



Exploring the Longitudinal Relationship
Between **Arts Engagement** and **Health**

Rebecca Gordon-Nesbitt
February 2015

Exploring the Longitudinal Relationship between Arts Engagement and Health
Rebecca Gordon-Nesbitt

<http://longitudinalhealthbenefits.wordpress.com>

Published by:
Clive Parkinson
Arts for Health
Manchester Metropolitan University
Righton Building
Cavendish Street
Manchester
M15 6BG
<http://artsforhealthmmu.blogspot.com>

ISBN: 978-1-900756-77-8
© Rebecca Gordon-Nesbitt and Arts for Health, 2015

All rights reserved. No part may be reproduced in any manner whatsoever
without the prior written permission from the copyright holders.

With special thanks to all those who assisted with this research.

Proofreading by 100% Proof
www.100percentproof.org

Design by Gary Nip
www.behance.net/garynip
garynip@hotmail.com



MANCHESTER
SCHOOL OF ART

www.art.mmu.ac.uk



www.miriad.mmu.ac.uk



www.artsforhealth.org



www.ahrc.ac.uk

Contents

| | |
|--|----|
| Research Framework | 1 |
| Foreword | 3 |
| Executive Summary | 5 |
| Introduction | 6 |
| Methodology | 9 |
| Critical Analysis of the Evidence Base | 13 |
| Discussion | 30 |
| Analysis of Possible Mechanisms Informing the Relationship between Arts Participation and Health | |
| ● Social Capital | 36 |
| ● Cognition | 40 |
| ● Occupational Health and Work Strain | 42 |
| ● Psycho-Neuroimmunology, Endocrine and Metabolic Effects | 44 |
| ● Epigenetics | 46 |
| Critical Analysis of the Data Sources Relevant to Explorations of the Long-Term Relationship Between Arts Participation and Health | |
| ● Nordic Datasets | 48 |
| ● UK-Based Datasets | 50 |
| Recommendations for Future Research | 55 |
| Concluding Remarks | 57 |
| Bibliography | 59 |
| Illustrative Table | 67 |

Research Framework

This research was conducted by Rebecca Gordon-Nesbitt at Arts for Health (Manchester Metropolitan University) under the auspices of the Cultural Value Project initiated by the Arts and Humanities Research Council (AHRC).

Rebecca Gordon-Nesbitt holds a BSc in Biochemistry with Molecular Biology, an MA in the History of Art, an MRes in Social Research and a PhD in Sociology. Between 1994 and 2003, she worked as an international curator of contemporary art, latterly at the Nordic Institute for Contemporary Art, with a responsibility for stimulating visual arts exhibitions, events, residencies and publications throughout the Nordic region, the UK and Ireland. She maintains a close relationship with the cultural sector, serving as Researcher-in-Residence at the Centre for Contemporary Art Derry~Londonderry during the first incarnation of UK City of Culture and advising Common Practice – a prominent network of small arts organisations in London and New York. Rebecca has written widely on issues affecting the cultural field, and her study of the cultural policy of the Cuban Revolution will be published in the US in spring 2015. She is a founder member of The Centre for Cultural Change (cambiarcultura.org), which is dedicated to exploring the potential of research and creative practice to precipitate socio-cultural change.

Founded in 1987, Arts for Health (artsforhealth.org) has consistently influenced research and development in a rapidly evolving global field. Arts for Health is currently working with people in recovery from substance misuse, exploring the social aspects of addiction, and, together with European partners, developing a Recoverist Manifesto which places recovery in a civil rights context. The current focus of Arts for Health is on less prescriptive notions of arts/health that take inequalities and the social determinants of health into account. Arts for Health works with NHS partners across the UK, and has supported the development of arts and health strategy in Australia, Finland and Lithuania. Current director, Clive Parkinson, is Co-Investigator on the Dementia and Imagination project, organised as part of the UK's Arts and Humanities Research Council (AHRC), Connected Communities programme. This builds on the Treasury-funded project, Invest to Save: Arts in Health Evaluation, which informed the first House of Lords debate on arts and health. Clive is also a member of the National Alliance for Arts, Health and Wellbeing, which is currently involved in the establishment of an All-Party Parliamentary Group on Arts and Health convened by Lord Howarth of Newport. He regularly blogs at www.artsforhealthmmu.blogspot.co.uk

In 2012, the AHRC launched the Cultural Value Project, with the aim of making a major contribution to how we think about the value of arts and culture to individuals and to society. The Cultural Value Project has sought to establish a framework that will advance the way in which we talk about the value of cultural engagement and the methods by which we evaluate that value. Its starting premise has been that we need to begin by looking at the actual experience of culture and the arts rather than the ancillary effects of this experience. It is understood that the cultural itself will give coherence to the framework as a whole. The value begins there, with something fundamental and irreducible, and all the other components in the framework might be seen, to a greater or lesser extent, to cascade from it. In giving priority to the cultural experience itself, the Cultural Value Project takes the lead in developing a rigorous approach to what many see as the most important aspect of art and culture.

Foreword

Over the past ten years, the hybrid field of arts and health seems to have been growing incrementally, as evinced by the emergence of specialist academic journals and conferences around the world. Many in the arts and health field intuitively understand the benefits of arts engagement, based on years of experience and mountains of anecdotal evidence. But, while there are certainly many successful arts and health projects active on the ground, the relevant research networks in the UK are still fledgling.

As part of the Arts and Humanities Research Council's Cultural Value Project, exploring the individual and social value of culture, Dr. Rebecca Gordon-Nesbitt devised a piece of research which explored the association between the arts and health. The main question underlying this research was: Is there a relationship between engaging in the arts and long-term health benefits, and, if so, can we find evidence of it? Inevitably, this entailed some meta-level work – research about research that had already been undertaken in this area. A scoping review and wide consultation in the field generated an evidence base, comprised of fifteen previous studies, which revealed significant, aggregated long-term health impacts that are summarised in this report.

In itself, this would qualify as a succinct and useful piece of work; after all, we all want evidence of impact – right? But perhaps a supplementary question might be: Who has been seeking this evidence and to what end? In considering the first part of this question, we find that it is the Nordic countries – specifically Finland, Norway and Sweden – which have strategically been seeking evidence of the long-term relationship between arts engagement and health over the past 30 years. At the same time, in the UK, Arts Council England has repeatedly told us that no such evidence exists. This is incorrect and misleading. The fact that attention has now turned to evaluating the individual and social value of the arts and culture prompts concerns about the evidence-seeking obsession of technocratic societies, in which a swathe of middle managers, informed by statistics and reports, have replaced specialists, guided by knowledge and intuition.

In answer to the second part of the question posed above, Nordic governments have used the evidence (however partial and inconclusive) to inform and implement high-quality arts programmes. This report not only scrutinises existing data; it also makes a serious contribution to the debate about how we might understand the value of culture and the arts within a health and wellbeing context.

The main headings in this body of work may draw your attention to the distinctions between cultural and social engagement, or they may suggest that, in areas of dementia, mental health, obesity and occupational health, the potential exists for immediate cost benefits and improvements to the NHS and our working lives. But this report poses some political challenges – challenges which, in the current climate of deficit and reductivism, might provoke new thinking in arts/health. It does this by considering whether engagement in the arts is a direct determinant of health or whether other factors come into play. Time and again, socio-economy comes to the fore as a potential mediator in the relationship between arts and health, which prompts urgent consideration of inequalities of access to the arts and health.

In recent years, the UK cultural policy landscape has been centred on investment in infrastructure – based on the premise of ‘if you build it, they will come’. However, early analysis of the Taking Part survey shows that it is the educated, white middle classes who attend arts events.¹ We might extrapolate from this that being affluent, educated and white is part of a package that encompasses access to the arts and health. Altering this picture requires systemic change, in which providing access to creative education from primary school upwards would seem to be a necessary prerequisite. There are lessons to be learnt from short-lived projects such as Sure Start, Healthy Schools and Creative Partnerships – lessons which invariably point to the benefits of a more sustained and holistic approach throughout the life-course.

Another key concern raised by this research pertains to the quality of the arts experience. Hitherto, attention has been focused on the quantity of culture consumed – with questions inevitably capturing how much and how often people engage with the arts. Much more work is needed to describe the actualities of experiencing the arts.

Whilst the arts and health inhabit two distinct policy areas, and the particularities of each field needs to be borne in mind, both health and the arts are inherently political. It follows that arts/health is a political movement, to which this report adds compelling weight.

Clive Parkinson,
Director of Arts for Health

¹ CASE: The Culture and Sport Evidence Programme, *Understanding the drivers, impact and value of engagement in culture and sport: An over-arching summary of the research*, July 2010.

Executive Summary

The prevailing narrative in UK policy-making circles is that we lack evidence around how engagement in the arts – as an audience member and/or practitioner – affects our physical and psychological health over time. Between February and July 2014, research was conducted which sought to address this perceived deficit in several ways.

In the first place, this research adopted an international perspective to locate and critically analyse those English-language studies to have explored the association between arts engagement and health. This gave rise to an evidence base, comprised of fifteen studies, which collectively suggest that arts engagement has a beneficial impact upon health over time. This observation, made in relation to a range of chronic diseases, prompted a detailed consideration of the likely physiological and molecular biological mechanisms underlying any positive results.

Attention was then turned to the likelihood of replicating and elaborating upon these results. This necessitated a critical appraisal of the population-based datasets underpinning international studies and a consideration of their UK comparators. Complemented by detailed consultation with leading researchers in the field, this part of the project yielded a series of recommendations for future analyses of the relationship between arts engagement and health in the UK and beyond. This takes account of the potential for further longitudinal studies, intervention into the surveys making up the relevant datasets and an ambitious new biomedical analysis. In this effort, it is suggested, attention will need to be paid to persistent inequalities of access to the arts, health and economic resources. It is to be hoped that past and future research in this area will provide the necessary evidence for policy-makers to invest in high-quality arts activities well beyond the clinical environment.

Introduction

In March 2014, an evidence review by Arts Council England (ACE), entitled *The Value of Arts and Culture to People and Society*, included health and wellbeing as one of its four key themes. This drew upon recent reports generated in the UK, including those by the Department for Culture, Media and Sport (DCMS) and the Scottish Government, to claim that ‘These studies show that arts and cultural activities can have a positive impact on the symptoms of conditions, for example improved cognition, physical stability, or self-esteem, and the ability of people to manage them, for example through changes in behaviour and increased social contact’.² While this statement jumbles together physical and psychological impacts, it rightly suggests that a wealth of cross-sectional studies has illustrated the beneficial short-term effect of arts engagement upon a range of symptoms.

² Arts Council England, *The Value of Arts and Culture to People and Society: An Evidence Review* (London: Arts Council England, 2014), p. 26.

³ loc cit.

⁴ See Dr. Sam Ladkin, ‘Against Value’, as part of the Cultural Value Project.

⁵ Arts Council England, op cit., p. 4.

⁶ John D. Carnwath and Alan S. Brown, *Understanding the Value and Impacts of Cultural Experience: A Literature Review* (London: Arts Council England, 2014), p. 2.

The research presented here departs from prevailing discourse around the arts and health in three main ways. In the first place, it refuses to confine itself to a consideration of symptoms, attempting instead to address the broader social and physiological factors underlying health conditions and the ways in which arts engagement might mitigate this relationship. In the second place, this research programme considers the effect upon physical and mental health of engaging in high-quality arts activities in non-clinical settings such as galleries and museums, theatres, cinemas and concert halls. In the third place, it addresses the fact that, in the UK, scant consideration has been given to the ways in which health may be affected by engaging with the arts over an extended period. While the ACE evidence review references large-scale Nordic research showing the positive impact of longitudinal cultural engagement, it ultimately defers to the UK to conclude that 'there is no evidence that these improvements are sustained in the long term, and the majority of studies have been small scale and unable to do more than report a correlation between the intervention and these benefits'.³ In a bid to redress the balance, this project set out to evaluate the long-term relationship between arts participation and health by adopting an international perspective, bringing new insights with regard to both longevity and scale and allowing us to move beyond the language of 'intervention'.

