multiple trials with the Royal College of Music, Imperial College London, Breathe Arts Health Research, King's College London, and the World Health Organization, we found that mothers who sang to their babies daily in the last

“

We have conducted the most comprehensive mapping exercises to date on both active ingredients and mechanisms of action for arts activities.”

Through a longitudinal controlled trial of three months of weekly singing sessions in a community choir, we found that carers of family members with cancer who joined the singing experienced significantly greater decreases in anxiety and increases in wellbeing compared to non-singers (23). In addition, singers who were bereaved due to cancer experienced more stable symptoms of depression and wellbeing, as well as gradual improvements in their self-efficacy and self-esteem compared to worsening experiences amongst non-singers (24). Similar to drumming, the underlying psychological mechanisms seem to be related to building resilience through shared experience, coping and confidence building; receiving social support and empathy from the group; experiencing wide-ranging emotions and identity development; and gaining skills (25).

trimester of pregnancy or in the first nine months after birth had lower symptoms of postnatal depression and higher levels of wellbeing, self-esteem, and self-reported mother-infant bonding. For those women who developed postnatal depression, engaging in 10-week programmes of singing led to a faster reduction of symptoms of PND than comparison groups of women who received usual care on the NHS or usual care plus social groups. More

broadly, these programmes led to changes in the musical behaviour of mothers, who continued to sing to their babies more than the control group, and there were signs that their partners also began singing more to their infants, suggesting a broader family influence (26). Mechanisms underlying these recovery effects for PND included activity-based, psycho-emotional, social, and environmental processes. The most important of these were the authenticity of the experience as being natural and calming, learning new skills, feeling good, being immersed, gaining a sense of

achievement and purpose, and increased bonding with infants (27). We have also explored biological and psychological mechanisms underlying the psychological effects of singing on mothers. Through 90-minute singing workshops compared with non-singing workshops with mothers of infants between 3 and 14 months old, we found that perceptions of mother-infant closeness increased much more in the singing group, as did increases in positive affect and reductions in negative affect, and decreases in the stress hormone cortisol (28).



“

For women who developed postnatal depression, engaging in 10-week programmes of singing led to a faster reduction of symptoms.”

Mental health and wellbeing in older adults

Particularly among older age groups, the importance of community and cultural engagement is apparent across our research, both for reducing the risk of developing certain mental health conditions and for managing these conditions and promoting wellbeing.

How is wellbeing affected?

Our research has shown how belonging to community groups can enhance the wellbeing of older adults. For example, older adults who engaged with education, the arts, or music classes had higher life satisfaction and lower negative affect 10 years later (n=2,548) (29). We have found similar results for other forms of arts engagement too. Arts group participation (e.g. choir, dance, photography, theatre, and music groups) was associated with multiple positive aspects of wellbeing including life satisfaction, positive affect, purpose in life, and perceived mastery (n=12,055) (30). We also found benefits for wider aspects of social wellbeing such as reduced loneliness among those who engaged in cultural activities. These benefits tended to persist over time for specific activities including attending museums, galleries, and

“

Adults who increased their community and cultural engagement experienced subsequent increases in how worthwhile they felt their lives were.”

“

Arts group participation (e.g. choir, dance, photography, theatre, and music groups) was associated with multiple positive aspects of wellbeing, including life satisfaction, positive affect, purpose in life, and perceived mastery.”

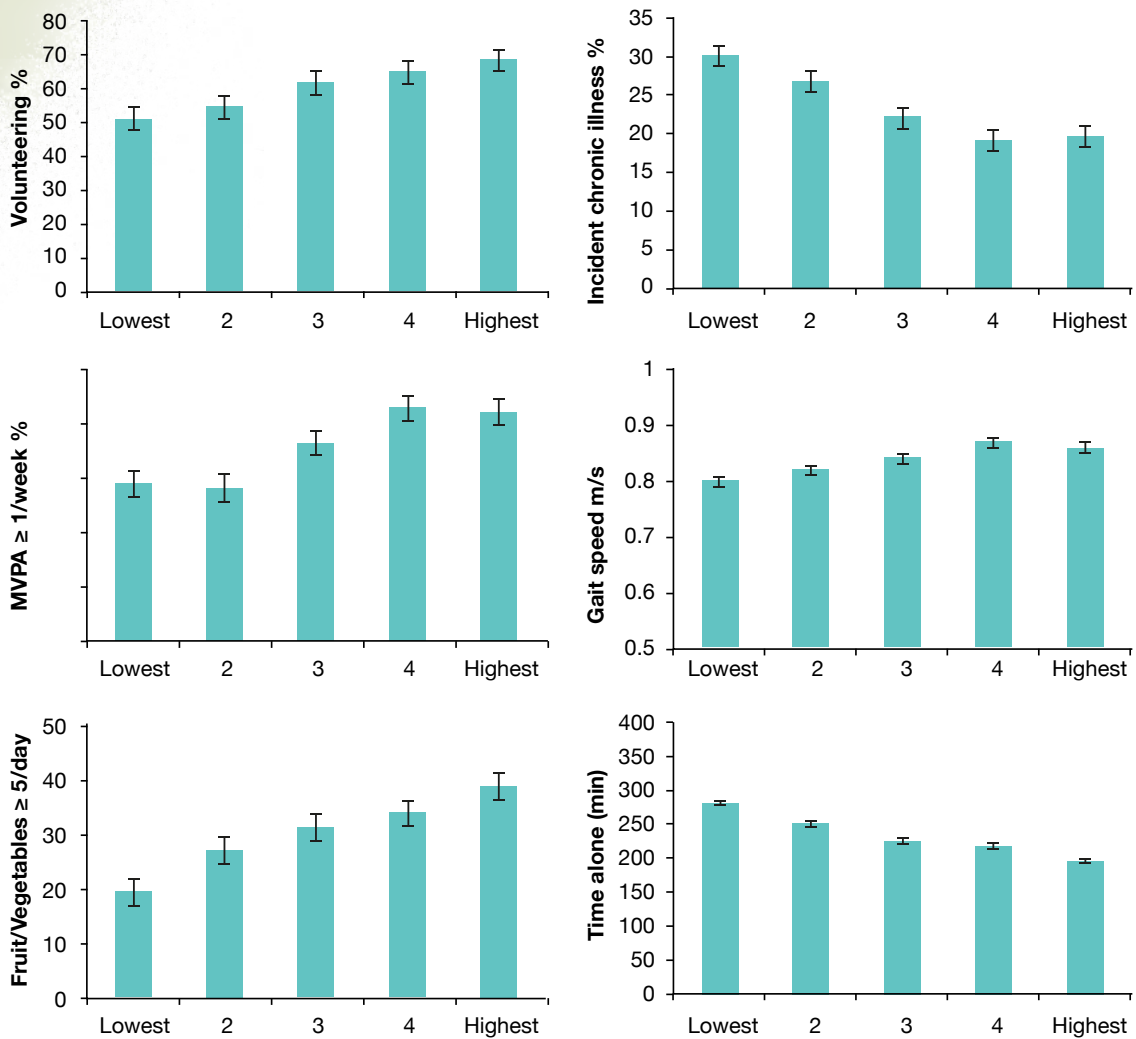
exhibitions (31). Notably, all of these results were maintained even when controlling for socio-demographic, social, health, and behavioural confounders as well as when ‘matching’ participants using approaches that mimic randomised controlled trials.

Interestingly, community and cultural engagement was associated with wellbeing in a virtuous cycle: adults over 50 (n=7,304) who felt their life was more worthwhile were more likely to be involved in community organisations (including those related to the arts), social activities, volunteering, and cultural activities (such as going to museums, galleries, the theatre and concerts) (32). Every one-point increase in how worthwhile a person rated their life from 0 to 10 correlated with a 7% increase in the odds of individuals taking on a cultural activity after baseline (32). Reciprocally, adults who increased their community and cultural engagement experienced subsequent increases in how worthwhile they felt their lives were (33). This increase in feeling one’s life is meaningful in older age was associated with wide-ranging benefits to health (n=7,304), including better self-rated health, fewer limiting long-standing illnesses and chronic diseases, lower depressive symptoms, lower pain levels, improved functioning, improved immune function, lower levels of obesity,

and increased health behaviours (32). These relationships are important for how we think about using community and cultural engagement for promoting wellbeing amongst older adults (see Figure 6) (32), particularly given our results suggest that older adults may benefit even more from

certain activities than younger age groups. Volunteering is a good example: in one of our studies (n=10,989), we found that volunteering had the strongest and clearest association with wellbeing for the 'Baby Boomers' generation, born between 1945 and 1964 (34).

Figure 6: Illustrative associations between worthwhile ratings and outcomes four years later



Associations are adjusted for age, sex, education, socio-economic position, and baseline values.

Source: Steptoe A, Fancourt D. Leading a meaningful life at older ages and its relationship with social engagement, prosperity, health, biology, and time use. *Proceedings of the National Academy of Sciences*. 2019 Jan 22;116(4):1207–12.

How is depression affected?

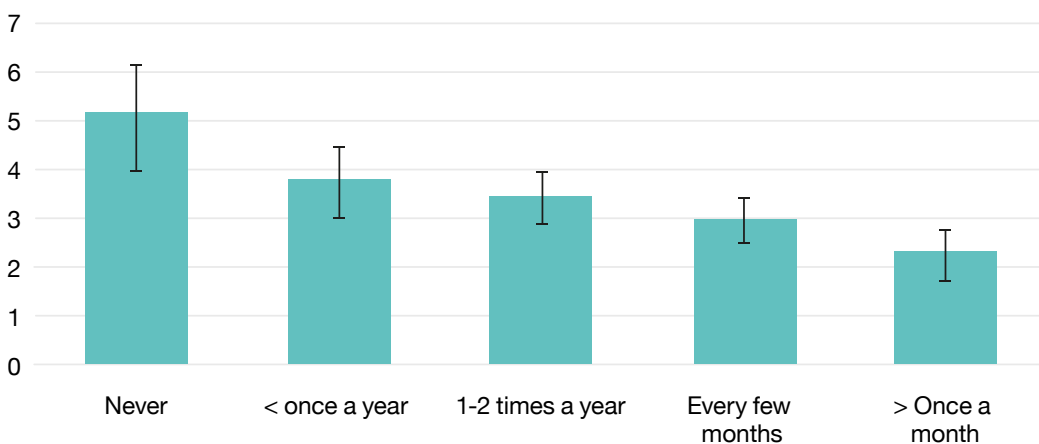
We have also found particularly interesting results with respect to depression in older adults. While a number of previous studies had suggested that arts and cultural engagement could help with the management of depressive symptoms and support in recovery, we were able to use cohort studies to explore the potential preventative effects of the arts for depression. In a study of adults aged over 50 who were free from depression when they entered the study (n=2,148), we found that those who visited cultural venues (e.g. the theatre, concerts, art galleries, etc.) every few months, had a 32% lower risk of developing depression over the following 10 years. The risk was 48% lower if they engaged monthly or more (35). This was a notable finding. But a key concern was whether such effects could simply be due to differences in the socio-economic position of people who engaged in cultural activities compared with those who did not. While our analyses controlled for socio-economic position, we wanted to test this further. So we used three different statistical approaches (logistic regression, propensity score matching, and fixed-effects regression) to triangulate results for associations between cultural engagement and odds of depression over 12 years. Each method has different strengths

“

Adults over 50 who visited cultural venues every few months had a 32% lower risk of developing depression over 10 years.”

and weaknesses. Logistic regression adjusts for confounders but residual imbalance between groups can still bias results. Propensity score matching addresses this by ensuring that both groups are comparable, but it only matches participants on characteristics that are pre-identified as potential confounders and focuses on one point in time. Fortunately, fixed-effects regression models dynamic changes over time and compares people against themselves so any fixed traits such as socio-economic position are accounted for automatically even if they are not known to the researchers. Using these three methods, we found that while the odds ratio changed per method, the association remained and socio-economic position only explained half of the relationship. It therefore suggests that components of arts engagement have their own independent roles in preventing depression (36).