In considering the social determinants of health, this research programme potentially veers into instrumental territory. Advocates of the instrumental benefits of arts and cultural engagement are rightly criticised for their econometric understandings of the arts and culture, their upbeat, often moralistic, slant and their lack of attention to the actual experience of cultural production and reception.⁴ By contrast, this research programme is underwritten by a thorough understanding of the subjective and potentially ambiguous nature of creative practice.

In his introduction to the aforementioned evidence review, Sir Peter Bazalgette, Chair of ACE, insisted that, 'When we talk about the value of arts and culture, we should always start with the intrinsic – how arts and culture illuminate our inner lives and enrich our emotional world. This is what we cherish. But while we do not cherish arts and culture because of the impact on our social wellbeing and cohesion, our physical and mental health [...] they do confer these benefits and we need to show how important this is'.⁵ Alongside the evidence review, ACE commissioned Wolf Brown to conduct a review of the international literature dealing with the value and impact of culture. In his foreword to this second review, ACE Chief Executive, Alan Davey, assumed intrinsic value to be 'associated with benefits to the individual (like happiness or inspiration)'.⁶ Taken together, these statements seem to suggest that the intrinsic impact of the arts is felt at the (individual) psychological level whereas health benefits are registered at the instrumental (social) level. While conceding that improvements to physical health

wrought by arts engagement are experienced by individuals, Wolf Brown ultimately argue that the manifest effect is cumulative and societal, thereby exempting the health effects of arts engagement from their focus on short-term, individualistic benefits. Accordingly, not one of the key international studies to have explored the longitudinal relationship between health and arts engagement (presented here) is included in the Wolf Brown review, and Davey reiterates Bazalgette virtually verbatim to bemoan the lack of 'longitudinal studies of the health benefits of participation in the arts, and comparative studies of the effects of participation in the arts as opposed to say, participation in sport'.⁷

The research presented here began with a scoping review of the international evidence concerning the association between arts engagement and health. Contrary to expectations, this process yielded fifteen key longitudinal studies which show arts engagement to have many beneficial effects upon human beings that cannot easily be separated into intrinsic and instrumental. While refuting the separation between individual/psychological and social/physical benefits, this research differentiates cultural from more general social engagement and distinguishes participation in the arts from that of sport. The evidence base has been compiled at: <http://longitudinalhealthbenefits.wordpress.com> This digital repository includes a précis of each study (compiled below), accompanied by links to the original research articles where it has been possible to secure copyright clearance. Visitors to this site are invited to provide details of any omissions, and it is hoped that the international evidence base will continue to grow as researchers draw attention to existing work in this area and new studies are carried out.

Critical analysis of the evidence base is followed here by a discussion of the findings and a detailed consideration of the social and physiological mechanisms thought to underlie any positive associations observed between arts engagement and health. This paves the way for an interrogation of the international datasets upon which the main epidemiological studies are based. In turn, this permits consideration of the suitability of UK-based datasets to longitudinal studies centred on the two main variables of arts engagement and health. Based on the foregoing considerations, recommendations are made which, it is hoped, will provide a useful starting point for future projects exploring the fertile territory between the arts and health.

Methodology

The part of the research programme presented here was comprised of three main elements:

- Scoping review of previous research into the relationship between arts and cultural engagement and long-term health outcomes in the UK and internationally.
- Critical analysis of the data sources relevant to explorations of the relationship between arts and cultural engagement and long-term health outcomes in the UK and internationally.
- Recommendations about possible future research directions.

Review of the Evidence Base in the UK and Internationally

This part of the project sought evidence of a longitudinal relationship between arts/cultural participation and health. The Principal Investigator (PI) initially searched the MEDLINE (using PubMed) and EMBASE (using Ovid SP) databases, beginning with generic terms such as 'art', 'culture', 'health', 'longitudinal'. However, as these words are ubiquitous in the literature – with 'culture' appearing frequently in relation to the cultivation of cells and 'art' regularly occurring in phrases such as 'state-of-the-art' and serving as an acronym for Atraumatic Restorative Treatment, Anti Retroviral Treatment and Assisted Reproductive Technologies – this generated in excess of 10,000 results when using Ovid. Sorting the results by relevance (five stars) failed to isolate three terms together. The use of truncated versions of the search terms – such as 'long' (306 results when searched with 'art' and 'survival' in Medline) – and Boolean operators – e.g. NOT HIV (216 results in Medline) – reduced the quantity of results, but came no closer to isolating even those studies which were known at the outset. As will be apparent from the titles of studies forming the evidence base, there is little common language, which precluded the use of generic search terms. The review also sought to take account of grey literature in the field, but a search of Open Grey produced 11 irrelevant studies, reinforcing the need for other methods.

In light of the above, it was decided to conduct a hand search of material, beginning with a nucleus of widely known studies – specifically those undertaken by Bygren et al and Hyypä et al. From there, the review radiated outwards, taking account of research published by these two teams and the studies to which they referred. This scoping process was complemented by the use of web-based search engines and facilitated by dialogues with the main researchers in the field, either in person during a week-long trip to the Nordic region (as in the case of Bygren, Väänänen and the team at the HUNT Research Centre) or by email (as in the case of Hyypä, now retired, and Kouvonen). Additionally, reports issued by the UK's main policy-making bodies, at Westminster and Holyrood, were scrutinised, and experts at DCMS were consulted.

The longitudinal focus of the review precluded cross-sectional studies. Furthermore, it has been noted that 'The phenomenal success of the pharmaceutical industry and the widespread adoption of the randomised placebo-controlled trial as the gold standard method of assessing new treatments has, in part, been responsible for the development of the view that the patient's state of mind and psychological well-being are largely irrelevant to disease outcome'.⁸ As this review reinstated consideration of psychological factors in examining the health effects of arts engagement in non-clinical settings, randomised controlled trials (RCTs) were excluded. Engagement in high-quality arts activities was understood not as an 'intervention', in the medical sense, but as a voluntary part of participants' lives, and its effect on all tangible physical and mental health conditions – that is to say, known and quantifiable morbidities – was included. Definitions of cultural engagement spanned the art forms.

The scoping process generated a long list of studies from which the eventual evidence base was culled. As several of the studies (particularly those undertaken from a social capital perspective) only mentioned arts engagement as an incidental element of socio-cultural interaction, the ultimate criterion for inclusion in the evidence base became the consideration of two or more discrete cultural activities.

The scoping process turned up an initial fourteen studies adopting a longitudinal approach. Given their finite number, it seemed appropriate to consider the specificities of each study separately, along with their strengths and weaknesses, in a format accessible to all those with an interest in the subject. Judgment of the quality of studies was based on the number of respondents involved, the efficacy of follow-up, the suitability of confounders and the reporting of confidence intervals. Qualitative assessment was made of the strengths and weaknesses of each study and whether potential for the null hypothesis was accommodated. Permission to make the research articles publicly available was requested from the primary authors, and copyright clearance was obtained from the relevant journals.

The international evidence base was launched at the annual conference of the Faculty of Public Health of the Royal College of Physicians on 3 July 2014. Since then, an additional study has been identified by the PI and included in the evidence base. This paved the way for a detailed analysis of the mechanisms that are speculated upon in cases where a positive relationship between arts engagement and health is observed.

Critical Review of UK and International Data Sources

This part of the project interrogated the datasets that have been used by the main research teams in this area. This included a day-long visit to the HUNT Research Centre in Levanger, Norway, to assess the quality of the biomedical and cultural data being collated there.

⁸ A.D. Watkins, 'Perceptions, emotions and immunity: an integrated homeostatic network', *Quarterly Journal of Medicine*, 88, 1995, p. 94.

In the UK, two documents were useful when considering longitudinal surveys – the Scottish Government’s Inventory of UK Longitudinal Surveys⁹ and a database of Longitudinal Data Sources compiled by DCMS.¹⁰ The former offers a brief overview of each of the major longitudinal surveys being conducted in the UK, with an emphasis on Scotland; the latter attends to whether longitudinal surveys contain questions pertinent to DCMS’s areas of interest, namely: culture, media and broadcasting, creative industries and sport (for the purposes of this analysis, culture was the relevant category, specifically the columns headed ‘arts’ and ‘museums and galleries’). These two overviews were cross-referenced with each other and, where possible, with the original questionnaires and/or data sources.

Face-to-face consultation with statisticians at DCMS and representatives from ACE was complemented by email enquiries to those researchers responsible for a range of longitudinal studies:

- British Cohort Study 1970 (BCS70)
- English Longitudinal Study of Ageing (ELSA)
- Growing up in Scotland
- Healthy Older People in Edinburgh
- Millennium Cohort Study
- Million Women Project
- MRC Unit for Lifelong Health and Ageing
- Office for National Statistics (ONS)
- Scottish Longitudinal Study
- Understanding Society

Overall, this process revealed that some of the studies highlighted as relevant by DCMS – such as the Families and Children Survey or the Longitudinal Study of Young People in England – contained scant data, centred on music lessons or television/internet use. Other data sources dismissed by DCMS – such as the English Longitudinal Study of Ageing – were found to be more useful.

Consultation and Recommendations

The inter-related elements outlined above formed the basis of a series of recommendations for future research. This drew on consideration of the evidence base and extant datasets, complemented by detailed and ongoing consultation with research teams in the Nordic countries. In its entirety, it is hoped that this report will serve as a useful grounding in the theoretical and methodological challenges at stake.

⁹ <http://www.scotland.gov.uk/Topics/Statistics/About/longitudinal>

¹⁰ http://old.culture.gov.uk/what_we_do/research_and_statistics/8250.aspx

Critical Analysis of the Evidence Base

Lennart Welin, Bo Larsson, Kurt Svardsudd, Bodil Tibblin and Gösta Tibblin, 'Social Network and Activities in Relation to Mortality from Cardiovascular Diseases, Cancer and Other Causes: A 12 Year Follow up of the Study of Men Born in 1913 and 1923', *Journal of Epidemiology and Community Health*, 46, 1992, pp. 127–32.

Drawing upon research demonstrating a positive association between social environment, illness and mortality, this team was among the first to include cultural participation in its consideration of activities. This study took as its sample population men born in 1913 who had been randomly selected from the Gothenburg population register in 1963. In 1973–4, all those still living locally were invited to participate in a health examination and questionnaire, along with any other men born in 1913 who had moved to the area in the intervening years and another random sample of men born in 1923. Serum cholesterol and blood pressure were measured, and data were gathered about smoking, alcohol consumption and previous incidence of heart attack and stroke. At the same time, questions were asked about self-rated health and the frequency of leisure activities undertaken inside and outside the home. Fourteen activities outside the home were assayed, including attendance at the cinema, theatre, concerts, museums and exhibitions.

A preliminary analysis of the data – with participants followed up for survival to the end of 1982 and less detail about cultural participation – was written up in *The Lancet* in 1985. The present study covers a re-examination undertaken in 1980, with participants followed up for mortality to the end of 1985 and causes of death classified as cancer, cardiovascular or other. Each of these three mortality causes was compared to the surviving group, and a logistic regression technique was used in a multivariate analysis involving only those variables significantly related to the specific causes of death.