Figure 7: Cultural engagement and depression incidence rates over 10 years per 100 person-years

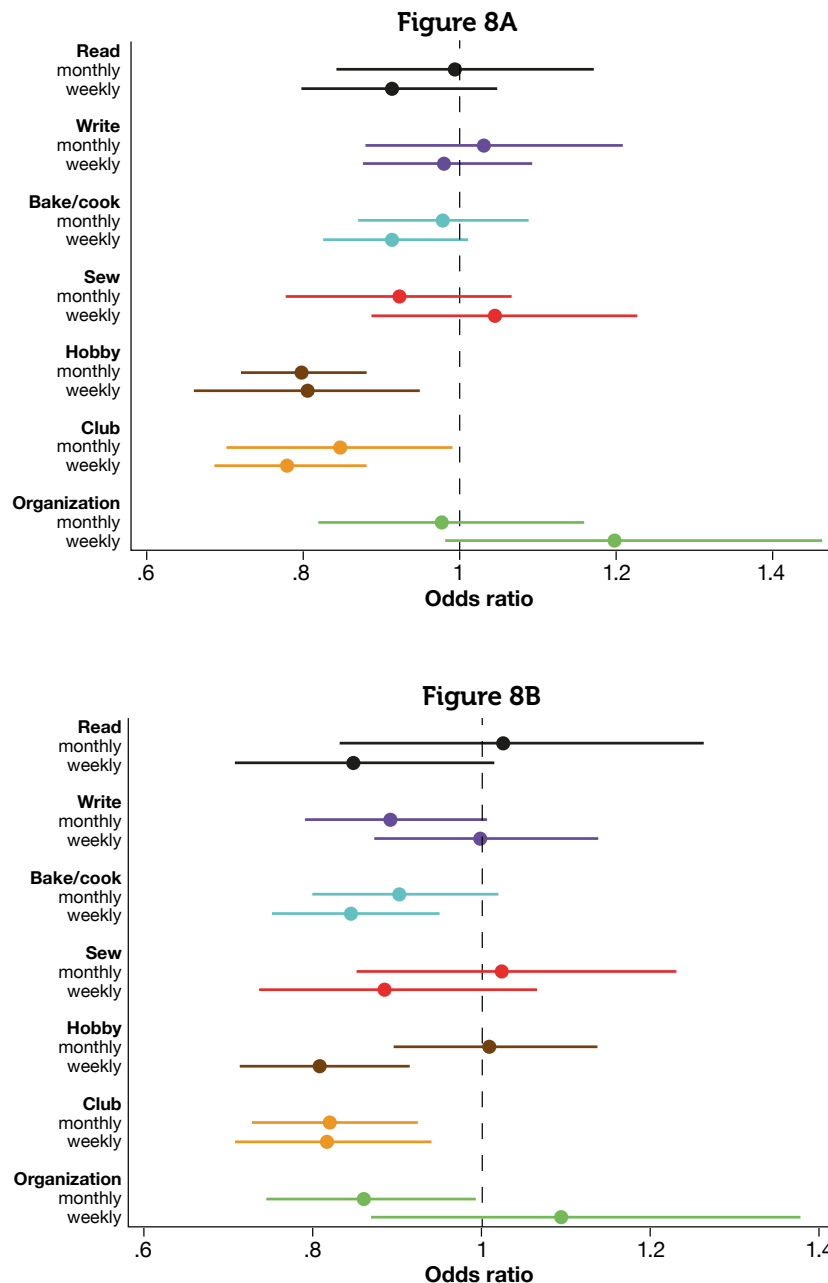


Source: Fancourt D, Tymoszuk U. Cultural engagement and incident depression in older adults: evidence from the English Longitudinal Study of Ageing. *The British Journal of Psychiatry*. 2019 Apr;214(4):225–9.

For participatory arts activities, our results on depression were more nuanced. In our work on older adults in the USA (n=19,134), we did not find an association between depression and some participatory arts activities, but other leisure activities were associated with a reduced risk of depression. In particular, attending a sports club, social club or other club, having a weekly hobby or project, and weekly baking or cooking were all associated with reduced

odds of depression two years later (37). This has led us to consider whether there may be different ‘ingredients’ in participatory engagement compared to attending cultural events that could lead to differing associations with mental health benefits (see Research Spotlight 1). Alternatively, broader categories or indices of arts participation, rather than specific activities, may lead to different results, which we are exploring further.

Figure 8: Associations between frequency of engagement in leisure activities compared to no engagement and the odds of depression



Odds ratios from population-averaged panel data models using generalised estimating equations to test the associations between frequency of engagement in leisure activities compared to no engagement and the odds of depression. A) Concurrent associations. B) Longitudinal associations, with depression measured two years later.

Source: Bone JK, Bu F, Fluharty ME, Paul E, Sonke JK, Fancourt D. Engagement in leisure activities and depression in older adults in the United States: Longitudinal evidence from the Health and Retirement Study. *Social Science & Medicine*. 2022 Feb 1;294:114703.

How much engagement is necessary?

A natural question is how much and how often people have to engage in community and cultural activities to experience mental health or wellbeing benefits. For this reason, we have examined frequency or “dosage” of engagement and the relationship with health. In general, we have found a “dose-response” relationship between engagement and wellbeing benefits, meaning that engaging more frequently has greater benefits. For example, our work on cultural engagement and incident depression described above found 32% lower odds of developing depression if people engaged every few months and 48% lower odds if they engaged monthly or more (35). Similarly, community arts group engagement (n=12,111) was more beneficial for older adults’ wellbeing if they took part on a weekly basis rather than monthly (30). As with all of our analyses, we confirmed that such findings were maintained even when we had accounted for socio-demographic factors, health and behavioural activities, and other hobbies or social interactions. But there may also be a ‘ceiling effect’, whereby after a certain amount of engagement, more engagement does not lead to further improvements. For example, in our analyses of loneliness, we found that the negative associations between attending cultural events and



loneliness was strongest if attendance was every few months or more (31). However, if frequency increased further, we did not find much evidence for the odds of loneliness decreasing any more (31). Additionally, it is not just frequency of engagement that is important, but also that such engagement is sustained over time. When exploring this in a study (n=3,188), we found that over the course of 10 years, wellbeing benefits were not as clear if engagement was only short-term (e.g. over the course of one year in that decade) but were seen if engagement was repeated regularly over two to four years or sustained for six to eight years (38). This supports the hypothesis that we previously proposed in our work on children and young people: that cultural engagement may be a ‘perishable commodity’, only continuing to show benefits if people maintain their engagement. For this reason, we are also exploring whether changes in people’s lives could lead to disengagement from cultural activities and what impact this may have on health.

“

Community arts group engagement was more beneficial for older adults’ wellbeing if they took part on a weekly basis rather than monthly.”



III. Healthy ageing

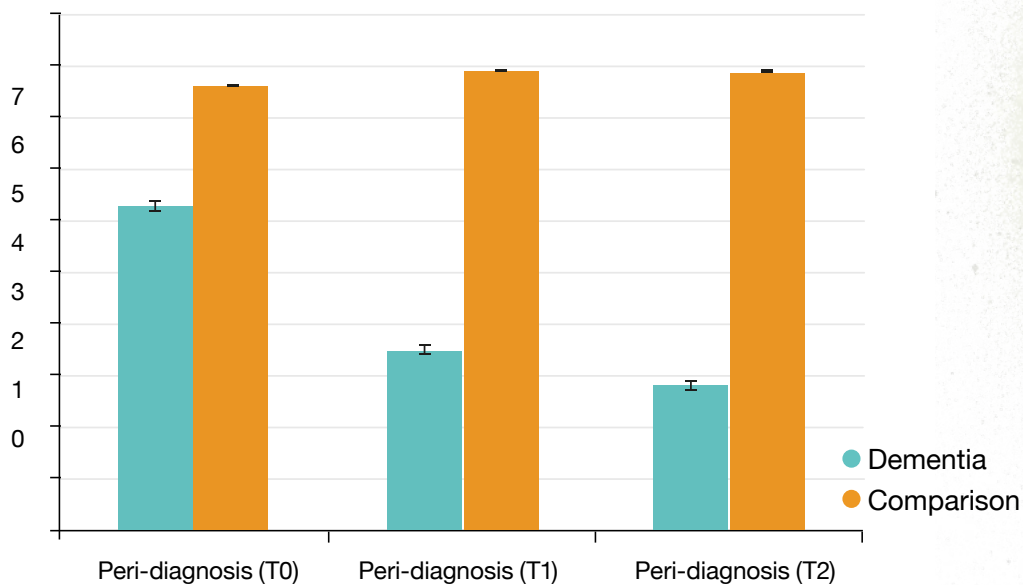
Cognition and dementia

How does time-use affect dementia risk?

In addition to wellbeing measures and mental health, we have extensively examined the role of the arts in cognitive decline and dementia among older adults. Given that lifestyle factors prior to diagnosis may influence the onset of dementia, we began by looking at time-use in older age and its association with cognitive ageing. For example, in one of our preliminary studies, we demonstrated an association between television watching and cognitive decline in the form of poorer verbal memory. The relationship was greater the longer individuals watched TV per day, suggesting

a dose-response effect (39). Mechanistically, these results build on a large body of literature suggesting other adverse health effects from television watching, including increases in sedentary behaviours. We also found that lower social interaction was associated with an increased risk of developing dementia. People with dementia were more likely to have less social interaction in the years preceding diagnosis, while people without dementia did not experience any change (n=4,171) (Fig. 9) (40). These results are relevant to the arts given that the arts can provide opportunities for social interaction, movement, and activity and could therefore have a role in mitigating some of the behavioural the factors that are associated with increased risk of dementia.

Figure 9: Proportion meeting friends and family on a monthly basis



Weighted and adjusted for age, sex, wealth, and education. Error bars are standard error of mean.

Source: Hackett RA, Steptoe A, Cadar D, Fancourt D. Social engagement before and after dementia diagnosis in the English Longitudinal Study of Ageing. Bayer A, editor. PLoS ONE. 2019 Aug 1;14(8):e0220195.

However, there is a key challenge in cognition research: many of the symptoms of cognitive decline and dementia can emerge years or even decades prior to diagnoses being made, driving changes in behaviours such as social withdrawal, decreased attention, and mood alterations. As a result, there is likely a bidirectional relationship between behaviours and cognitive decline. Nonetheless, there is a growing literature on the concept of 'cognitive reserve': the idea that we can build the resilience of the brain against cognitive decline. Given the richness of the existing literature on the role that the arts can play in supporting child

cognitive development and in maintaining memories, language, and functioning in people living with dementia ⁽⁴⁾, there is a theoretical rationale for the arts being able to support cognitive reserve. Therefore, we have subsequently conducted a range of analyses to identify if there is any evidence of a relationship between arts and cultural engagement and cognitive decline and the development of dementia. While investigating symptom development before the onset of dementia will always be a challenge, we have applied a wide range of statistical techniques and controlled broadly for confounders to try and mitigate this risk.