When leisure-time activity patterns were considered in relation to causes of death, socially orientated activities were found to be a significant predictor of death from cardiovascular disease, but much weaker than blood pressure, smoking and previous cardiovascular illness; socio-cultural activities were found to have no impact upon cancer-related mortality, for which age and smoking habits were predictors; in relation to other causes of death, low levels of domestic activity were seen to be a predictor along with poor perceived health. Residual confounders, such as low income (common among men who declined to participate in the study), were acknowledged as significant. In summary, it was possible to say that 'A poor social network and low levels of activities appear to be important predictors of various causes of mortality, but those already ill at the baseline examination (higher scores for perceived health or previous myocardial infarction or stroke) might be more isolated and less active due to the illness and the illness makes them more prone to death' (p. 130). This acknowledged the possibility of a 'disease drift' causing diminished participation in social and cultural activities as a result of actual and perceived ill health, thus skewing the results through reverse causation. In the context of this systematic review, it is significant that cultural activities were included, but noteworthy that no distinction was made between cultural and other leisure activities occurring outside the house.

Lars Olov Bygren, Boinkum Benson Konlaan and Sven-Erik Johansson, 'Attendance at Cultural Events, Reading Books or Periodicals, and Making Music or Singing in a Choir as Determinants for Survival: Swedish Interview Survey of Living Conditions', *British Medical Journal*, 313, 21–28 December 1996, pp. 1577–80.

As part of the 1982–3 Swedish Survey of Living Conditions, 12,982 randomly selected individuals aged 16–74 were interviewed about their (passive) attendance at, and (active) engagement in, both individual and social cultural activities. A total of 6,301 men and 6,374 women (97.64 percent of the original sample) were followed up to 31 December 1991, and it was found that 533 men and 314 women died during this period. Taking survival as the main outcome measure, this study used a proportional hazards model to estimate the risk of mortality. The impact of three independent indices was then studied. These were: an attendance index (including cinema, theatre, concerts, art and other exhibitions/museums, sermons and sporting events, the latter of which was analysed separately), a reading index (books/periodicals) and a music-making index (including choral singing). Frequency of attendance was categorised as rarely, occasionally or often, the latter of which (at least 80 visits per year) became the reference group. Potential confounders included were: age, gender, education level, income, long-term disease, social networks, smoking and exercise.

Age, smoking, disease and exercise influenced survival in the expected directions. By contrast, educational level was not found to be an important confounder with respect to mortality, whereas income level was. For men, the possession of a social network was a slight risk factor; for women, the opposite pattern was observed. After adjusting for all of the confounders, it seemed that people attending cultural events occasionally were more at risk of dying than those attending either seldom or often, those attending least found to have a 60% higher risk of death. This led the authors to speculate that 'Perhaps cultural participation underlies some of the notorious social class differences in survival' (p. 1580). Nonetheless, no causal conclusion could be drawn. Rather, the study acknowledged that the social element of cultural participation might be an important determinant of survival, suggesting that 'Perhaps cultural behaviour is so intermingled with life as a whole that it is impossible to discern its influence' (p. 1578). In terms of follow-up, the team recommended scrutiny of large samples with well-controlled confounders and well-differentiated cultural activities.

The team highlighted some of the flaws in the research design, including the crudeness of the original dataset and the frequency measures derived therefrom, which were lacking in qualitative detail. They also acknowledged possible reverse causation, with disease determining attendance, and it took account of residual confounding, particularly in relation to educational level. Beyond this, the three independent indices – attendance, reading and music-making – enabled a distinction to be made between passive and active and between individual and collective forms of engagement. However, in combining so many forms of attendance within each index, differentiation between art forms and between cultural and sporting or religious events was lost.

Speculating on the possible mechanisms through which cultural participation might improve survival rates, the authors commented that increased self-reflexivity and vicarious emotional arousal might lead to changes in the nervous and immune systems, via innervation of the lymphatic organs, the release of growth hormones and prolactin or the production of neurotransmitters possessing immunological resonance, thereby improving physical health. In relation to psychological health, it was thought that environmental enrichment might increase glucocorticoid receptors in the hippocampal region of the brain, implying a positive impact upon depressive diseases.

After adjusting for all of the confounders, it seemed that people attending cultural events occasionally were more at risk of dying than those attending either seldom or often, those attending least found to have a 60% higher risk of death.

Boinkum Benson Konlaan, Lars Olov Bygren and Sven-Erik Johansson, 'Visiting the Cinema, Concerts, Museums or Art Exhibitions as Determinant of Survival: A Swedish Fourteen-Year Cohort Follow-Up', *Scandinavian Journal of Public Health*, 28, 2000, pp. 174–78.

Four years later, the Swedish team followed up their 1996 study, this time to 31 December 1996. From the original random sample of 10,609 people (5,364 men and 5,245 women) aged 25–74 years, 916 men and 600 women found to have died in the intervening period. The purpose of this study was to introduce differentiation between the different types of cultural activity in which respondents had participated. In this regard, the seven independent variables were attendance at: the cinema, theatre, concerts, art exhibition, museum, church service and sporting event. Attendance at each type of event was stratified into rarely, sometimes and at least once a week. Among the potential confounders, cash buffer was used instead of income, and music-making and reading were inserted as background variables known to have a positive impact upon health.

Regarding the control variables, the same pattern was observed as before, with educational level exhibiting a more pronounced positive bias in relation to survival. Significantly, social ties were found to have a negligible effect as a confounder, irrespective of strength/quality. When checking for the effect on life expectancy of each of the cultural variables, a positive association was observed for cinema, concerts, art exhibition and museum visits but not for theatre, church or sporting attendance. The discussion drew attention to the fact that the art forms in which a positive association was observed are all nonverbal.

As the same dataset was used as in the previous study, the same weaknesses persisted. These included the lack of complexion offered by frequency measures when contemplating the qualitative cultural experience and the possible negative effects of cultural engagement. The team also confessed to not knowing which residual confounders might remain. Notwithstanding these limitations, the art form differentiation identified as lacking in the previous study was addressed.

The possible mechanisms through which arts participation might influence health were elaborated upon. Consideration was given the communicative theory of art action (which prioritises the symbolic nature of nonverbal art forms and their power in structuring feelings), the arousal theory (which supposes that art stimulates functions necessary to our survival as a species, including food, sex and death) and the psychoanalytic theory (which presumes that art offers vicarious satisfaction of sublimated desires). The neuro-immunological possibilities considered in the previous study were reiterated, and the connection between the hypothalamus, pituitary and adrenal glands (the HPA axis) and depression was elaborated, with cultural attendance thought to contribute to an enriched environment, increasing neural receptors in the hippocampus and lowering depression.

Sven-Erik Johansson, Boinkum Benson Konlaan and Lars Olov Bygren, 'Sustaining habits of attending cultural events and maintenance of health', *Health Promotion International*, 16, no. 3, 2001, pp. 229–34.

In 1990–1, 3,793 of the initial random sample of subjects from the 1982–3 Swedish Survey of Living Conditions were re-interviewed using the same questionnaire. In this study, self-reported health status was taken as the main outcome measure, categorised as good, poor or somewhere in between, the latter two of which were grouped into the 'poor' category. Control variables were: age, type of residence (rented or owned), geographical region of domicile (metropolis, municipality, small town/rural) and socio-economic status (via educational level). Independent variables comprised reading, music-making and attendance at: cinemas, theatres, concerts, museums and art exhibitions. A longitudinal transitional model was analysed using logistic regression.

The researchers acknowledged that a change in health status could affect both self-reported health and cultural attendance (in either direction). Low self-rated health was found to correspond with poor education, older age and low urbanisation. Music-making and reading did not have any significant effect upon self-reported health. Taking account of all the variables, those participants whose cultural attendance was low at both interview dates or had decreased between the two interview dates reported lower perceived health. The converse was also true – those participants whose cultural attendance was high at both interview dates or had increased between the two dates reported higher perceived health. The researchers concluded that cultural stimulation was transient, a 'perishable commodity' that needed replenishing if good perceived health was to be maintained over a long period. Again, the possibility of establishing a causal connection between cultural participation and (self-rated) health was rejected.

In framing these results, the team lingered on tension reduction and the possible psychological mechanisms through which this might operate. As before, attention was paid to psychoanalytic, arousal and communicative theories. Similarly, space was dedicated to psycho-neuroimmunological theories, including the innervation of lymphoid organs and the release of appropriate neurotransmitters, offering protection from infections and perhaps also autoimmune diseases. Again, the HPA axis was looked to as a possible beneficiary of environmental enrichment in the defence against depression.

Lars Olov Bygren, Sven-Erik Johansson, Boinkum Benson Konlaan, Andrej M Grijbovski, Anna V Wilkinson and Michael Sjöström, 'Attending Cultural Events and Cancer Mortality: A Swedish Cohort Study', *Arts & Health*, 1, no. 1 (March 2009), pp. 64–73.

Building on the observed association between attendance at cultural events, survival and self-rated health, this research aimed to investigate the link between cultural attendance and cancer-related mortality.

A cohort of 9,011 cancer-free participants from the randomly selected 1990–1 Swedish Survey of Living Conditions was followed up to 31 December 2003. During this time, according to the Swedish National Death Register, 290 participants had died of cancer, 630 of other causes. The main outcome measure was cancer-related mortality and the main independent variable was cultural attendance. Participants were asked about the regularity of their previous year's attendance at: cinemas, theatres, art galleries, live music concerts and museums. Frequency was categorised on a four-point scale ranging from fewer than five to more than twenty visits per year, and a cumulative score (a cultural participation index, or CPI) was generated across the cultural activities assayed. Demographic co-variables subjected to a proportional hazards analysis included: age, sex, chronic conditions, disposable income, educational attainment, smoking, exercise and urban/non-urban residency.

Low cultural attendance was found among older, less well educated participants with a lower disposable income, who were often current or former smokers and reported more chronic conditions than frequent attenders. Cancer mortality was also found to be associated with the demographic and behavioural variables in the expected directions. After adjusting for potential confounders, it was suggested that, in urban areas only, 'rare attendees at cultural events had higher cancer-related mortality than frequent attendees' (p. 68).

In the process of explaining this result, it was acknowledged that the cultural activities assayed might not have broad appeal across all segments of society, raising the possibility of residual confounding. In the opposite direction, it was freely admitted that those of higher socio-economic status enjoyed healthier lifestyles and possessed greater cancer awareness and access to treatment, suggesting that 'the relationship between attending cultural events and health is not causal; rather, attending cultural events serves as a proxy variable for other cancer preventative factors' (p. 71).

The urban bias was hard to explain, and was thought to arise as a result of lower concentrations of particular types of cultural activities in non-urban areas. The self-reported nature of the cancer diagnosis at baseline was also highlighted as a flaw in the study, potentially obscuring detail about the onset of cancer and raising the possibility of reverse causation. Nonetheless, it was suggested that 'in urban areas, frequently attending cultural events is a robust predictor of cancer mortality, similar to physical activity and being a current smoker, for the vast majority of the population, regardless of current health status, socio-economic status, and behavioural risks' (p. 69). In interpreting this result, it was suggested that engagement in meaningful activities (including culture) might play a part in counteracting the stress and negative immunological responses associated with cancer.

Carin Lennartsson and Merrill Silverstein, 'Does Engagement With Life Enhance Survival of Elderly People in Sweden? The Role of Social and Leisure Activities', *Journal of Gerontology*, 56B, no. 6, 2001, pp. S335–S342.

This study examined data from the Swedish Panel Study of Living Conditions of the Oldest Old from 1992, which had approached 537 participants who had exceeded the upper age limit of the Swedish Survey of Living Conditions (used in the studies by Bygren et al), to ask them about their leisure activities. This included scope for reporting on attendance at the cinema and cultural venues including theatres, concerts and museums (reported as a combined category), reading books or newspapers (two separate categories) and participating in study groups across the frequency levels of not at all, sometimes or often. In 1996, 463 non-institutionalised respondents were followed up for survival. Mortality between 1992 and 1996 was taken as the main outcome measure, and a Cox proportional hazard regression model was used to estimate the relative effects of independent variables (including age, gender and educational level) on the logged hazard rate of mortality. Additional controls were made for factors observed to increase mortality risk, including functional impairment, the presence of heart or circulatory problems and tobacco use.

The focus of this study – looking at the relationship between engagement in life and successful ageing – was on the extent to which those leisure-time activities found to influence mortality were sedentary or active, solitary or social. Within this, socio-cultural attendance was taken to fall into the latter category on each axis, i.e. active and social, which contradicted studies suggesting that non-participatory attendance is more passive than active. When adjusting for age and education, socio-cultural activities showed a negligible association with mortality in either gender. The same pattern was observed when adjusting for age, education, functional health, circulatory/heart problems and current smoking. The only association that was observed to have a positive effect on mortality was engagement in solitary–active activities, such as gardening and engaging in hobbies (including carpentry), and this association was only observed in men.

In interpreting these results, the researchers offered a cautionary note that reverse causation might exist between the choice of activities and health condition. An effort was made to compensate for this by including the multi-dimensional confounder of functional ability, which was arrived at through the physical testing of participants. Further, the relatively small sample size and the observational nature of this study precluded any causal claims while admitting the possibility of residual confounding.

The relevance of this study to the present analysis lies in its rejection of socially orientated leisure-time events (including cultural and religious attendance) as a significant factor in mortality in older people. It also considered the subjective nature of participation, observing that 'It is likely that activities are consequential when they are experienced as significant ways to engage one's free time' (p. S340).

Hui-Xin Wang, Anita Karp, Bengt Winblad and Laura Fratiglioni, 'Late-Life Engagement in Social and Leisure Activities Is Associated with a Decreased Risk of Dementia: A Longitudinal Study from the Kungsholmen Project', *American Journal of Epidemiology*, 155, no. 12, 2002, pp. 1081–87.

This study sought to explore whether social and leisure activities in later life diminished the risk of dementia. It followed two acknowledged case control and follow-up studies to adopt a longitudinal approach. To this end, it drew upon data from the Kungsholmen Project, a population-based study carried out in a central area of Stockholm. In 1987–9, information was gathered – through interviews with nurses, examinations by physicians and assessments by psychologists – from 1,810 participants, aged over 75, about their mental, physical, social, productive and recreational activities. Of these, 1,375 people were determined to be cognitively intact and living outside an institution. They were followed up in 1991–3 (during which 158 dementia cases were identified among 934 participants) and 1994–6 (at which point a further 123 dementia cases were identified among 683 participants). The study group was taken to be those subjects who developed dementia between the first and second follow-ups. Age, gender, education, cognitive functioning, comorbidity (indicated by hospitalisation), depressive symptoms and physical functioning at baseline were taken into account as potential confounders.

Type and frequency of social and leisure participation was arranged according to: mental activity (reading books/newspapers, writing, studying, undertaking crossword puzzles, painting or drawing); physical activity (swimming, walking or gymnastics); social activity (attending the theatre, concerts or art exhibitions, traveling, playing cards/games or participating in social groups or a pension organisation); productive activity (gardening, housekeeping, cooking, working for pay after retirement, doing voluntary work or sewing, knitting, crocheting or weaving); recreational activity (watching television or listening to the radio). Of relevance to the present analysis is the fact that solitary/participatory engagement – including reading, painting and drawing – was categorised as mental activity, while attendance at the theatre, concerts or exhibitions was considered social activity, irrespective of the potential for mental stimulation. Within the four activity groups, no separate account was taken of different activities.

Cox proportional hazard models were used to estimate the relative risks and corresponding 95 percent confidence intervals for the social and leisure activities associated with development of dementia, followed by multivariate analysis for each of the potential confounders. The results 'suggest that stimulating activity, either mentally or socially oriented, may protect against dementia, indicating that both social interaction and intellectual stimulation may be relevant to preserving mental functioning in the elderly' (p. 1081). Conversely, physical activity was not deemed to have a discernible effect on dementia risk.

The significance of this finding to the present analysis is that both participatory creative activity (including painting and drawing, classified as mental activity) and cultural attendance (understood as social activity) were found to be beneficial in protecting against dementia. Various hypotheses were offered as to why this might be the case, with mental stimulation thought to improve cognition and social participation thought to increase self-efficacy. The possibility of environmental enrichment giving rise to physiological changes in the cerebral cortex was also discussed.

Kristina Sundquist, Martin Lindström, Marianne Malmström, Sven-Erik Johansson and Jan Sundquist, 'Social Participation and Coronary Heart Disease: A Follow-up Study of 6900 Women and Men in Sweden, *Social Science & Medicine*, 58, 2004, pp. 615–22.

This research team – which overlaps with the Bygren team by virtue of its use of the same dataset and the involvement of Johansson – sought to explore the longitudinal relationship between social participation and coronary heart disease.

A sample of 6,861 women and men aged 35–74 who had taken part in the 1990–1 Swedish Survey of Living Conditions was followed up for hospital admissions and deaths due to coronary heart disease to 31 December 2000. As has been seen, the baseline survey collected data about attendance at the cinema, theatre, concerts, art exhibitions and museums. Eighteen such variables were used to make up a social participation index, and respondents were grouped into low, medium and high social participation. This evinces a reversion to social measures from which Bygren et al had been departing. A Cox regression model was used to estimate the hazard ratio for the different variables. Socio-economic and educational status, housing tenure and smoking were controlled for, along with age, gender, marital status and geographical region.

As might be expected, social participation was negatively associated with advanced age and low socio-economic and educational levels, corresponding with a higher risk of coronary heart disease, as did smoking. After adjustment for all the variables, an association was found between low social participation and increased incidence of coronary heart disease morbidity and mortality. The relevance of this study to the present analysis is that, of the eighteen variables in the social participation index subjected to factor analysis (with a higher coefficient corresponding to greater importance in the index), the highest scores were seen in relation to the five cultural factors listed above. In other words, attendance at the cinema, theatre, concerts, art exhibitions and museums had (by far, in most cases) the most significance within the social participation index.

After adjustment for all the variables, an association was found between low social participation and increased incidence of coronary heart disease morbidity and mortality.

Markku T Hyypä, Juhani Mäki, Olli Impivaara and Arpo Aromaa, 'Leisure-Based Participation Predicts Survival: A Population-Based Study in Finland', *Health Promotion International*, 21, no. 1, 2006, pp. 5–12.

Crossing the Baltic Sea to Finland, this study sought to explore the relationship between leisure participation and survival. The Mini-Finland Health Survey – a two-stage cluster sample of 8,000 people aged 30–99, carried out in 1978–80 – was designed to assess health status and its determinants via a comprehensive health examination, interviews and questionnaires. Demographic questions included residential stability, socio-economic status, marital status and relations, trusting relationships, alcohol consumption and smoking. Health data related to mental health, self-reported chronic diseases or disabilities and self-rated overall health. Cultural and leisure attendance took account of: (1) clubs and voluntary societies; (2) cultural and sports attendance (including theatre, cinema, concerts, art exhibitions and sporting events); (3) religious engagement and (4) outdoor activities. The questionnaire also recorded more participatory activities such as (5) studying, (6) cultural interests (reading, listening to music) and (7) so-called hobby activities (including drama, singing, photography, painting and handicraft). The frequency of these activities was allotted a numerical value from never (0) to once a week or more (3), and a cumulative activity score was achieved by multiplying the number of leisure activities engaged in by their frequency (maximum = 21).

Since the baseline survey, the mortality of survey participants was followed up to 2002, showing 962 subjects (632 men and 330 women) to have died. Multivariable Cox proportional hazard models were applied to survival, controlling for relevant covariates. This showed that '68.5% of the subjects with scarce leisure participation and 84.6% of the subjects with intermediate and abundant participation were alive' (p. 7). However, this association was found to be lacking in healthy women.

The research team acknowledged the limitations of this study, including the lack of sampling during a long intermediary period in which Finland experienced an economic recession. They also accepted that reverse causation was in evidence as 'self-reported and self-rated health predicts survival and modifies leisure engagement' (p. 10). Equally, participants may have had undiagnosed cancers at the time of the baseline study, which was not captured in self-rated health measures. Nonetheless, the researchers maintained that the 'significant protective effect of the leisure activity endures. Although our findings suggest causality from leisure participation towards health, this does not rule out that leisure participation in itself may be a component of health' (Ibid).

In this study, cultural participation is inextricably linked to social capital, using individual measures of social participation. This implies that it is the social side of cultural engagement which has an impact, with even reading and listening to music linked to social action via public libraries, and it goes some way towards explaining the gender-specific nature of these findings. A social capital approach permits a multiplicity of diverse leisure-time activities to be bunched together in the analysis, obviating any differentiation between art forms and between passive and active forms of cultural engagement. Re-interpretation of the same data with attention to art form specificity would be pertinent in the future, as would closer inspection of the biochemical measurements taken during the baseline survey.

Markku T Hyypä, Juhani Mäki, Olli Impivaara and Arpo Aromaa, 'Individual-Level Measures of Social Capital as Predictors of All-Cause and Cardiovascular Mortality: A Population-Based Prospective Study of Men and Women in Finland', *European Journal of Epidemiology*, 22, 2007, pp. 589–97.

Drawing upon the same dataset as the previous study, this analysis emphasised the focus upon social capital by considering migration and trusting relationships alongside leisure participation (the latter of which was arranged over the same seven categories and frequency scale as before). Individual-level social capital was captured through questions about migration (from one municipality to another), residential stability, trust in family relations, close friends and trust in them and leisure and social participation (as above). This time, deaths during the first five years of follow-up were excluded, to allow for undiagnosed diseases at the time of the baseline study. In the reduced cohort, all-cause and cardiovascular mortality (including strokes) up to November 2004 was established, with reference to the Finnish National Registry for Cause of Death as before. Four sets of Cox proportional hazard models were constructed around individual-level social capital, with all non-significant confounders omitted.

This study found that 'In men, leisure social participation only just predicted all-cause mortality, but none of the measures of individual-level social capital predicted cardiovascular mortality. Economic status slightly modified the effect of leisure participation in men, thus emerging as a tentative mediator between social capital and health in men' (p. 594). The measures taken to be indicative of social capital were less robust. While interpersonal trust proved to be a predictor of both all-cause and cardiovascular mortality in women, residential stability (enabling longevity of trust networks) was rejected as a measure of social capital.

The researchers responsible for this study assessed its strengths and limitations. As with the Swedish studies, it was based on a robust population sample and accurate mortality data. While reverse causation during the first five years of follow-up was avoided within this revised research design, the problem of the long intervening period persisted.

Neda Agahi and Marti G. Parker, 'Leisure Activities and Mortality: Does Gender Matter?', *Journal of Aging and Health*, 20, 2008, pp. 855–71.



k

This study relied on Swedish data from both the Level of Living Survey (used by Bygren et al and Sundquist et al) and the Panel Study of Living Conditions of the Oldest Old (used by Lennartson and Silverstein). The former includes participants up to the age of 74; the latter follows those who have reached the age of 75. A total of 1,246 men and women who had participated in both surveys in 1990–1 and 1992 were selected and followed up for survival until 31 December 2003, during which period 691 individuals died. Account was taken of the frequency of hobby activities (including handicrafts and painting), cultural activities (including attendance at the cinema, theatre, concerns, museums and exhibitions) dancing, playing musical instruments, and choir singing. Hazard ratios were performed using Cox regression analyses. A range of symptoms and diseases, functional status, age, gender, educational level (as a measure of socio-economic position), smoking, alcohol, body mass index were included as potential confounders.