How does arts engagement affect dementia risk?

We began our arts analyses on cognition with a novel assessment of the relationship between museum attendance and dementia incidence over a 10-year period. We found that adults aged over 50 who visited museums every few months or more were less likely to develop dementia (41). While demographic factors, health factors, and other forms of community engagement explained some of the relationship, results were maintained after accounting for these factors (41). Reasons may have to do with cognitive function as we found that receptive cultural engagement can

predict changes in cognitive function. Using semantic fluency and memory to test cognition, we found that compared to those who did not engage, individuals who infrequently or frequently attended a gallery or museum had smaller cognitive declines in terms of memory. Attending once a year or more was also protective against loss of semantic fluency, which is a marker of executive function. Meanwhile attending the theatre, concerts or the opera once a year or more had protective associations with both memory loss and semantic fluency (n=3,445) (Fig. 10) (42). We controlled for other types of social activities to see whether cultural engagement was merely a proxy for broader social behaviours known to benefit cognition, but associations still remained (42).

“

Attending the theatre, concerts or the opera once a year or more had protective associations with both memory loss and semantic fluency.”

Figure 10: Associations between cultural engagement and (A) memory (B) semantic fluency.

Figure 10A: Memory

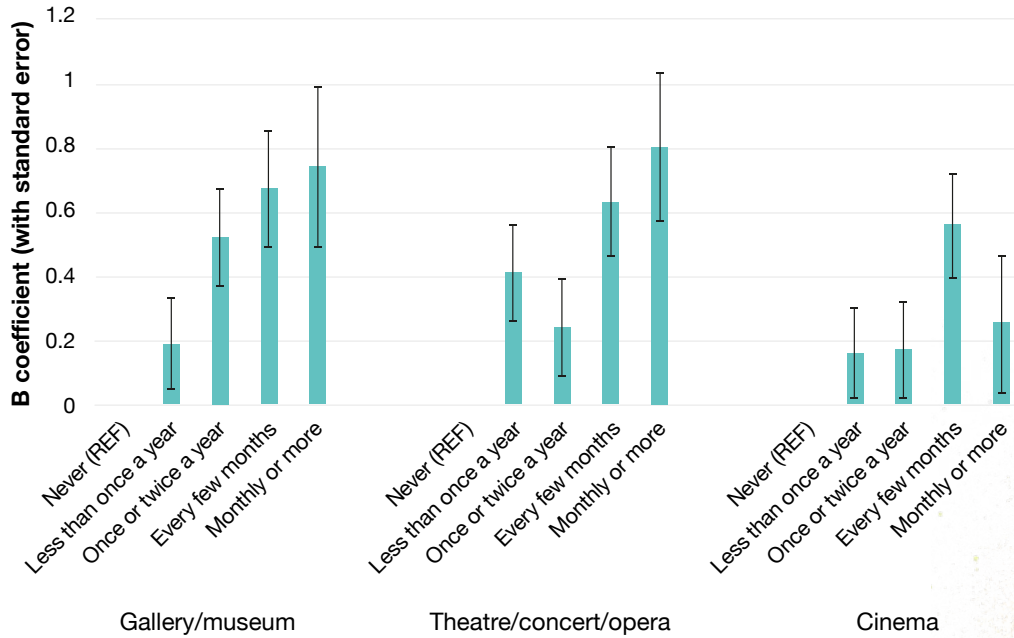
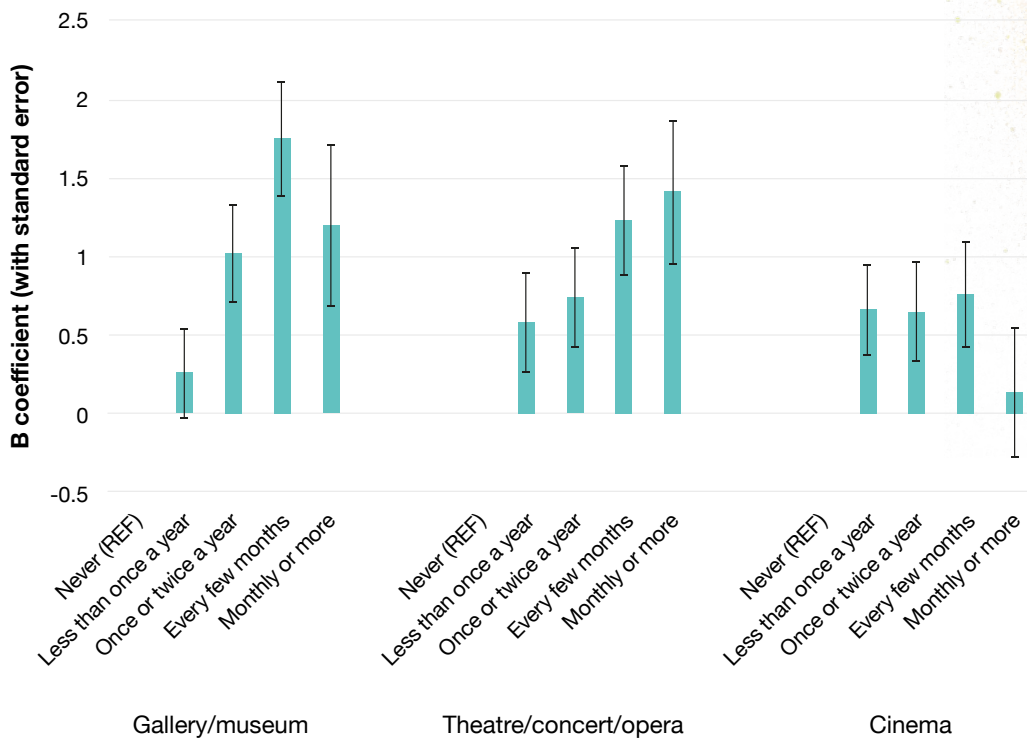


Figure 10B: Semantic Fluency

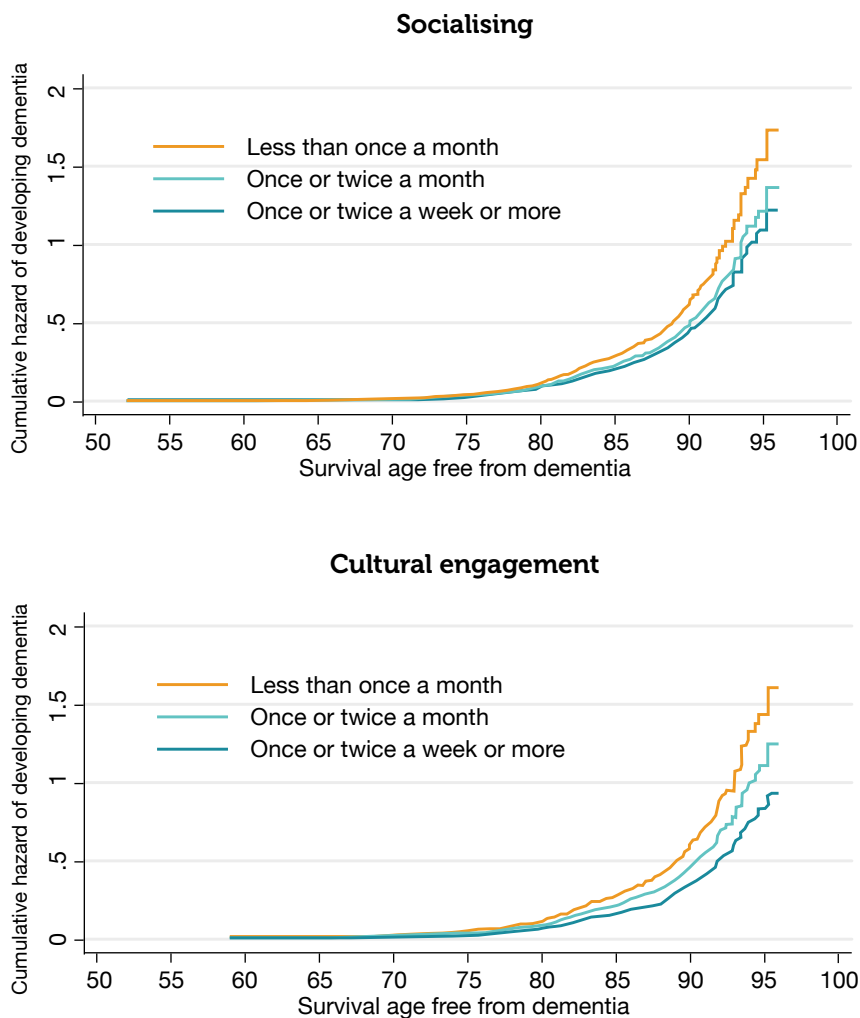


Source: Cultural engagement predicts changes in cognitive function in older adults over a 10-year period: findings from the English Longitudinal Study of Ageing | Scientific Reports Available from: <https://www.nature.com/articles/s41598-018-28591-8>

While it is still possible that the positive effects of social interaction on the prevention of dementia also exist within cultural engagement and therefore lead to similar associations, our research additionally showed that social factors only explained 9-10% of the association between cultural engagement (visiting museums, galleries, and theatres) and the risk of developing dementia in older age (n=9,550) (Fig. 11) (43). In fact, community engagement on its own, which we classified

as groups of common interest such as a political party, trade union, tenants or neighbourhood groups, churches, or other societies, was not associated with lower dementia risk. This suggests that there are specific components of cultural activities over and above their social components that have benefits for cognition, such as neural and sensory stimulation and cognitive engagement (41). This has promising implications for the use of culturally-focused social prescribing schemes (43).

Figure 11: Association between cultural engagement and the risk of developing dementia in older age



Cox proportional hazards regression models showing the cumulative hazard function for social and cultural engagement (both entered simultaneously into the model so mutually adjusted).

Source: Fancourt D, Steptoe A, Cadar D. Community engagement and dementia risk: time-to-event analyses from a national cohort study. *J Epidemiol Community Health*. 2020 Jan;74(1):71-7.

That said, the relationship is not always clear-cut. We had different results when looking at arts and cultural engagement over a seven-year period in older adults in the USA (n=4,344). Participatory arts engagement was not associated with better subsequent memory after adjusting for confounders and only low frequencies of receptive arts engagement were associated

with better subsequent cognition. A dose-response relationship was not found, unlike in previous studies. But the follow-up in this study was shorter, and it's possible that people with cognitive decline had already started engaging less or struggled more than others to complete the survey questionnaires (44).

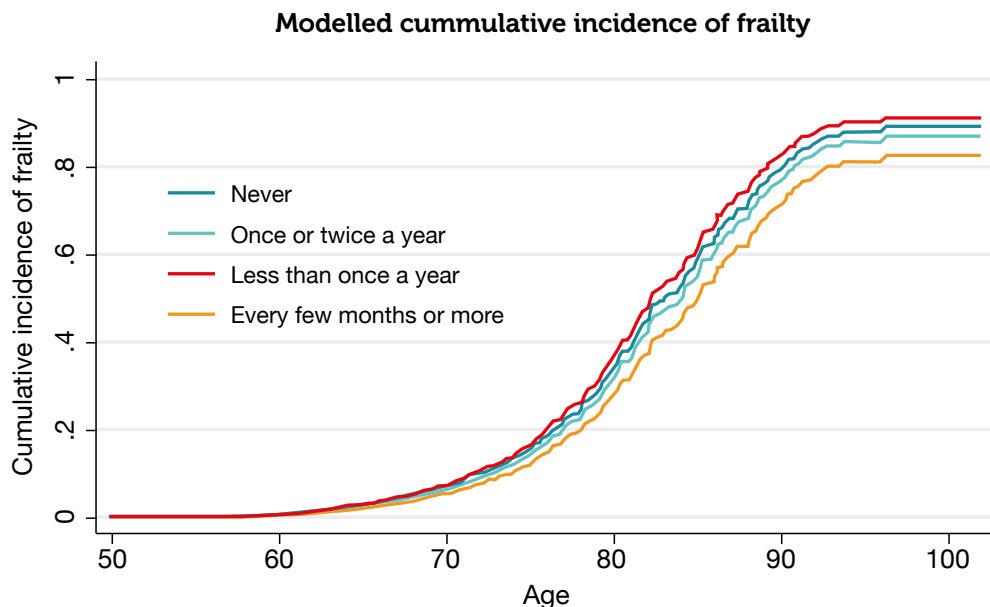
Morbidity and mortality

How is age-related physical decline affected?

Outside of mental health, wellbeing, and cognitive health, cultural engagement can also play a role in promoting physical health in older age. For instance, we found that greater engagement in cultural activities has links with reduced frailty. Specifically, older adults (n=4,575) who attended cultural events every few months

or more over 10 years had a lower risk of becoming frail or of frailty progressing. The relationship remained even after adjusting for whether participants were already frail before the study, as well as demographic and social confounders. A dose-response relationship was observed, meaning the greater the cultural engagement, the lower the risk of frailty incidence and progression (Fig. 12) (45).

Figure 12: Modelled cumulative incidence of frailty by frequency of cultural engagement

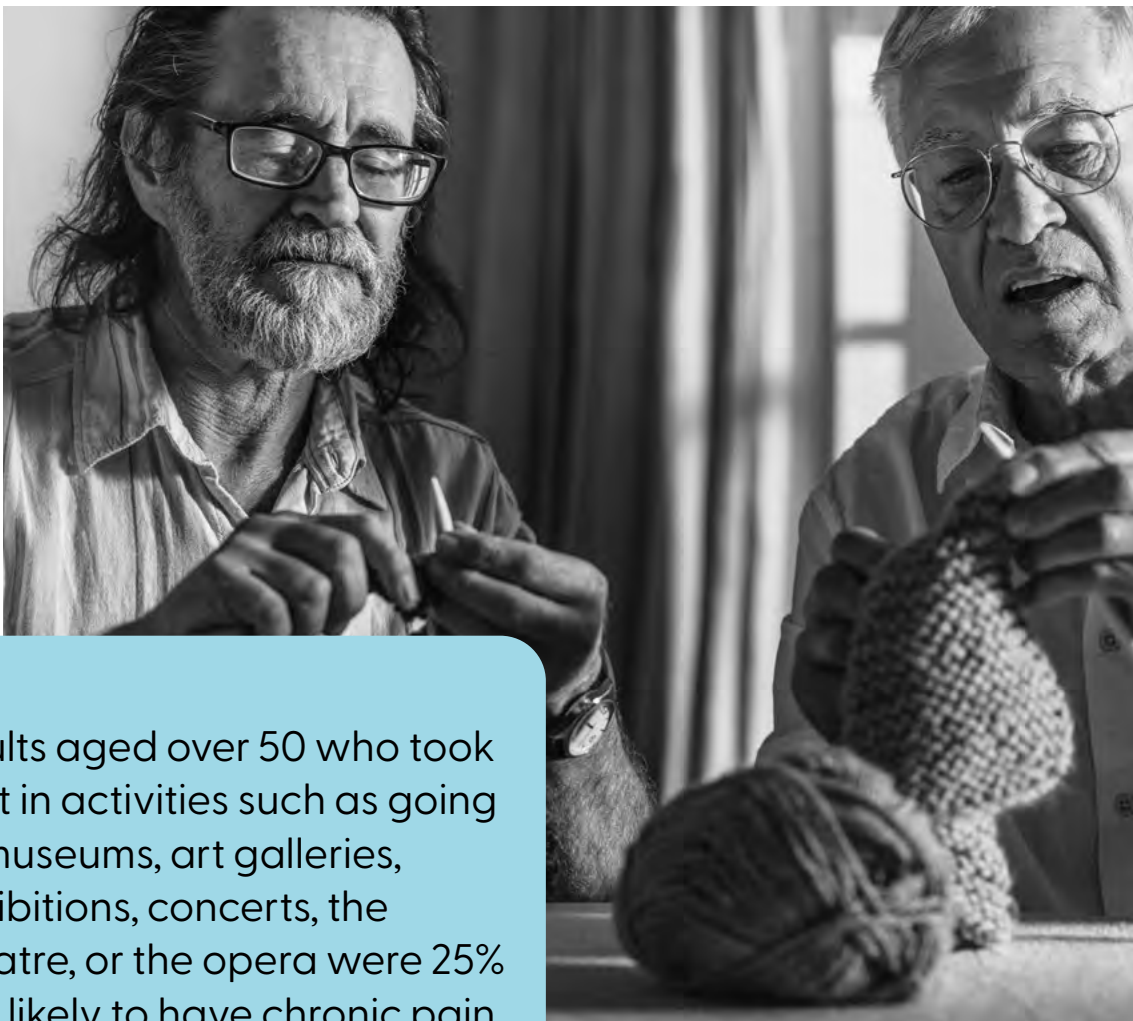


Adjusted for all covariates and accounting for the competing risk of death.

Source: Rogers NT, Fancourt D. Cultural Engagement Is a Risk-Reducing Factor for Frailty Incidence and Progression. *The Journals of Gerontology: Series B*. 2020 Feb 14;75(3):571–6.

In addition, age-related disability, which affects around 45% of adults over 65, also appears to have inverse links with arts engagement. When we examined adults aged over 50 (n=5,343) we found that cultural engagement was related to their ability to do activities that were either essential for independent living, such as dressing or bathing oneself, or important for their quality of life, such as managing their homes or finances. Over 12 years, if adults engaged every few months or more, the risk of them developing a disability was lowered by 20%. Again, this association was independent of identified confounding factors (46). Our analyses became even

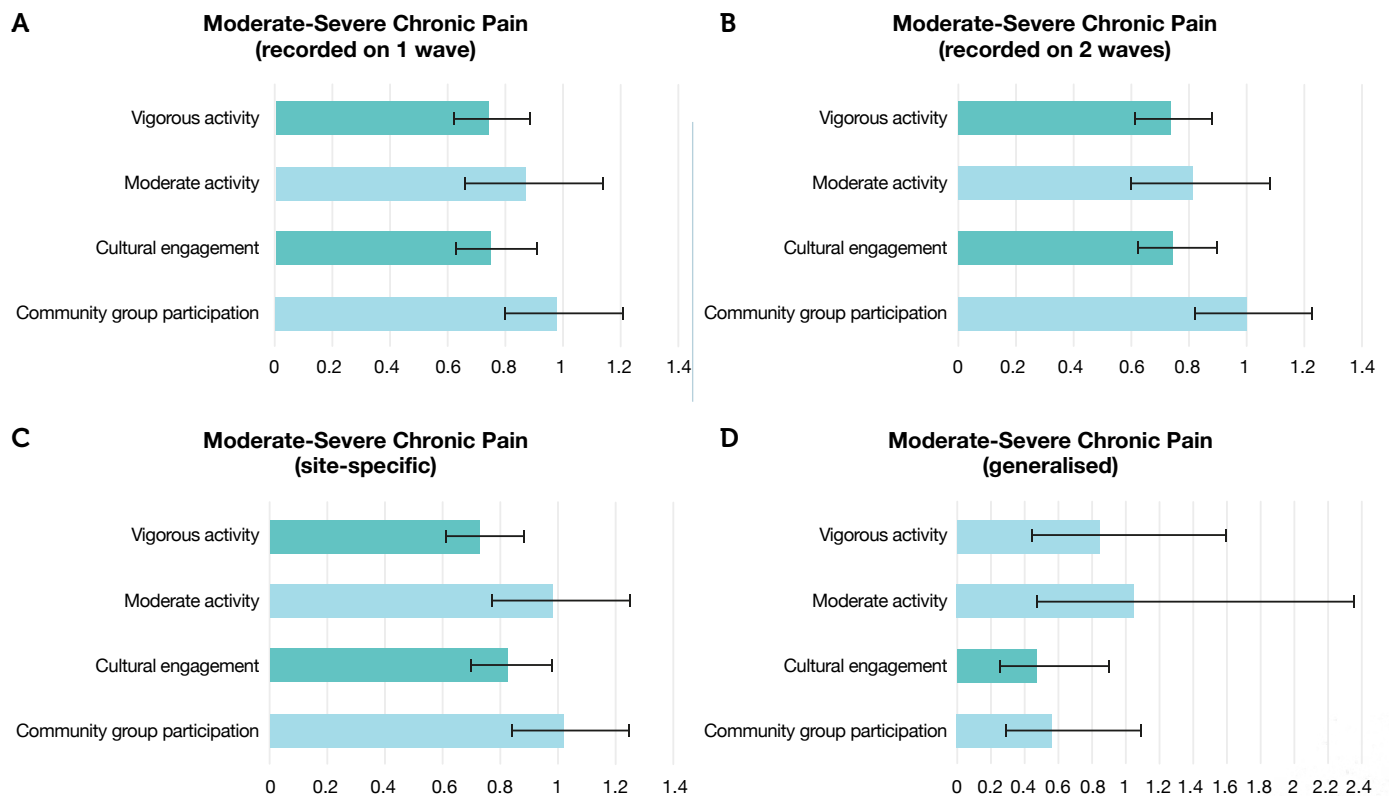
more specific as we looked at chronic pain prevention, an issue that affects many in older age. Our paper was the first investigation of the potential protective effects of cultural engagement against chronic pain in older age. Adults aged over 50 who took part in activities such as going to museums, art galleries, exhibitions, concerts, the theatre, or the opera were 25% less likely to have chronic pain 10 years later (n=2,631). This was comparable to the risk reduction associated with vigorous exercise and chronic pain. No effects were found for moderate weekly physical activity and community group participation (Fig. 13) (47-48).



“

Adults aged over 50 who took part in activities such as going to museums, art galleries, exhibitions, concerts, the theatre, or the opera were 25% less likely to have chronic pain 10 years later.”

Figure 13: Associations between physical and psychosocial factors and the development of chronic pain over the following decade in adults aged ≥ 50 years.



ORs and confidence intervals. (Dark blue: significant results.) All results are adjusted for age, gender, ethnicity, educational qualifications, wealth, cohabitation, employment, physical illnesses, arthritis, alcohol consumption, smoking, depression, sleep quality, sedentary behaviours, and social isolation.

Source: Fancourt D, Steptoe A. Physical and Psychosocial Factors in the Prevention of Chronic Pain in Older Age. *The Journal of Pain*. 2018 Dec 1;19(12):1385–91.