When all the activities were analysed collectively, participation in 0-1 activities tripled mortality risk, while participating in two activities doubled the risk relative to those taking part in six or more activities. Within this, women exhibited a dose-response relationship between overall participation and mortality risk. When the activities were analysed individually, together with age and education, strong associations between hobby and cultural activities in survival were observed, with the former particularly significant for men and the latter for women. When health indicators were taken into account, the association between hobby activities and survival was lost for women, but the relationship between cultural activities and survival uniquely persisted for both men and women. A significant relationship emerged between reading books and survival amongst women even when controlling for cognitive status and education level.

In interpreting these results, the authors accepted the possibility of reverse causation, with health status influencing both participation and mortality. In considering residual confounders, they understood that the socio-cultural activities analysed might serve as proxies for health status, but concluded that this would not explain any gender biases observed. A further confounder might be health behaviour, which was presumed by Bygren et al to exert an influence on the relationship between socio-cultural engagement and health. In a bid to compensate for this, account was taken of smoking, alcohol intake and body mass index, which did not modify the results. And, while socio-economic position was acknowledged as a likely confounder of the relationship between engagement and mortality, it was accepted that using education level as a solitary, dichotomised measure may prove inadequate to the task of capturing this.

Hanna-Reetta Lajunen, Anna Keski-Rahkonen, Lea Pulkkinen, Richard J Rose, Aila Rissanen and Jaakko Kaprio, 'Leisure Activity Patterns and Their Associations with Overweight: A Prospective Study among Adolescents', *Journal of Adolescence*, 32, no. 5, October 2009, pp. 1089–1103.

The FinnTwin12 study included all twins born in Finland between 1983 and 1987, collating data, through self-completion questionnaire, from 5,184 twins aged 11–12 years, followed up at age 14 and 17 years. Responses concerning leisure activities and pubertal development, weight and height and parental education at baseline were analysed. A wide range of leisure activities was assayed, including: television and video viewing, computer games, listening to music, playing board games and musical instruments, reading, arts, crafts, socialising and taking part in clubs or scouts, sports and outdoor activities. Within this, 'Arts were defined as drawing or painting and crafts as handicrafts, woodwork, or building scale models' (p. 4), and frequency was classified as 2-3 times per week, month or year. Logistic regression models were used to study associations between becoming overweight, individual leisure activities and leisure activity patterns. The latter were categorised as active and sociable, active but less sociable, passive but sociable or passive and solitary. Models were adjusted for pubertal timing, socio-economic status and parents' educational levels.

The study found that activity patterns did not predict the tendency to become overweight in boys, but sports and playing an instrument reduced the risk and arts and listening to music increased it. This finding is significant to the present analysis because it suggests that engagement in the arts in boys was detrimental to the maintenance of recommended weights. Among girls, few individual leisure activities predicted becoming overweight. However, the 'passive and solitary' cluster carried the greatest risk of becoming overweight in late adolescence. Contrary to Lennartsson and Silverstein's definition of cultural participation as active and social, it is unclear which of the above-mentioned leisure activities mapped onto the passive and solitary cluster. This renders the deployment of leisure activity patterns useless to the present analysis.

The research team accepted the possibility of reverse causation between social participation and being overweight. One of the (acknowledged) weaknesses in this study was the self-reported nature of weight and the potential bias this might introduce, though this was not thought significant when considered in relation to leisure participation. Data about genetic predispositions to obesity were equally lacking from this study. In seeking to explain the findings, speculations were made about lack of sociability precipitating changes in the autonomic nervous system or the HPA axis, leading to feelings of loneliness and depression.

Ari Väänänen, Michael Murray, Aki Koskinen, Jussi Vahtera, Anne Kouvonen and Mika Kivimäki, 'Engagement in Cultural Activities and Cause-Specific Mortality: Prospective Cohort Study', *Preventive Medicine*, 49, 2009, pp. 142–47.

In 1986, the Finnish Institute of Occupational Health (an independent research institute linked with the Ministry of Social Affairs) invited the 12,173 workers at Enzo Guzeit – a major employer in the forestry industry, which accounted for 80–90 percent of income in Finland at that time – to participate in a survey. This was open to employees of all grades, from cleaners to managers, although the majority of the eventual sample (of whom 1,681 were women and 5,864 men) was comprised of blue-collar employees. Linking to national registers, participants with cardiovascular disease, cancer-related and alcohol-related diseases and psychological conditions (including suicidal behaviour) were excluded from the study. The questionnaire solicited information about engagement in socially shared arts and cultural activities, associations and societal action, as compared with individual engagement via reading and studying. Frequency was self-rated from low (a few times a year) to high (daily or near daily) with an intermediate category of once a week or twice a month. The original cohort was re-surveyed in 1996 and 2000 and followed up for survival until 2004 (using the National Death Registry data kept by Statistics Finland). Associations between cultural engagement and various types of mortality were assessed using Cox proportional hazard models. Account was taken of socio-demographic factors (including age, marital status, educational level, social contact, smoking, alcohol consumption, exercise), stress, diabetes and hypertension.

After adjusting for socio-demographic, biological and social factors and stress, the risk of all-cause mortality and deaths from cardiovascular and external causes (such as suicides, accidents and violence-related deaths) was found to be reduced for those regularly engaging with culture. After taking account of behavioural risk factors, this association remained for external-cause mortality (including the primary external causes of accidents and suicides) but it was significantly diminished for cardiovascular mortality. From this, the researchers concluded that there was a 'robust link between cultural activities and the reduction in deaths from external causes'. Possible reasons given for this were previously reported links between cultural engagement, health status and morale, combined with the fact that engagement with non-risky cultural activity might insulate people from life-threatening situations while providing routes to better psychological health and diminishing the risk of suicide. Within this, solitary cultural activities seemed to be related to all-cause and cardiovascular mortality while socially shared cultural activity generally pertained to death from external causes, but this association was lost when adjusting for socio-economic status and behavioural risk factors. This led to the speculation that readers might be better informed about health risks, while mental health might be improved through socio-cultural engagement.

Arts and cultural activities were included as a catch-all category in the survey, alongside a range of other activities from gardening to housework. In future studies, it would be useful to have more differentiation between types of arts and cultural activities. As the distinction between collective and solitary participation was foregrounded in this study, it would also be beneficial to acknowledge the difference between (social) attendance at arts events and (individual) participation in the making of artwork. This would add complexion to the persistent debate around (passive) attendance and (active) creation.

Anne Kouvonen, Judy Anne Swift, Mia Stafford, Tom Cox, Jussi Vahtera, Ari Väänänen, Tarja Heponiemi, Roberto De Vogli, Amanda Griffiths and Mika Kivimäki, 'Social Participation and Maintaining Recommended Waist Circumference: Prospective Evidence From the English Longitudinal Study of Aging', *Journal of Aging and Health*, 24, no. 2, 2012, pp. 250–68.

With four of the same personnel as the Väänänen research team, this study used data drawn from the English Longitudinal Study of Ageing. Since 2002, this panel survey has assayed the health and social habits of a representative sample of Englishmen and women aged 50 and over. In 2004–5 and 2008–9 (waves 2 and 4), a nurse visited respondents and took various measurements including waist circumference. The research team sought to determine whether this dependent variable (as an indicator of obesity) was affected by respondents' social behaviours. The sample was comprised of 4,280 participants (2,373 women and 1,907 men) with complete data in waves 2 and 4. Logistic regression was used to determine whether social participation at baseline predicted waist circumference at follow-up (in two groups, according to whether they met or exceeded recommended baseline waist measurements). Gender-stratified models adjusted for age, ethnicity, marital status, total wealth, longstanding limiting illness, depressive symptoms, smoking status and physical activity. Interestingly, the discussion highlighted the ethnic homogeneity of the sample.

No association was found between social participation and waistline measurement in women. By contrast, those men with an initial waist measurement in the recommended range who participated in education, arts or music groups or evening classes and in charitable associations were more likely to maintain their waist circumference, while social participation showed no association with meeting recommended waist measurements for those with a waistline that exceeded the recommended range at baseline. As before, the possibility was acknowledged that obesity might determine participation, that social participation may be comprised of, or encourage, physical activity or that it may be a proxy for a healthier lifestyle and better access to information and resources.

The significance of this study to the present analysis is that it unites the main Finnish and Swedish work in an English context. Referencing Bygren et al and Lennartson and Silverstein, this work acknowledges the possible impact of arts and cultural attendance upon the HPA axis in particular and upon health, longevity and psychological wellbeing in general. However, despite the claim that 'the study differentiates between different forms of participation' (p. 262), no analysis was made of the specificities of arts engagement.

Koenraad Cuypers, Karin De Ridder, Kirsti Kvaløy, Marguun Skjei Knudtsen, Steinar Krokstad, Jostein Holmen and Turid Lingaas Holmen, 'Leisure Time Activities in Adolescence in the Presence of Susceptibility Genes for Obesity: Risk or Resilience against Overweight in Adulthood? The HUNT Study', *BMC Public Health*, 12, no. 820, 2012.

Adding complexion to the studies of Lajunen et al and Kouvonen et al, this research – conducted in Norway – distinguished between social and cultural participation when considering adolescent obesity. It relied on data collected as part of the HUNT Study. In 1995–7, 8,408 adolescents (13–19 years) completed a comprehensive questionnaire about their lifestyle, health and quality of life and underwent a clinical examination during which anthropometric measurements, including waist circumference, were taken. In 2006–8, 1,450 of these participants were followed up as young adults (24–30 years); they had measurements and blood taken and were genotyped. Cultural activities were taken to imply a mental function that could be performed alone, such as reading a book, listening to or playing music, doing homework or watching television (with the latter understood to be biased by snacking and psychosocial problems), whereas social activities were understood to involve friends. Each activity was awarded a score from one to four, based on frequency (from never to four times a week), and cumulative scores were calculated as a function of the number and frequency of cultural and social activities, dichotomised into highly culturally active and not. In relation to the dependent variable of obesity, account was taken of body mass index, waist circumference, waist-hip ratio and natural development of the body over the life course. Possible confounders – such as physical activity, socio-economic status, pubertal timing and genetic proclivity to obesity – were also included. Linear regression models were used to explore the association between genetic predisposition, body mass and waist circumference, and the interaction between these scores and cultural/social participation was assessed at follow-up.

More girls than boys were found to be engaged in cultural activities, while social activities were equally distributed across the genders. Beyond this, participation in cultural activities was found to have a negative association with obesity in girls in adulthood, whereas participation in social activities was found to have a positive association with obesity in both girls and boys. In other words, participation in social activities increased the tendency towards obesity in girls, whereas participation in cultural activities guarded them against being overweight. These results were amplified when considering those participants who were at the recommended weight when the survey began and when television was excluded as an activity. Interestingly, no interaction was found between social and cultural activities, suggesting that they are independent concepts in relation to fat retention. As in the Kouvonen study, this research suggested that, rather than having a corrective effect, 'highly culturally active adolescents seemed to be better protected against the effect of obesity-susceptibility genes when measured in young adulthood' (p. 6).

Among the possible explanations given for the relationship between cultural participation and obesity were healthy lifestyle, stress reduction and the impact of enriched environments upon the production and metabolism of fats.

Discussion

As the above summary shows, longitudinal research into the relationship between arts engagement and long-term health outcomes has largely been centred on the Nordic countries. Given the ready availability of data pertaining to date and cause of death in the Nordic region it is, perhaps, inevitable that research teams initially focused upon mortality/survival as their main dependent variable.