As we've investigated further, we've found that arts activities can be related to a range of health outcomes as people age. In particular, people who regularly engaged in creative activities at home (whether baking, cooking, making clothes, writing, etc.) were more likely to have better health concurrently (n=8,893) (49). This includes measures of health such as daily functioning and physical fitness, frailty, chronic health conditions, heart health, weight, and sleep. Older adults who regularly engaged in creative activities were also more likely to have better daily functioning, physical fitness, weight, and sleep eight years later (49). We also examined the relationship between arts

engagement and the likelihood of ageing healthily, which we defined as being free of major chronic diseases, having no cognitive impairment, having good physical functioning, and having good mental health. Adults aged over 50 (n=1,269) who did receptive arts activities more than once a month had 84% higher odds of ageing healthily two years later compared to those who never engaged. However, participatory arts activities did not have such a clear association with healthy ageing, perhaps indicating they lack specific active ingredients found in receptive activities. Or it is possible that older adults with poorer health could access participatory activities more easily than receptive activities such

as the theatre or a concert that require physical attendance and travel (44).

It is also possible that the arts could influence whether older adults are likely to seek healthcare and therefore play a role in the management of their health. In an analysis of over 12,000 adults in the USA, we found that those with higher rates of social, community, and cultural engagement also had higher rates of accessing outpatient care and dental care (50). This suggests that such adults were more proactive in seeking care earlier, reducing their risk of developing

health conditions and their need for more expensive health care. Indeed, even when they did require hospital inpatient care, these individuals had shorter hospital stays. In contrast, over a period of six years, those who engaged with social, cultural and community activities less or hardly at all had higher odds of receiving inpatient care (50). The implications are significant for reducing the risk of comorbidities and enhancing healthy ageing, and we are investigating what mechanisms underlying social, community, and cultural engagement may encourage care-seeking behaviours in older adults.

How are perceptions of ageing affected?

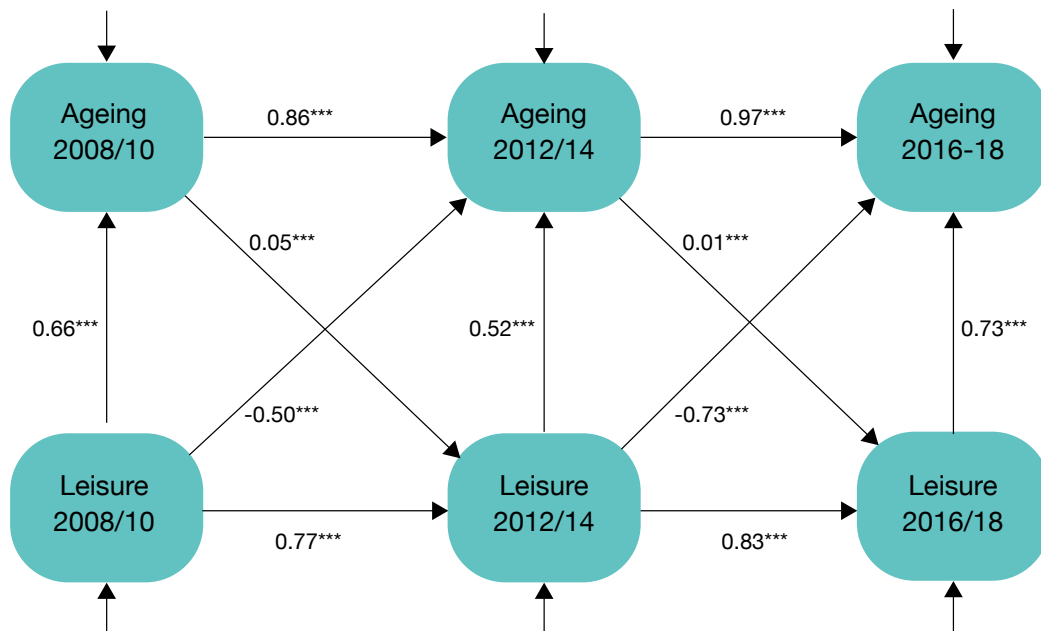
The mechanisms of these relationships are worth investigating, particularly as some of our most recent work has found associations between older adults' engagement in leisure activities and their perception of ageing, including how content they are with their age, whether they have had to stop doing things they enjoy due to ageing, and their satisfaction with ageing. Greater engagement in activities was significantly associated

with more positive perceptions of the ageing process, both concurrently and longitudinally (n= 17,753) (Fig.14) (51). These associations were present across different types of leisure activity including community activities (e.g. volunteering or joining a group), cognitive activities (e.g. board games, cards, or chess), creative activities (e.g. gardening or making clothes), and physical activities. We also found some evidence for reciprocal relationships, suggesting that one's perception of ageing can influence whether one subsequently takes part in these activities. However, there was less evidence for this and it is more likely that cultural, community, and cognitive engagement had an impact on older adults' perception of ageing, instead of the other way around (51).





Figure 14: Concurrent and longitudinal relationships between leisure engagement and ageing perception among older adults



Results from full structural equation model. Adults aged ≥ 50 . All results adjusted for age, gender, marital status, race/ethnicity, education, employment status, household income, difficulties with activities of daily living, and self-reported chronic health conditions.

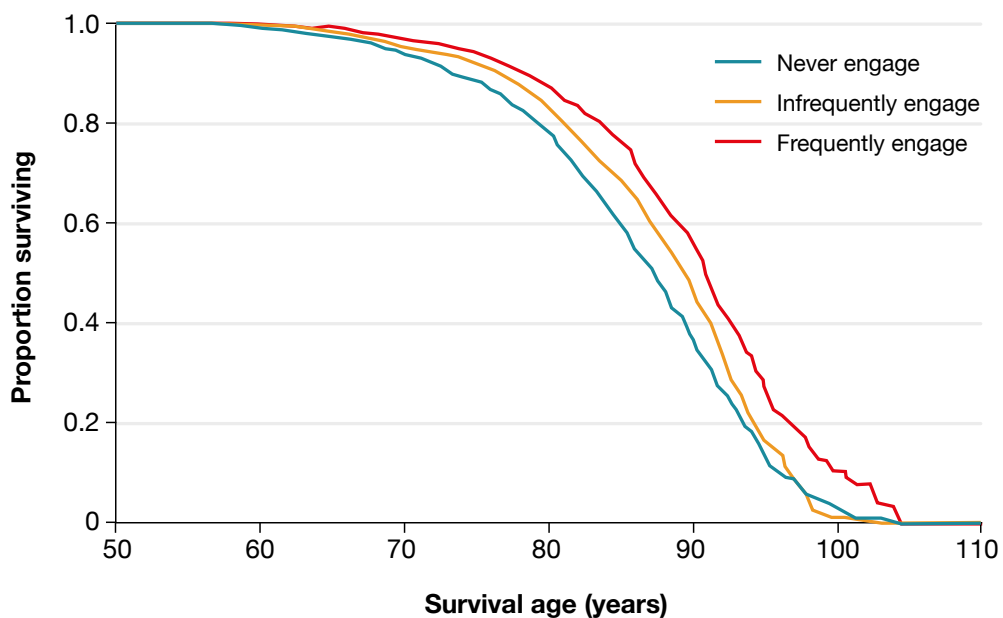
Source: Bu F, Mak, H W, Bone J, Gao Q, Sonke JK, Fancourt D. Leisure engagement and self-perceptions of ageing: Longitudinal analysis of concurrent and lagged relationships. In preparation. 2023.

How is mortality affected?

On a broad level, we have also found that cultural engagement has associations with mortality. In one of our seminal papers, we found a 33% lower risk of death over 14 years between those who engaged with cultural activities compared to those who never engaged. Forty-two percent of the association was explained by identified confounding factors. Of these factors, the association was partly explained by baseline differences in cognition (15%), social and civic engagement (12%), mobility and disability (12%), wealth (9%), health behaviours (9%), sedentary behaviours (6%), loneliness, living status, and marital status (6%). Health conditions and sensory impairment had no discernible impact on the association. However, even when accounting for these confounders, there remained a 20%

lower risk of death amongst those who were culturally engaged. This builds on all of our previous work on mental and physical health across the life course, suggesting there is something about cultural engagement—in this case receptive engagement with museums, art galleries, exhibitions, theatres, concerts, and the opera—that has protective links with survival (Fig. 15) (52). Reasons are likely wide-ranging and revolve around how cultural engagement could increase social capital, sense of purpose, emotion regulation, coping, stress management, and adaptability, as well as support mental, physical and cognitive health, as outlined above. But as our work on mechanisms has shown, reasons are also likely multiple and act in highly complex ways (see Research Spotlight 1).

Figure 15: Cultural engagement and survival age



Survivor function, which shows survival age by frequency of receptive arts engagement when adjusting for demographic, socio-economic, health-related, behavioural, and social confounding factors.

Source: Fancourt D, Steptoe A. The art of life and death: 14-year follow-up analyses of associations between arts engagement and mortality in the English Longitudinal Study of Ageing. *BMJ*. 2019 Dec 18;367:l6377.

IV. Access to the arts

Given the health and wellbeing effects of the arts, it is clearly important that every person has access to them. But access to the arts is unequal, even though the Universal Declaration of Human Rights Article 27 states that “everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits.” This is very apparent in the UK where we found that although many people do creative activities from time to time, only 10.3% of adults (n=38,069) have regular patterns of participation in the arts such as singing, playing an instrument, taking

part in a drama group, painting, drawing, or writing stories or poems. (Our analyses did not look at textiles, crafts, or broader arts activities.) Furthermore, only 18% of adults are frequently engaged in cultural activities, such as going to book clubs, exhibitions, plays, live music events, museums, historical places, or archaeological sites (53).

Therefore, alongside our longitudinal research, we have been exploring these inequalities to identify predictors and patterns of arts engagement and understand what may be preventing people from engaging in arts and cultural activities.

Socio-economic and demographic barriers

While socio-economic position does not explain all associations between arts engagement and health outcomes, as mentioned in our research outlined above, it does have a role to play in predicting engagement. For example, in one of our analyses, we found that it was a predictor of cultural engagement, possibly reflecting how cultural engagement often requires payment for attendance (n=38,069) (54). Furthermore, people who had fewer educational qualifications or lower supervisory or technical jobs did not engage in the arts and culture as much as those with higher education levels or in managerial or professional employment (52, 54). We therefore found a clear social gradient in arts and cultural participation. However, although socio-economic position was a barrier to engagement, it did not prevent people from benefitting from the arts. In fact, we found that people from lower socio-economic backgrounds made greater use of the arts to regulate their emotions (15).

“

We found a clear social gradient in arts and cultural participation.”

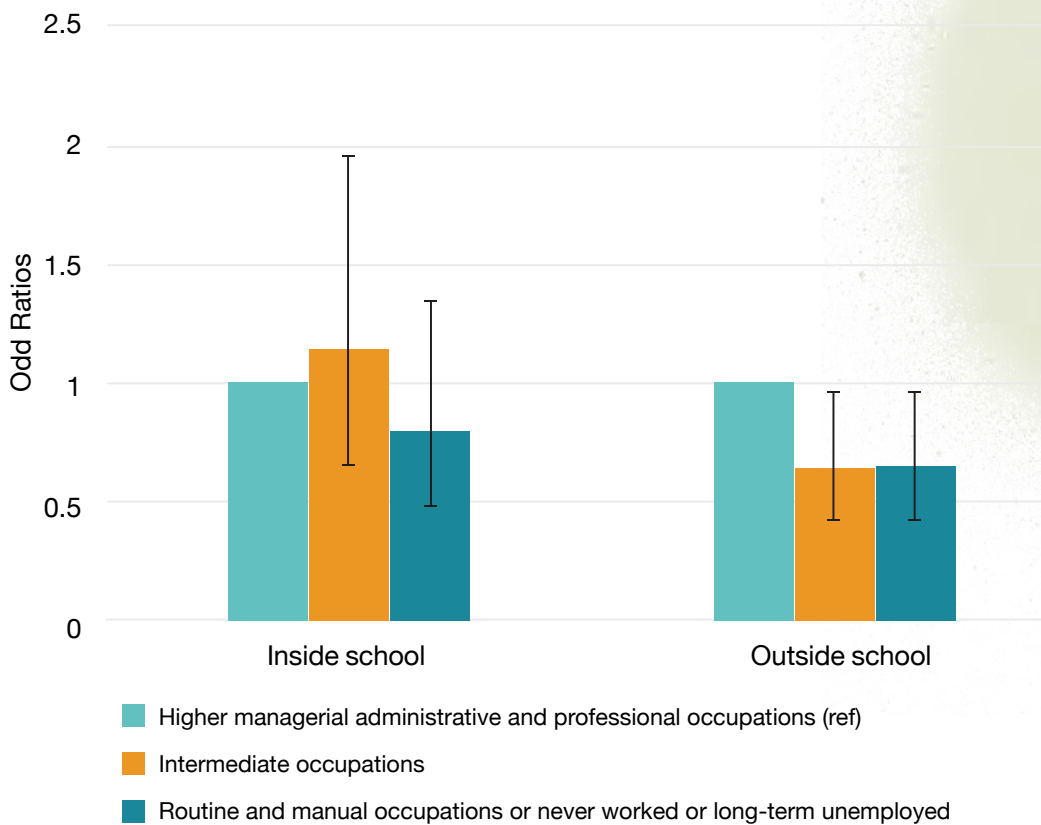
Parental socio-economic position (53) and parental education (55) were also associated with arts engagement, illustrating how adult engagement may partly depend on exposure as a child and how the effects of socio-economic position can be transmitted across generations. In fact, parental social status was a very consistent predictor of arts engagement, reflecting links between socio-economic status and child participation (56). Additionally, we investigated the role of schools in providing arts activities and how this



compared to engagement outside schools. In the UK, we found that school-based arts activities actually removed the social gradient found in arts and cultural engagement among children (n=1,986). This means that while children from poorer socio-economic backgrounds

tended to engage less outside of school compared to children of more advantaged backgrounds, inside schools this was equalised (56). So schools can remove barriers to arts participation, thereby enhancing child mental and physical health during adolescence.

Figure 16: In-school vs out-of-school engagement in archives, museums, and heritage sites



Associations between parents' socio-economic position and children's in-school and out-of-school engagement in archives, museums, and heritage sites in children aged 11-15. Data were analysed from the Taking Part Survey [2015-2018]. Odds ratios and confidence intervals are presented. Other predictors were also explored including children's gender, ethnicity, parents' marital status, parents' socio-economic position, parents' working status, parents' educational level, neighbourhood deprivation levels, housing tenure, living area, parents' current engagement in museums and heritage, and parents' previous engagement in museums and heritage while growing up.

Source: Mak HW, Fancourt D. Do socio-demographic factors predict children's engagement in arts and culture? Comparisons of in-school and out-of-school participation in the Taking Part Survey. PLoS ONE. 2021;16(2): e0246936.

In terms of demographic factors that predict arts engagement, we found that gender, ethnicity, and living situation are important. Women were more likely to participate than men (53) (55) and people from ethnic minorities were less likely to engage in arts and cultural activities compared to people from white backgrounds (53). Individuals who were responsible for children (53) or married (55) were also less likely to participate.

When we extended these analyses to the USA, we found that similar demographic and socio-economic factors predicted arts engagement (33) (36). We explored whether different factors were associated with cultural events, participatory activities, and creative groups, and found that higher levels of individual education and parental education and female gender were associated with higher rates of engagement in all types of activities (33). Several socio-economic factors, such as higher income and social class, better health, and living in rural areas increased attendance at cultural events, but

were not related to other arts activities or interest in the arts, indicating a larger social gradient in cultural engagement than other forms of the arts in the USA (33).

Age also has a role to play. Compared with young people, older people were less likely to participate in arts activities but were more likely to engage frequently in cultural activities (53). One of our findings from the US suggested that this may be because wealth becomes less of an important predictor of cultural engagement for older age groups, indicating that such events are more affordable in later life (57). But other demographic factors also became stronger predictors of engagement, including levels of cognition and whether people had difficulties in performing daily living activities (57). Also, as people aged, we found that they were less likely to feel that they were not capable of engaging or that there were insufficient opportunities for engaging with the arts, suggesting that these types of barriers may be more of a problem for younger groups with work or family pressures (58).



Geographical barriers

Socio-economic factors relating to arts engagement are also reflected in the places people live. Those living in the 10% least deprived areas had 21% higher odds of engaging in the arts compared to those living in areas of medium levels of deprivation. They also had twice the odds of engaging in cultural activities. Conversely, people living in the 10% most deprived areas had a 17% lower odds of engaging in the arts and a 64% lower odds of engaging in cultural activities (59). Specifically, lower participation for all types of arts, culture, and heritage was found in neighbourhoods where there was a lack of skills attainment in the local population, poorer local employment levels, higher numbers of people experiencing income deprivation, a greater risk of health conditions, and a higher risk of victimisation (54). Poor physical and financial accessibility to housing and local services were also associated with reduced arts participation (54).

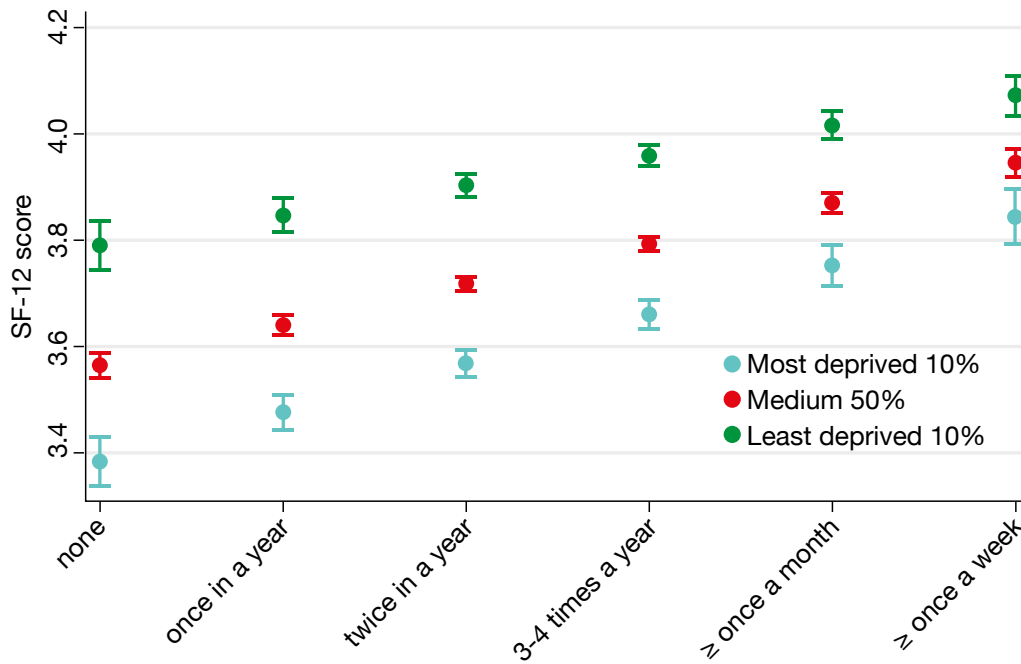
But there were other geographic differences that remained even after accounting for socio-economic position. Those in the northern parts of England had 14% lower odds of participating in the arts and 20% lower odds of engaging in cultural activities than those in the southern regions, and engagement was higher in the countryside than in industrial areas. Engagement in cultural activities was also higher amongst those living in cosmopolitan student neighbourhoods and in relatively affluent countryside areas but lower amongst those living in hard-pressed communities. Notably, the positive associations between higher socio-economic position and education and cultural engagement were also more pronounced in highly deprived areas and less pronounced in more affluent places (59). Therefore, where individuals live can influence the relationship between socio-economic position and engagement, and in turn their socio-economic position can also



influence the impact that living in a deprived area can have on cultural engagement.

This social and geographical gradient in arts engagement is concerning because it means that people from lower socio-economic positions, who are also more likely to have poorer health, are less likely to have to the opportunity to benefit from the health influences of the arts, exacerbating health inequalities. But the good news is that while geographical factors can relate to levels of engagement, improvements to wellbeing still exist in areas of deprivation. We found that if someone lives in a poor neighbourhood (n=14,783), it did not lessen the positive health effects of arts engagement, but may even have made these effects more salient (60).

Figure 17: Association between cultural attendance and SF-12 mental health functioning by levels of area deprivation



Data were from the UK Household Longitudinal Study Waves 2 [2010/12] and 5 [2013/15]. OLS regression was used while adjusting for age, gender, ethnicity, partnership status, whether responsible for children aged under 16, whether living alone, and regional locations.

Source: Mak HW, Coulter R, Fancourt D. Associations between community cultural engagement and life satisfaction, mental distress and mental health functioning using data from the UK Household Longitudinal Study (UKHLS): are associations moderated by area deprivation? *BMJ Open*. 2021;11: e045512.

Health barriers

Health-related challenges can also prevent people from engaging with the arts as people with poorer physical health perceive themselves as less capable of taking part in arts activities. We found that people with poor mental health reported similar perceptions of their capabilities, but they were also less motivated to engage regardless of whether they had opportunities to do so (58). Loneliness was also a factor; those who were lonely felt there were fewer opportunities for them to engage, partly as reduced social connections limited their awareness of different arts and cultural options (58). We also found that people with depression or anxiety tended to feel that they were not as capable, either mentally or physically, of engaging, and they felt less

motivated to engage (61). And in general, lower levels of happiness corresponded with a lower likelihood of taking part in multiple cultural activities (n=7241) (62).

However, we know that poorer mental health can be associated with lower socio-economic position. We therefore additionally carried out analyses adjusting for socio-economic position and found that while it and education levels did account for lower engagement in some activities, the relationship remained for others (62). In contrast, people with high levels of anxious feelings participated similarly across activities, suggesting that different mental health conditions also have different impacts on engagement (62).

Examining access to the arts: A behavioural science approach

Alongside our epidemiological research, we've used a behavioural science approach to understand more about barriers and facilitators to engagement in the arts, particularly for people with mental health conditions. We interviewed individuals, community organisations, and healthcare professionals to understand how the barriers we had identified quantitatively were experienced in real life and why they existed.

Barriers for individuals

Amongst individuals with mild and moderate mental health problems, lack of confidence in social situations or in one's abilities to engage in the arts prevented some people from participating. Some individuals feared that they would be unable to learn new skills or that others would be more skilled than them. If they did not consider themselves creative or if a past experience had suggested they were not creative, or if they were fearful of how they would be perceived and would be rejected by a group, people were less motivated to engage. Physical limitations were also preventative, with many participants discussing how chronic illnesses, medication side effects, or other symptoms such as fatigue made it harder for them to take part in the arts (63). There

were also structural barriers outside of mental illness that influenced peoples' opportunities to engage. Some people felt they didn't have information about what arts activities were available to them, which was a demotivating factor. In terms of opportunities, affordability was a barrier for most participants and even if activities were free, transport or equipment costs were at times prohibitive. Sometimes even affordable activities weren't accessible and required difficult travel logistics or were offered at times that did not suit people's schedules (63).