The first study in the evidence base – exploring the impact of social engagement upon deaths through cancer, cardiovascular disease and other causes – took account of attendance at the cinema, theatre, concerts, museums and exhibitions.¹¹ While any association between socio-cultural engagement and longevity was cautiously reported, especially when compared to more directly causal relationships – such as that observed between cardiovascular disease and blood pressure, smoking and underlying health conditions – this paved the way for more rigorous scrutiny of cultural – as distinct from social – impacts.

In isolating cultural from social engagement, the team comprised of Lars Olov Bygren, Sven-Erik Johansson and Boinkum Benson Konlaan has led the field. In a study published in the *British Medical Journal*, which has formed the basis of many subsequent research programmes, this team conceded that the social element of cultural participation might be an important determinant of survival, suggesting that ‘Perhaps cultural behaviour is so intermingled with life as a whole that it is impossible to discern its influence’.¹² Four years later, the same team found social ties to have a negligible effect as a confounder, irrespective of their strength or quality.¹³ At the same time, low (compared to regular) attendance at cultural events was shown to significantly increase the likelihood of death. They also began to address the lack of differentiation between art forms – which had typified their own earlier studies and those of other

¹¹ Lennart Welin, Bo Larsson, Kurt Svardsudd, Bodil Tibblin and Gösta Tibblin, ‘Social Network and Activities in Relation to Mortality from Cardiovascular Diseases, Cancer and Other Causes: A 12 Year Follow up of the Study of Men Born in 1913 and 1923’, *Journal of Epidemiology and Community Health*, 46, 1992, pp. 127–32.

¹² Lars Olov Bygren, Boinkum Benson Konlaan and Sven-Erik Johansson, ‘Attendance at Cultural Events, Reading Books or Periodicals, and Making Music or Singing in a Choir as Determinants for Survival: Swedish Interview Survey of Living Conditions’, *British Medical Journal*, 313, 21–28 December 1996, p. 1578.

¹³ Boinkum Benson Konlaan, Lars Olov Bygren and Sven-Erik Johansson, ‘Visiting the Cinema, Concerts, Museums or Art Exhibitions as Determinant of Survival: A Swedish Fourteen-Year Cohort Follow-Up’, *Scandinavian Journal of Public Health*, 28, 2000a, pp. 174–78.

research teams – to demonstrate a positive association between attendance at the cinema, concerts and exhibitions and survival. Transferring this approach to a US context, Bygren worked on a cross-sectional study to show a positive association between self-rated health and attendance at exhibitions, dance performances, films, popular music concerts and theatre plays, as well as establishing a directly proportional relationship between self-rated health and the number of cultural activities attended.¹⁴ Bygren, Johansson and Konlaan have also consistently offered convincing speculations about the possible mechanisms through which these associations might operate, which will be discussed in greater depth in the next section. For now, it is interesting to note that they posit cultural stimulation as a ‘perishable commodity’,¹⁵ continually in need of replenishment, which has important consequences for our conception of arts engagement. These combined findings suggest that it is the cultural, rather than social, nature of arts engagement which has a part to play in alleviating life-threatening conditions, and that regular and sustained attendance at stimulating arts events gives way to longer lives better lived.

In differentiating between the most prevalent causes of mortality, Welin et al were unable to find a link between socio-cultural activities and cancer-related mortality, while Lennartson and Silverstein found no negligible effect upon mortality from socio-cultural engagement.¹⁶ In 2007, Hyyppä et al found that leisure social participation mildly predicted all-cause mortality but had no discernible effect upon cardiovascular mortality.¹⁷ Building on this study two years later, Väänänen et al found an association between external causes of mortality (such as accident and suicide) and (particularly socially orientated) cultural participation.¹⁸ All of these studies deployed a social capital approach, the implications of which will be discussed in the next section. In the same year as the Väänänen et al study was published, Bygren et al orchestrated a project focusing on cultural, rather than social, activities, and found arts engagement to have a potentially preventative effect.¹⁹ In this regard, rare cultural attendees were found to be suffering from higher rates of cancer-related mortality than their high-attending counterparts in urban areas. This study claimed that cultural attendance evinced a similar effect to physical activity and smoking as a predictor of cancer-related mortality, irrespective of health and socio-economic status. This is significant because, as we have seen, both the Chair and Chief Executive of Arts Council England have decried the lack of studies distinguishing cultural from physical activity.

¹⁴ Anna V. Wilkinson, Andrew J. Waters, Lars Olov Bygren and Alvin R. Tarlov, ‘Are Variations in Rates of Attending Cultural Activities Associated with Population Health in the United States?’, *BMC Public Health*, 31 August 2007.

¹⁵ Sven-Erik Johansson, Boinkum Benson Konlaan and Lars Olov Bygren, ‘Sustaining habits of attending cultural events and maintenance of health’, *Health Promotion International*, 16, no. 3, 2001, p. 233.

¹⁶ Carin Lennartsson and Merrill Silverstein, ‘Does Engagement With Life Enhance Survival of Elderly People in Sweden? The Role of Social and Leisure Activities’, *Journal of Gerontology*, 56B, no. 6, 2001, pp. S335–S342.

¹⁷ Markku T. Hyyppä, Juhani Mäki, Olli Impivaara and Arpo Aromaa, ‘Individual-Level Measures of Social Capital as Predictors of All-Cause and Cardiovascular Mortality: A Population-Based Prospective Study of Men and Women in Finland’, *European Journal of Epidemiology*, 22, 2007, pp. 589–97.

¹⁸ Ari Väänänen, Michael Murray, Aki Koskinen, Jussi Vahtera, Anne Kouvonen and Mika Kivimäki, ‘Engagement in Cultural Activities and Cause-Specific Mortality: Prospective Cohort Study’, *Preventive Medicine*, 49, 2009, pp. 142–47.

¹⁹ Lars Olov Bygren, Sven-Erik Johansson, Boinkum Benson Konlaan, Andrej M Grjibovski, Anna V Wilkinson and Michael Sjöström, ‘Attending Cultural Events and Cancer Mortality: A Swedish Cohort Study’, *Arts & Health*, 1, no. 1, March 2009, pp. 65–6.

Another area in which the long-term relationship between cultural attendance and health has been studied is that of dementia. In this endeavour, Wang et al categorised attendance at cultural events as social and engagement in creative activity (such as drawing or painting) as mental, to find that both types of activity exhibited a positive association with dementia prevention, as compared to physical activity.²⁰ This observation is echoed in many cross-sectional dementia studies, and informs the Dementia and Imagination programme.

With obesity looming as a major public health issue, a further area of research has centred on the relationship between socio-cultural engagement and weight gain.

Focusing on the social aspects of participation, Lajunen et al alluded to arts engagement increasing the likelihood of adolescent boys becoming overweight.²¹ Yet, while Kouvonon et al found no association between social participation and waistline measurement in adult women, they observed a greater likelihood of maintaining weight within the recommended range for adult men.²² Also in 2012, Cuypers et al found that, as compared to social participation, teenage girls engaging in cultural activities were less likely to be obese.²³ This conflicting body of work seems to reaffirm the distinction between social and cultural participation in favour of the latter.

Research carried out around successful ageing and obesity elaborates on the gendered nature of health effects. One paper in the evidence base takes this as its main focus, drawing on the ageing Swedish population. It is here that we encounter the most direct claims of causality, with a dose-response relationship being reported between social participation and survival in women. Differentiating between a range of social activities, it was found that 'participation in cultural activities was the only activity that was significantly related to survival in both men and women'.²⁴

More generally, the studies considered here are united by the tentative nature of their claims around association (or occasionally correlation) rather than causation. In their seminal 1996 paper, Bygren, Konlaan and Johansson suggested that cultural participation might underlie the different survival rates observed across social classes. Low income (which had been identified as a residual confounder by Welin et al in 1992) was taken into account and found to be significant with respect to mortality. When subsequently considering the association between cancer-related mortality and cultural attendance, Bygren et al asserted that 'the relationship between attending cultural activities and health is not causal; rather, attending cultural events serves

²⁰ Hui-Xin Wang, Anita Karp, Bengt Winblad and Laura Fratiglioni, 'Late-Life Engagement in Social and Leisure Activities Is Associated with a Decreased Risk of Dementia: A Longitudinal Study from the Kungsholmen Project', *American Journal of Epidemiology*, 155, no. 12, 2002, pp. 1081–87.

²¹ Hanna-Reetta Lajunen, Anna Keski-Rahkonen, Lea Pulkkinen, Richard J Rose, Aila Rissanen and Jaakko Kaprio, 'Leisure Activity Patterns and Their Associations with Overweight: A Prospective Study among Adolescents', *Journal of Adolescence*, 32, no. 5, October 2009, pp. 1089–1103.

²² Anne Kouvonon, Judy Anne Swift, Mia Stafford, Tom Cox, Jussi Vahtera, Ari Väänänen, Tarja Heponiemi, Roberto De Vogli, Amanda Griffiths and Mika Kivimäki, 'Social Participation and Maintaining Recommended Waist Circumference: Prospective Evidence From the English Longitudinal Study of Aging', *Journal of Aging and Health*, 24, no. 2, 2012, pp. 250–68.

²³ Koenraad Cuypers, Karin De Ridder, Kirsti Kvaløy, Marguun Skjei Knudtsen, Steinar Krokstad, Jostein Holmen and Turid Lingaas Holmen, 'Leisure Time Activities in Adolescence in the Presence of Susceptibility Genes for Obesity: Risk or Resilience against Overweight in Adulthood?', *The HUNT Study*, *BMC Public Health*, 12, no. 820, 2012a.

²⁴ Neda Agahi and Marti G. Parker, 'Leisure Activities and Mortality: Does Gender Matter?', *Journal of Aging and Health*, 20, 2008, p. 865.

as a proxy variable for other cancer preventive factors'.²⁵ Given that the association between cancer-related mortality and cultural attendance could only be determined in urban locations, the researchers concluded that arts participation might be part of a healthy and active lifestyle. Elsewhere, it is argued that cultural participation might be a component²⁶ or marker²⁷ of health, and attempts have been made to test this hypothesis. Agahi and Parker concluded that, if arts engagement were simply a proxy for health, this would not explain the observed gender biases. They factored in smoking, alcohol intake and body mass index as indicators of a healthy lifestyle, but this failed to modify the results. Similarly, Lennartson and Silverstein found that their chosen methodology reduced 'the chance that the effect of activity involvement is simply a proxy for physical health'.²⁸ Wilkinson et al hinted at the existence of a possible missing link (such as motivation) between cultural participation and health, which raises questions about who is motivated to access the arts. The potential factors mediating between arts engagement and health are discussed in the next section, while the relationship of health to economy and class remains an open question.

In a similarly cautious way, cultural engagement is presumed to have a preventative, rather than remedial, effect. So, for example, Kouvonen et al and Cuypers et al assume participation to have an impact upon the maintenance of recommended weights.

When the international evidence base was launched at the annual conference of the Faculty of Public Health, it generally met with a positive response. However, caution was advised regarding the use of statistics to prove a point at which we have already arrived, and the merits of the null hypothesis were extolled. Indeed, a number of the studies in the evidence base seem keen to fit their findings to a predetermined thesis, whereas others remain more open to explanations.