Barriers in communities

A key aspect of whether people can take part in the arts is the availability of local resources and organisations to encourage participation. Unfortunately, while many arts groups are motivated to help people with their mental health needs and develop innovative arts-in-health services, they



face many challenges in doing so. Some arts organisations spoke about feeling concerned that they lacked necessary skills, training, and support to work with people who have mental illness and to manage things like statutory responsibilities and GDPR. Staff in some organisations were also worried about the workload of taking on extra responsibilities and being mistaken for mental health organisations rather than arts and cultural groups. They spoke about the challenge of finding opportunities to

collaborate meaningfully between the arts sector and health sector or described how some partnerships that had developed were not strong enough. Some organisations had experienced situations where they felt underappreciated by health partners or felt their expertise and time were not properly valued. Long-term and reliable funding was also very difficult to find, especially given complicated and confusing commissioning processes for social prescribing (64).

Barriers in health settings

One of the most promising schemes for connecting people with poor health to arts and cultural resources is social prescribing. As part of the NHS Long Term Plan to expand personalised care, it allows general practitioners to refer patients to arts-based organisations and groups. However, we've identified many barriers that make this difficult. A lack of training for GPs means they are less likely to prioritise social prescribing

or want to learn more about it. Within clinical settings, there is a general lack of knowledge about local community assets. Further, arts and community organisations tend to have unsustainable funding and groups may only exist short-term. GPs also find it difficult to persuade their patients of the benefits of social prescribing, as they feel they lack evidence of its effectiveness in improving mental health and wellbeing (65).

Read our briefing on how to improve access to the arts for people with mental health conditions. Visit <https://marchlegacy.org> to learn more about our partnerships and research on community assets for mental health.

“

As part of the NHS Long Term Plan, social prescribing allows general practitioners to refer patients to arts-based organisations and groups.”

Summary and implications

Over the last five years, our longitudinal research has demonstrated the influence of arts and cultural engagement on health outcomes over time. We have shown that benefits of the arts for health exist not just in bespoke health interventions but through daily engagement across our lives.

The implications are profound for population health as this evidence offers multiple avenues related to policy and practice for preventing, treating, and managing physical and mental health across society. The health benefits of the arts begin in childhood and are associated with physical and mental health behaviours in early and late adolescence. We've found links with a range of behaviours and perceptions including hyperactivity and inattention, prosocial behaviour, maladjustment, likelihood of criminality, self-control, perceived social support, likelihood of substance use, physical activity, and others.

Among adults, arts and cultural engagement can be used to support emotional regulation, enhance wellbeing and enhance mental health, including reducing the risk of developing mental health problems. Among older adults, in addition to psychological benefits, the arts have protective associations against cognitive decline, dementia incidence, and multiple aspects of physical health and functioning including frailty, chronic pain, and disability, as well as better perceptions of ageing. Even lifespan is associated; those who are culturally engaged having a lower mortality risk.

Based on our research, we offer these five following areas of action:

1. Arts engagement in schools

We need to protect and promote arts-focused initiatives in schools, highlighting the importance of training and engagement in the arts for the long-term physical and mental health of young people. Schemes that both enable families to expose their children and adolescents to arts-based activities, as well as educate them on the benefits of doing so, are essential. We recommend developing education policies that support teaching and training in the arts in schools.

2. Clinical and community care

Strengthening the links between clinical and community care is vital. By scaling social prescribing schemes that refer people to arts and cultural programmes that could support their health and wellbeing, we could widen access to arts and cultural and community engagement activities within patient treatment programmes. Arts engagement could also be formalised as part of treatment and management programmes, especially for those with chronic conditions.

3. Preventative public health

However, we should not limit programmes on arts and health to formal referral pathways. Initiatives to normalise and facilitate arts and cultural engagement as part of daily life are important for preventative public health schemes, promoting effective emotion regulation strategies, enhancing coping, building social support, and increasing resilience. This could include work to promote the arts within workplaces and during retirement.

4. Using the arts to reduce population health disparities

Our research has shown that people from poorer socio-economic backgrounds are less able to access the arts. From a population health perspective, this is a crucial problem to solve given that those of lower socio-economic positions are at higher risk of poor health. If these individuals do not have opportunities to experience the health benefits of the arts that more privileged groups do, this could exacerbate health inequalities and our public health system faces a missed opportunity to reduce health disparities through the arts. Especially given that our research suggests that people from lower socio-economic backgrounds and living in more deprived areas actually stand to gain more from arts engagement, arts accessibility should be prioritised within national health policy initiatives. However, care should be taken not to oversimplify the complex ecosystem of individual, community-level, and societal barriers that can prevent people from engaging in the arts. In particular, place-based funding schemes should be encouraged to properly address such barriers in different areas and amongst different populations.

5. Enhanced longitudinal and complex research

Questions related to arts and cultural engagement are sporadic among cohort datasets and in many they do not exist at all. We recommend prioritising the inclusion of arts and cultural engagement in both current and future cohort studies to enrich the data available for analysis. Furthermore, our knowledge of the links between health and the arts could be enhanced by a research agenda aimed at understanding the complex relationships between active ingredients, mechanisms, and health outcomes. We encourage funding initiatives that support advanced and novel research approaches that embrace this growing scientific field of the arts in health.



Looking ahead

As demonstrated, the support for our work has not only led to pioneering longitudinal research on the societal health impacts of arts and cultural engagement, but it has catalysed other research and initiatives in the scientific field of the arts in health. We are proud to have played a key role in this growth, and we continue to launch innovative projects that will not only deepen analysis in the field, but also incorporate more scholars into this area of research. Our ongoing and upcoming research projects involving cohort data include:

- Undertaking further longitudinal data analysis to explore the relationship between arts, culture, heritage, communities, and health outcomes, involving increasingly sophisticated statistical techniques;
- Ascertaining the replicability of our findings in other cultural contexts, including cohort studies from the USA, Europe, and Asia;
- Identifying patterns and predictors of arts and cultural engagement internationally to understand how and why barriers to engagement vary in different settings;
- Exploring how schemes such as social prescribing can connect people to arts, culture, and community activities and help to reduce inequalities in participation;
- Continuing to map the relationship between the ingredients in arts, culture, and community activities, the mechanisms they activate, and the health outcomes that result.



The Social Biobehavioural Research Group is based at University College London. Visit www.sbbresearch.org to learn about our research projects in the fields of behavioural science, clinical trials and implementation science, epidemiology, and complexity science.



References

1. Fancourt D, Finn S. What is the evidence on the role of the arts in improving health and well-being? A scoping review [Internet]. Copenhagen: WHO Regional Office for Europe; 2019 [cited 2021 Apr 17]. (Health Evidence Network synthesis report). Report No.: 67. Available from: <https://apps.who.int/iris/handle/10665/329834>
2. Mak HW, Fancourt D. Longitudinal associations between reading for pleasure and child maladjustment: Results from a propensity score matching analysis. *Social Science & Medicine*. 2020 May 1;253:112971.
3. Fluharty M, Bone J, Bu F, Sonke J, Fancourt D, Paul E. Associations between extracurricular arts activities, school-based arts engagement, and subsequent externalising behaviours: Findings from the Early Childhood Longitudinal Study [Internet]. PsyArXiv; 2021 [cited 2022 Jun 30]. Available from: <https://psyarxiv.com/gdk3t/>
4. Bone JK, Bu F, Fluharty ME, Paul E, Sonke JK, Fancourt D. Arts and Cultural Engagement, Reportedly Antisocial or Criminalized Behaviors, and Potential Mediators in Two Longitudinal Cohorts of Adolescents. *J Youth Adolesc*. 2022 Aug;51(8):1463–82.
5. Bone J, Fancourt D, Fluharty M, Paul E, Sonke J, Bu F. Cross-sectional and longitudinal associations between arts engagement, loneliness, and social support in adolescence [Internet]. PsyArXiv; 2021 [cited 2022 Jul 13]. Available from: <https://psyarxiv.com/64d7c/>
6. Bone JK, Bu F, Sonke JK, Fancourt D. Longitudinal Associations Between Arts Engagement and Flourishing in Young Adults: A Fixed Effects Analysis of the Panel Study of Income Dynamics. *Affective Science*. 2022 Oct 11: 1-2.
7. Mak HW, Fancourt D. Reading for pleasure in childhood and adolescent healthy behaviours: Longitudinal associations using the Millennium Cohort Study. *Preventive Medicine*. 2020 Jan 1;130:105889.
8. Fluharty M, Bu F, Bone J, Sonke JK, Fancourt D, Paul E. Associations of arts and cultural engagement with substance use trajectories in adolescence and early adulthood: a latent growth curve analysis of the Add Health cohort [Internet]. PsyArXiv; 2022 [cited 2022 Jun 30]. Available from: <https://psyarxiv.com/nz7ps/>
9. Fancourt D, Steptoe A. Effects of creativity on social and behavioral adjustment in 7- to 11-year-old children. *Ann N Y Acad Sci*. 2019 Feb;1438(1):30–9.
10. Mak HW, Fancourt D. Arts engagement and self-esteem in children: results from a propensity score matching analysis. *Ann N Y Acad Sci*. 2019 Aug;1449(1):36–45.
11. Mak HW, Fancourt D. Longitudinal associations between ability in arts activities, behavioural difficulties and self-esteem: analyses from the 1970 British Cohort Study. *Sci Rep*. 2019 Oct 2;9(1):14236.
12. Warran K, Burton A, Fancourt D. What are the active ingredients of ‘arts in health’ activities? Development of the INgredients iN ArTs in hEalth (INNATE) Framework. *Wellcome Open Res*. 2022 Jan 11;7:10.
13. Wang S, Mak HW, Fancourt D. Arts, mental distress, mental health functioning & life satisfaction: fixed-effects analyses of a nationally-representative panel study. *BMC Public Health*. 2020 Feb 11;20(1):208.
14. Fancourt D, Garnett C, Spiro N, West R, Müllensiefen D. How do artistic creative activities regulate our emotions? Validation of the Emotion Regulation Strategies for Artistic Creative Activities Scale (ERS-ACA). *PLOS ONE*. 2019 Feb 5;14(2):e0211362.
15. Fancourt D, Garnett C, Müllensiefen D. The relationship between demographics, behavioral and experiential engagement factors, and the use of artistic creative activities to regulate emotions. *Psychology of Aesthetics, Creativity, and the Arts*. 2020 Jan 13.