Interestingly, the potentially detrimental effects of arts participation have been acknowledged from the outset, with Bygren et al speculating that 'Negative effects of cultural activities could be that people lose their sense of reality and identify with asocial models of behaviour and are themselves encouraged towards asocial behaviour'.²⁹ This is echoed by Hyyppä, with the sentiment that 'It is highly probable that not all cultural activities are beneficial for health and survival; some can even be detrimental to health'.³⁰ In a variation on this theme, Welin et al acknowledged that 'We did not measure the quality of home, outside home, and social activities. It may well be that this quality of for example social participation (social activities) is more important than its quantity as a factor of premature mortality'.³¹

²⁵ Bygren et al, 2009, op cit., p. 71.

²⁶ Markku T Hyyppä, Juhani Mäki, Olli Impivaara and Arpo Aromaa, 'Leisure-Based Participation Predicts Survival: A Population-Based Study in Finland', *Health Promotion International*, 21, no. 1, 2006, pp. 5–12.

²⁷ Koenraad Cuypers, Steinar Krokstad, Turid Lingaas Holmen, Margunn Skjei Knudtsen, Lars Olov Bygren and Jostein Holmen, 'Patterns of receptive and creative cultural activities and their association with perceived health, anxiety, depression and satisfaction with life among adults: the HUNT study, Norway', *Journal of Epidemiology and Community Health*, 66, 2012b, pp. 698–703.

²⁸ Lennartson and Silverstein, op cit., p. 341.

²⁹ Bygren et al, 1996, op cit., p. 1578.

³⁰ Markku T. Hyyppä, *Healthy Ties, Social Capital, Population Health and Survival* (Dordrecht: Springer, 2010), p. 51.

³¹ Welin et al, op cit., p. 131.

One of the persistent ambiguities within this body of research concerns the way in which arts engagement is defined, and the extent to which it is considered active or passive, individual or social. So, for example, a summary of (longitudinal and cross-sectional) research in Sweden and Norway distinguishes between the 'recreational/receptive (e.g. visiting museums, concerts, spectator in cultural events and so on) and creative (club meetings, singing, painting, and various physically challenging cultural activities)'.³² While Bygren et al spearheaded a focus upon attendance, later studies have reintroduced considerations of participatory creative activity, with Wang et al pointing to the beneficial mental stimuli afforded by practising the arts. Similarly, Lennartson and Silverstein's subdivision of social engagement into passive–proactive, sedentary–active, solitary–social and solitary–active showed positive results for the latter, which included (creative) hobbies.

Perhaps surprisingly, a cross-sectional study of self-rated health for DCMS, drawing on a UK-based dataset (wave 2 of Understanding Society – to be considered in a later section), finds that:

*Interestingly, **attendance at arts events has an effect on health but participation in arts does not.** Attending the arts is associated with a 5% increase in the likelihood of reporting good health. Within the audience variables film (cinema), exhibitions and plays and dramas all had significant positive impacts and music audience was positive and significant at the 10% level. The participation variables were a mix of positive and negative effects, which were all insignificant except art participation and this explains why the overall participation variable was found to be insignificant. Participation in art was actually found to have a negative impact on health, although this may be explained to some extent by reverse causality; that is, unhealthy people may be more likely to engage in arts.*³³

The likelihood of 'reverse causality' – that is, the possibility that health has an impact on arts participation, rather than the other way around – will be returned to, and it will be seen that ill health is generally thought likely to diminish, rather than increase, engagement. In exploring the active–passive distinction, a study conducted at the HUNT Research Centre in Norway attempted to distinguish between receptive and creative cultural activities in relation to self-rated health, depression and life satisfaction. This showed both receptive and creative cultural activity to have a positive association with all the health indices for both genders, which was only slightly stronger for receptive cultural activities and particularly pronounced for men.³⁴ This reinforced the gender differentiation noted elsewhere, and found participation to be strongly associated with socio-economy. It is clear that future research needs to bear in mind the distinction between attendance at cultural events and participation in creative activity while continuing to address the broadest range of factors (confounders) that might otherwise influence health.

³² Koenraad Frans Cuypers, Margunn Skjei Knudtsen, Maria Sandgrenc, Steinar Krokstad, Britt Maj Wikström and Töres Theorell, 'Cultural activities and public health: research in Norway and Sweden: An overview', *Arts & Health*, Vol. 3, No. 1, March 2011, p. 7.

³³ Daniel Fujiwara, Laura Kudrna and Paul Dolan, *Quantifying the Social Impacts of Culture and Sport* (London: Department of Culture, Media and Sport, 2014a), p. 17, emphasis in original.

³⁴ Cuypers et al., 2012b, op cit.

So, where does this leave us when considering the relationship between arts participation and health? The initial results are encouraging. Evangelists working at the intersection between the arts and health can go forward, armed with slightly more evidence than theologians – evidence that has been considered sufficient for Nordic governments to implement arts and health programmes at a local, regional and national level.³⁵ There is still much work to be done, certainly in the UK, where several longitudinal, population-based surveys are ripe for analysis. This will be considered more fully below. For now, let us turn to a consideration of the possible mechanisms through which research teams envisage that arts engagement might evince a positive association with health.

The initial results are encouraging. Evangelists working at the intersection between the arts and health can go forward, armed with slightly more evidence than theologians – evidence that has been considered sufficient for Nordic governments to implement arts and health programmes at a local, regional and national level.

Analysis of Possible Mechanisms Informing the Relationship between Arts Participation and Health

Social Capital

In the 1970s, a raft of research investigating the relationship between health and socio-cultural factors was published in the *American Journal of Epidemiology* and elsewhere. In 1976, Cassel drew attention to a 'category of environmental factors capable of producing profound effects on host susceptibility to environmental disease agents', which included 'the presence of other members of the same species, or more generally, certain aspects of the social environment'.³⁶ This paved the way for consideration of psychosocial factors as determinants of health. At the end of the decade, Berkman and Syme asserted that social isolation increased the risk of all-cause mortality, irrespective of socio-economic status, self-rated health, smoking, drinking and obesity.³⁷ Beyond this, it was argued that social support guarded against a range of chronic diseases³⁸ and self-reported symptoms, both physical and psychological.³⁹ The mechanisms that were looked to in mediating these associations included the diminution of life stress and the activation of nervous, hormonal and immunological systems, all of which will be discussed in greater depth shortly.

³⁶ John Cassel, 'The Contribution of the Social Environment to Host Resistance', *American Journal of Epidemiology*, Vol. 104, No. 2, 1976, p. 108.

³⁷ Lisa F. Berkman and S. Leonard Syme, 'Social Networks, Host Resistance and Mortality: A Nine-Year Follow-Up of Alameda County Residents', *American Journal of Epidemiology*, Vol. 109, No. 2, 1979, pp. 186–204.

³⁸ James S. House, Cynthia Robbins and Helen L. Metzner, 'The Association of Social Relationships and Activities with Mortality: Prospective Evidence from the Tecumseh Community Health Study', *American Journal of Epidemiology*, Vol. 116, No. 1, 1982, pp. 123–40; Victor J. Schoenbach, Lisa Fredman and David G. Kleinbaum, 'Social Ties and Mortality in Evans County, Georgia', *American Journal of Epidemiology*, Vol. 123, No. 4, 1986, pp. 577–91; George A. Kaplan, Jukka T. Salonen, Richard D. Cohen, Richard J. Brand, S. Leonard Syme and Pekka Puska, 'Social Connections and Mortality from all Causes and from Cardiovascular Disease: Prospective Evidence from Eastern Finland', *American Journal of Epidemiology*, Vol. 128, No. 2, 1988, pp. 370–80.

³⁹ Lisa F. Berkman 'The Role of Social Relations in Health Promotion', *Psychosomatic Medicine*, 57, 1995, pp. 245–54; Teresa E. Seeman, 'Social Ties and Health: The Benefits of Social Integration', *Annals of Epidemiology*, Vol. 6, No. 5, September 1996, pp. 442–51.

By the beginning of the new millennium, social capital was increasingly being invoked to explain the perceived diminution of social cohesion.⁴⁰ Contemporary commentators acknowledge the multi-faceted and mutable nature of social capital,⁴¹ and attempt to reconcile the social, political and ideological connotations of this problematic construct.⁴² With the interaction between social networks and mortality most pronounced in middle class white men,⁴³ attention has been paid to the unequal distribution of social capital across class, ethnic and gender lines.

Given its complex nature, a reliable unitary measure for social capital has proven elusive, necessitating a composite approach, made up of 'social support, social participation and networks, and trust and reciprocity'.⁴⁴ Markku T Hyypä – a Finnish neuroscientist with two studies in the evidence base – distinguishes between the structural and cognitive dimensions of social capital, with the former regarded as an objective, measurable entity (made up of connections, networks and modes of participation) and the latter taken to be subjective and slippery (centred on interpersonal and personal trust and reciprocity), often resulting in it being downplayed in measurement frameworks.⁴⁵ There is much scope for unforeseen confounders; so, for example, it has been found that 'Levels of participation in social and civic community life in an urban setting are significantly influenced by individual socioeconomic status, health and other demographic characteristics'.⁴⁶ Unsurprisingly, research into the relationship between social capital and health has consistently produced ambiguous results.

The first of the studies in the evidence base to include a longitudinal consideration of arts engagement came out of research into social capital. In the context of the present analysis, it is significant that, although cultural activities were included as a factor of social participation, no distinction was made between cultural and other leisure activities occurring outside the house. More generally, this body of work suggests that the artistic specificities of engagement are subordinate to the social milieu in which engagement occurs, on the basis that:

⁴⁰ Robert Putnam, *Bowling Alone: The Collapse and Revival of American Community* (London: Simon & Schuster, 2001).

⁴¹ Frances E. Baum and A.M. Ziersch, 'Social capital', *Journal of Epidemiology and Community Health*, 57, 2003, pp. 320–3.

⁴² Simon Szreter and Michael Woolcock, 'Health by association? Social capital, social theory, and the political economy of public health', *International Journal of Epidemiology*, 33, 2004, pp. 650–67.

⁴³ Á. Skrabski, M. Kopp and I. Kawachi, 'Social capital in a changing society: cross sectional associations with middle aged female and male mortality rates', *Journal of Epidemiology and Community Health*, 57, 2003, pp. 114–9; Nan Lin, 'Inequality in Social Capital', *Contemporary Sociology*, Vol. 29, No. 6, Nov 2000, pp. 785–95.

⁴⁴ Tarja Nieminen, Ritva Prättälä, Tuija Martelin, Tommi Härkänen, Markku T Hyypä, Erkki Alanen and Seppo Koskinen, 'Social capital, health behaviours and health: a population-based associational study', *BMC Public Health*, 13, 613, 2013, 405.

⁴⁵ Hyypä, 2010, op cit.

⁴⁶ Frances E. Baum, Robert A. Bush, Carolyn C. Modra, Charlie J. Murray, Eva M. Cox, Kathy M. Alexander and Robert C. Potter, 'Epidemiology of participation: an Australian community study', *Journal of Epidemiology and Community Health*, 54, 2000, p. 414.

*Cultural attendance and events are socially-related, and cultural experiences are gained in interaction with other people. Consequently, if attending cultural events, making art, visiting museums, and the multitude of other forms of cultural participation have causal and positive influences on population health, such influences may depend on the social nature of cultural capital, which has either been totally missed or not been measured or controlled for in the handful of epidemiological surveys in existence up to date.*⁴⁷

Such an approach permits a multiplicity of diverse leisure-time activities to be bunched together in the analysis, obviating differentiation between art forms.