16. Fancourt D, Steptoe A. Present in body or just in mind: differences in social presence and emotion regulation in live vs. virtual singing experiences. *Frontiers in psychology*. 2019 Apr 10;10:778.
17. Fancourt D, Ali H. Differential use of emotion regulation strategies when engaging in artistic creative activities amongst those with and without depression. *Sci Rep*. 2019 Jul 9;9(1):9897.
18. Fancourt D, Perkins R, Ascenso S, Atkins L, Kilfeather S, Carvalho L, et al. Group Drumming Modulates Cytokine Response in Mental Health Services Users: A Preliminary Study. *PPS*. 2016;85(1):53–5.
19. Fancourt D, Perkins R, Ascenso S, Carvalho LA, Steptoe A, Williamon A. Effects of Group Drumming Interventions on Anxiety, Depression, Social Resilience and Inflammatory Immune Response among Mental Health Service Users. *PLOS ONE*. 2016 Mar 14;11(3):e0151136.
20. Ascenso S, Perkins R, Atkins L, Fancourt D, Williamon A. Promoting well-being through group drumming with mental health service users and their carers. *International Journal of Qualitative Studies on Health and Well-being*. 2018 Jan 1;13(1):1484219.
21. Perkins R, Ascenso S, Atkins L, Fancourt D, Williamon A. Making music for mental health: how group drumming mediates recovery. *Psychology of Well-Being*. 2016 Nov 29;6(1):11.
22. Fancourt D, Williamon A, Carvalho LA, Steptoe A, Dow R, Lewis I. Singing modulates mood, stress, cortisol, cytokine and neuropeptide activity in cancer patients and carers. *Ecancermedalscience*. 2016 Apr 5;10:631.
23. Fancourt D, Warran K, Finn S, Wiseman T. Psychosocial singing interventions for the mental health and well-being of family carers of patients with cancer: results from a longitudinal controlled study. *BMJ Open*. 2019 Aug 1;9(8):e026995.
24. Fancourt D, Finn S, Warran K, Wiseman T. Group singing in bereavement: effects on mental health, self-efficacy, self-esteem and well-being. *BMJ Supportive & Palliative Care*. 2022 Oct 1;12(e4):e607–15.
25. Warran K, Fancourt D, Wiseman T. How does the process of group singing impact on people affected by cancer? A grounded theory study. *BMJ Open*. 2019 Jan 1;9(1):e023261.
26. Fancourt D, Perkins R. Does attending community music interventions lead to changes in wider musical behaviours? The effect of mother–infant singing classes on musical behaviours amongst mothers with symptoms of postnatal depression. *Psychology of Music*. 2019 Jan 1;47(1):132–43.
27. Perkins R, Yorke S, Fancourt D. How group singing facilitates recovery from the symptoms of postnatal depression: a comparative qualitative study. *BMC Psychology*. 2018 Aug 17;6(1):41.
28. Fancourt D, Perkins R. The effects of mother–infant singing on emotional closeness, affect, anxiety, and stress hormones. *Music & Science*. 2018 Jan 1;1:2059204317745746.
29. Fancourt D, Steptoe A. Community group membership and multidimensional subjective well-being in older age. *J Epidemiol Community Health*. 2018 May 1;72(5):376–82.
30. Bone JK, Fancourt D, Fluharty ME, Paul E, Sonke JK, Bu F. Associations between participation in community arts groups and aspects of wellbeing in older adults in the United States: a propensity score matching analysis. *Ageing & Mental Health*. 2022 Apr 26;0(0):1–10.
31. Tymoszuk U, Perkins R, Fancourt D, Williamon A. Cross-sectional and longitudinal associations between receptive arts engagement and loneliness among older adults. *Soc Psychiatry Psychiatr Epidemiol*. 2020 Jul 1;55(7):891–900.
32. Steptoe A, Fancourt D. Leading a meaningful life at older ages and its relationship with social engagement, prosperity, health, biology, and time use. *Proceedings of the National Academy of Sciences*. 2019 Jan 22;116(4):1207–12.
33. Steptoe A, Fancourt D. An outcome-wide analysis of bidirectional associations between changes in meaningfulness of life and health, emotional, behavioural, and social factors. *Sci Rep*. 2020 Apr 15;10(1):6463.

34. Mak HW, Coulter R, Fancourt D. Relationships between Volunteering, Neighbourhood Deprivation and Mental Wellbeing across Four British Birth Cohorts: Evidence from 10 Years of the UK Household Longitudinal Study. *International Journal of Environmental Research and Public Health*. 2022 Jan;19(3):1531.
35. Fancourt D, Tymoszuk U. Cultural engagement and incident depression in older adults: evidence from the English Longitudinal Study of Ageing. *The British Journal of Psychiatry*. 2019 Apr;214(4):225–9.
36. Fancourt D, Steptoe A. Cultural engagement and mental health: Does socio-economic status explain the association? *Soc Sci Med*. 2019 Sep;236:112425.
37. Bone JK, Bu F, Fluharty ME, Paul E, Sonke JK, Fancourt D. Engagement in leisure activities and depression in older adults in the United States: Longitudinal evidence from the Health and Retirement Study. *Social Science & Medicine*. 2022 Feb 1;294:114703.
38. Tymoszuk U, Perkins R, Spiro N, Williamon A, Fancourt D. Longitudinal Associations Between Short-Term, Repeated, and Sustained Arts Engagement and Well-Being Outcomes in Older Adults. *The Journals of Gerontology: Series B*. 2020 Aug 13;75(7):1609–19.
39. Fancourt D, Steptoe A. Television viewing and cognitive decline in older age: findings from the English Longitudinal Study of Ageing. *Sci Rep*. 2019 Feb 28;9(1):2851.
40. Hackett RA, Steptoe A, Cadar D, Fancourt D. Social engagement before and after dementia diagnosis in the English Longitudinal Study of Ageing. Bayer A, editor. *PLoS ONE*. 2019 Aug 1;14(8):e0220195.
41. Fancourt D, Steptoe A, Cadar D. Cultural engagement and cognitive reserve: museum attendance and dementia incidence over a 10-year period. *The British Journal of Psychiatry*. 2018 Nov;213(5):661–3.
42. Fancourt D, Steptoe A. Cultural engagement predicts changes in cognitive function in older adults over a 10 year period: findings from the English Longitudinal Study of Ageing. *Sci Rep*. 2018 Jul 5;8(1):10226.
43. Fancourt D, Steptoe A, Cadar D. Community engagement and dementia risk: time-to-event analyses from a national cohort study. *J Epidemiol Community Health*. 2020 Jan;74(1):71–7.
44. Bone J, Fancourt D, Sonke J, Bu F. Participatory and receptive arts engagement in older adults: Associations with cognition over a seven-year period [Internet]. *PsyArXiv*; 2022 [cited 2022 Jul 19]. Available from: <https://psyarxiv.com/2ywtv/>
45. Rogers NT, Fancourt D. Cultural Engagement Is a Risk-Reducing Factor for Frailty Incidence and Progression. *The Journals of Gerontology: Series B*. 2020 Feb 14;75(3):571–6.
46. Fancourt D, Steptoe A. Comparison of physical and social risk-reducing factors for the development of disability in older adults: a population-based cohort study. *J Epidemiol Community Health*. 2019 Oct;73(10):906–12.
47. Fancourt D, Steptoe A. Physical and Psychosocial Factors in the Prevention of Chronic Pain in Older Age. *The Journal of Pain*. 2018 Dec 1;19(12):1385–91.
48. Fancourt D, Steptoe A. Physical activity and social and cultural engagement as risk-reducing factors in the prevention of chronic pain in older age: findings from a longitudinal cohort study. *The Lancet*. 2018 Nov 1;392:S34.
49. Bone J, Bu F, Sonke JK, Fancourt D. Leisure engagement in older age is related to objective and subjective experiences of aging [Internet]. *PsyArXiv*; 2023 [cited 2023 Jan 12]. Available from: <https://psyarxiv.com/dh6f5/>
50. Gao Q, Bone J, Bu F, Paul E, Sonke JK, Fancourt D. Associations between social, cultural and community engagement and healthcare utilization in the Health and Retirement Study. Under review/in preparation. 2023.
51. Bu F, Mak HW, Bone J, Gao Q, Sonke JK, Fancourt D. Leisure engagement and self-perceptions of aging: Longitudinal analysis of concurrent and lagged relationships [Internet]. *PsyArXiv*; 2023 [cited 2023 Feb 24]. Available from: <https://psyarxiv.com/qzjvb/>
52. Fancourt D, Steptoe A. The art of life and death: 14 year follow-up analyses of associations between arts engagement and mortality in the English Longitudinal Study of Ageing. *BMJ*. 2019 Dec 18;367:l6377.

53. World Health Organization. Regional Office for Europe, Mak HW, Coulter R, Fancourt D. Patterns of social inequality in arts and cultural participation: findings from a nationally representative sample of adults living in the United Kingdom of Great Britain and Northern Ireland. *Public Health Panorama*. 2020;6(1):55–68.
54. Mak HW, Coulter R, Fancourt D. Associations between neighbourhood deprivation and engagement in arts, culture and heritage: evidence from two nationally-representative samples. *BMC Public Health*. 2021 Sep 16;21(1):1685.
55. Bone JK, Bu F, Fluharty ME, Paul E, Sonke JK, Fancourt D. Who engages in the arts in the United States? A comparison of several types of engagement using data from The General Social Survey. *BMC Public Health*. 2021 Jul 8;21(1):1349.
56. Mak HW, Fancourt D. Do socio-demographic factors predict children's engagement in arts and culture? Comparisons of in-school and out-of-school participation in the Taking Part Survey. *PLOS ONE*. 2021 Feb 12;16(2):e0246936.
57. Fluharty M, Paul E, Bone J, Bu F, Sonke J, Fancourt D. Difference in predictors and barriers to arts and cultural engagement with age in the United States: A cross-sectional analysis using the Health and Retirement Study. *PLOS ONE*. 2021 Dec 20;16(12):e0261532.
58. Fancourt D, Mak HW. What barriers do people experience to engaging in the arts? Structural equation modelling of the relationship between individual characteristics and capabilities, opportunities, and motivations to engage. *PLOS ONE*. 2020 Mar 25;15(3):e0230487.
59. Mak HW, Coulter R, Fancourt D. Does arts and cultural engagement vary geographically? Evidence from the UK household longitudinal study. *Public Health*. 2020 Aug 1;185:119–26.
60. Mak HW, Coulter R, Fancourt D. Associations between community cultural engagement and life satisfaction, mental distress and mental health functioning using data from the UK Household Longitudinal Study (UKHLS): are associations moderated by area deprivation? *BMJ Open*. 2021 Sep 1;11(9):e045512.
61. Fancourt D, Baxter L, Lorencatto F. Barriers and enablers to engagement in participatory arts activities amongst individuals with depression and anxiety: quantitative analyses using a behaviour change framework. *BMC Public Health*. 2020 Feb 27;20(1):272.
62. Fancourt D, Baxter L. Differential participation in community cultural activities amongst those with poor mental health: Analyses of the UK Taking Part Survey. *Social Science & Medicine*. 2020 Sep 1;261:113221.
63. Baxter L, Burton A, Fancourt D. Community and cultural engagement for people with lived experience of mental health conditions: what are the barriers and enablers? *BMC Psychology*. 2022 Mar 16;10(1):71.
64. Baxter L, Fancourt D. What are the barriers to, and enablers of, working with people with lived experience of mental illness amongst community and voluntary sector organisations? A qualitative study. *PLOS ONE*. 2020 Jul 2;15(7):e0235334.
65. Aughterson H, Baxter L, Fancourt D. Social prescribing for individuals with mental health problems: a qualitative study of barriers and enablers experienced by general practitioners. *BMC Family Practice*. 2020 Sep 21;21(1):194.

Questions about this report may be directed to:

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

Citation: Fancourt D, Bone JK, Bu F, Mak HW, Bradbury A. The Impact of Arts and Cultural Engagement on Population Health: Findings from Major Cohort Studies in the UK and USA 2017 – 2022. London: UCL; 2023 March.



the **social**
biobehavioural
research group

www.sbbresearch.org