Hyypä and Mäki have consistently focused upon the social dimension of cultural participation in an attempt to explicate the longer life expectancies observed in the Swedish-speaking minority population in Finland.⁴⁸ Their second study in the evidence base finds that, 'In men, leisure social participation only just predicted all-cause mortality, but none of the measures of individual-level social capital predicted cardiovascular mortality. Economic status slightly modified the effect of leisure participation in men, thus emerging as a tentative mediator between social capital and health in men'.⁴⁹ Despite this finding, there is a tendency to underplay socio-economic inequalities within social capital research. By contrast, it has been observed that 'cultural engagement levels are highest in the highest household income groups in Scotland and decline to be lowest in the lowest household income groups. Similarly, adult participation in cultural and sporting activities varies by area deprivation, with participation increasing as area deprivation decreases'.⁵⁰ This has implications for public health in general and for health (and cultural) inequalities in particular.

We have seen that Bygren et al have dismissed the relationship between social ties and longevity. Departing from this team to reconsider cultural engagement as a factor in social participation, Sundquist et al drew up a participation index with eighteen variables.⁵¹ It is noteworthy that those variables with the greatest significance were found to be the five forms of cultural attendance included in the index: cinema, theatre, concerts, art exhibitions and museums.

⁴⁷ Hyypä, 2010, op cit., p. 53.

⁴⁸ Markku T. Hyypä and Juhani Mäki, 'Why do Swedish-speaking Finns have longer active life? An area for social capital research', *Health Promotion International*, Vol. 16, No. 1, 2001a, pp. 55–64; Markku T. Hyypä and Juhani Mäki, 'Individual-Level Relationships between Social Capital and Self-Rated Health in a Bilingual Community', *Preventive Medicine*, 32, 2001b, pp. 148–55; Markku T. Hyypä and Juhani Mäki, 'Social participation and health in a community rich in stock of social capital', *Health Education Research*, Vol. 18, No. 6, 2003, pp. 770–9.

⁴⁹ Hyypä et al, 2007, op cit., p. 594.

⁵⁰ Clare Leadbetter and Niamh O'Connor, *Healthy Attendance? The Impact of Cultural Engagement and Sports Participation on Health and Satisfaction with Life in Scotland* (Edinburgh: Scottish Government, 2013), p. 7.

⁵¹ Kristina Sundquist, Martin Lindström, Marianne Malmström, Sven-Erik Johansson and Jan Sundquist, 'Social Participation and Coronary Heart Disease: A Follow-up Study of 6900 Women and Men in Sweden', *Social Science & Medicine*, 58, 2004, pp. 615–22.

Contemplating Bygren et al's work, Hyypä insisted that 'it may be too early to argue that attendance at cultural events per se has beneficial effects on survival, without taking into account (individual-level) social capital that is latently included in all cultural participation'.⁵² However, he conceded that 'the Swedish surveys were well-controlled, and what is important, they were adjusted for long-lasting diseases and other health-related factors that are known to strongly influence on [sic] one's health and survival. Adjusting for several conventional health-related factors, the authors were able to show a strong link between cultural activity and survival'.⁵³ A report by the Swedish National Institute of Public Health noted that:

*One difficulty highlighted by several researchers concerning research in this area is to determine whether it is the artistic experience in itself or the social context within which it takes place that has a positive impact on health. Experiments comparing cultural participation to participation in physical activity under the same social circumstances indicate, however, that social stimulus alone cannot explain the health effects of participating in cultural activities.*⁵⁴

Taking account of the studies comprising the evidence base, it seems likely that 'there is a general, rather than cause-specific, effect of social support on health status'.⁵⁵

If, as Bourdieu suggested, both social and cultural capital may be regarded as proxies for access to resources within class society,⁵⁶ there is likely to be a proportional relationship between access to the arts and to health information and services. In this sense, considerations of social capital may help us to understand who has access to these vital goods and services, but it tells us little about how arts participation might affect health. Instead, Bygren et al consistently emphasise cognitive and physiological explanations which are useful to unravel here, delving into cross-sectional studies and RCTs where necessary.

⁵² Hyypä, 2010, op cit., pp. 50–1.

⁵³ Ibid, p. 51.

⁵⁴ Swedish National Institute of Public Health, *Kultur för hälsa* [Culture for Health], (Stockholm: Swedish National Institute of Public Health, 2005), p. 17.

⁵⁵ Kristina Orth-Gomér and Jeffrey V. Johnson, 'Social Network Interaction and Mortality: A Six-Year Follow-Up Study of a Random Sample of the Swedish Population', *Journal of Chronic Disease*, Vol. 40, No. 10, 1987, p. 956.

⁵⁶ Pierre Bourdieu, 'Cultural Reproduction and Social Reproduction' in *Knowledge, Education, and Social Change: Papers in the Sociology of Education* (London: Tavistock, 1973), pp. 71–112.

Cognition

Characterised by their openness to possible explanations for any positive association observed between arts participation and health, Bygren et al have alluded to several cognitive theories. These include: the communicative theory of art action (which prioritises the symbolic nature of nonverbal art forms and their power in structuring feelings), the arousal theory (which supposes that art stimulates functions necessary to our survival as a species, akin to food and sex) and the psychoanalytic theory (which presumes that art offers vicarious satisfaction of sublimated desires).

In humans, arts engagement has been shown to have a cognitive effect, and studies are increasingly being dedicated to unravelling the neural basis for this. Different parts of the brain have been found to respond to the rhythm, tone and timbral complexity of music,⁵⁷ which becomes differentiated during free improvisation.⁵⁸ In a study of people with dementia, singing and listening to music were found to improve mood, orientation, remote episodic memory and general cognition, while singing has been seen to enhance short-term and working memory.⁵⁹

Delving deeper into physiological explanations for these observations, the connection between the hypothalamus, pituitary and adrenal glands (the HPA axis) has been looked to as a possible mediator in psychosomatic mechanisms since the 1940s, and Bygren et al have consistently implicated this axis as a possible factor in the defence against depression. Studies of brain function repeatedly implicate excess production of glucocorticoids (cortisol in humans – produced when the body is placed under stress) in the suppression of the hypothalamus and pituitary gland⁶⁰ and deterioration of the hippocampus (which deals with memory and spatial navigation).⁶¹ The HPA axis is also implicated in bipolar disorder, attention deficit hyperactivity disorder (ADHD) and major depressive disorder. By contrast, environmental enrichment in rodents has been found to increase the number of glucocorticoid receptors in the hippocampus, augmenting the plasticity of neurons, improving cognitive functions, such as learning and memory,⁶² and increasing willingness to explore.⁶³

⁵⁷ Vinoo Alluri, Petri Toiviainen, Iiro P. Jääskeläinen, Enrico Glerean, Mikko Sams and Elvira Brattico, 'Large-scale brain networks emerge from dynamic processing of musical timbre, key and rhythm', *NeuroImage*, 59, 2012, pp. 3677–89.

⁵⁸ Aaron L. Berkowitz and Daniel Ansari, 'Generation of novel motor sequences: The neural correlates of musical improvisation', *NeuroImage*, 41, 2008, pp. 535–43.

⁵⁹ Teppo Särkämö, Mari Tervaniemi, Sari Laitinen, Ava Numminen, Merja Kurki, Julene K. Johnson and Pekka Rantanen, 'Cognitive, Emotional, and Social Benefits of Regular Musical Activities in Early Dementia: Randomized Controlled Study', *The Gerontologist*, 2014, pp. 634–50.

⁶⁰ Carina Hibberd, Joyce L.W. Yau and Jonathan R. Seckl, 'Glucocorticoids and the ageing hippocampus', *Journal of Anatomy*, 197, 2000, pp. 553–62.

⁶¹ Tommy Olsson, Abdul K. Mohammed, Lucy F. Donaldson and Jonathan R. Seckl, 'Transcription factor AP-2 gene expression in adult rat hippocampal regions: effects of environmental manipulations', *Neuroscience Letters*, 189, 1995, pp. 113–16.

⁶² Sigbritt Rasmuson, Tommy Olsson, Bengt G. Henriksson, Paul A.T. Kelly, Megan C. Holmes, Jonathan R. Seckl and Abdul H. Mohammed, 'Environmental enrichment selectively increases 5-HT_{1A} receptor mRNA expression and binding in the rat hippocampus', *Molecular Brain Research*, 53, 1998, pp. 285–90.

⁶³ Aurelia Zimmermann, Markus Stauffacher, Wolfgang Langhans and Hanno Würbel, 'Enrichment-dependent differences in novelty exploration in rats can be explained by habituation', *Behavioural Brain Research*, 121, 2001, pp. 11–20.

Extrapolating the connection between creativity and cognition, a Swedish team has found that creativity increases as the density of D2 dopamine receptors in the thalamus decreases.⁶⁴ A lower density of receptors in an area of the brain associated with schizophrenia and bipolar disorder facilitates greater flexibility and originality. The same team found the density of D2 receptors in the striatal region of the brain to be positively associated with 'flow', which is understood as a 'psychological state of high but subjectively effortless attention, low self-awareness, sense of control and enjoyment that can occur during the performance of tasks that are challenging, but matched in difficulty to the skill level of the person'.⁶⁵ Several studies have established links between proneness to flow and self-esteem, life satisfaction and psychological wellbeing.⁶⁶

These findings are reflected in the evidence base, with Bygren et al speculating that 'The cognitive engagement and effort that results from attending cultural events may stimulate [immunological responses] in sensitive individuals'.⁶⁷ Wang et al and Cuypers et al also understand cultural activities to require a mental function. In investigating deaths through accident and suicide, Väänänen et al presume that increased socio-cultural participation gives way to better mental health. This takes us to another site for scrutinising the long-term effect of arts participation – that of occupational health.

In humans, arts engagement has been shown to have a cognitive effect, and studies are increasingly being dedicated to unravelling the neural basis for this.

⁶⁴ Örjan De Manzano, Simon Cervenka, Anke Karabanov, Lars Farde and Fredrik Ullén, 'Thinking Outside a Less Intact Box: Thalamic Dopamine D2 Receptor Densities Are Negatively Related to Psychometric Creativity in Healthy Individuals', *PLOS one*, May 2010, Vol. 5, No. 5, e10670, p. 1.

⁶⁵ Örjan De Manzano, Simon Cervenka, Aurelija Jucaite, Oscar Hellenäs, Lars Farde and Fredrik Ullén, 'Individual differences in the proneness to have flow experiences are linked to dopamine D2-receptor availability in the dorsal striatum', *NeuroImage*, 67, 2013, p. 1.

⁶⁶ K. Asakawa, 'Flow experience and autotelic personality in Japanese college students: how do they experience challenges in everyday life?', *Journal of Happiness Studies*, 5, 2004, pp. 123–154; K. Asakawa, 'Flow experience, culture, and well-being: how do autotelic Japanese college students feel, behave, and think in their daily lives?', *Journal of Happiness Studies*, 11, 2010, pp. 205–223; I. Ishimura and M. Kodama, 'Dimensions of flow experience in Japanese college students: relation between flow experience and mental health', *Journal of Health Psychology*, 13, 2006, pp. 23–34.

Occupational Health and Work Strain

After Cassel, Welin et al outline two 'types of social processes of importance in disease aetiology. The first is dominated by deleterious or stress factors which enhance vulnerability to disease. The second consists of protective factors which buffer the organism from the effects of noxious stimuli'.⁶⁸ In relation to the first factor, work strain – typically engendered through a composite of high psychological effort and low recognition/reward, enduring into retirement and equally applicable to un/under-employment – is 'thought to suppress the immune system and thus render an organism more susceptible to disease, especially those diseases closely linked with immune functioning, such as malignancy, infection, autoimmune disease, and allergy'.⁶⁹ In relation to the second factor, Bygren et al observe that 'Cultural activity might be thought to increase resistance to a broad spectrum of diseases or be the impetus to start dealing with problems'.⁷⁰ It is useful to consider the relationship between these two factors more closely.

In 2005, a short-term study of Canadian emergency services employees found that 'higher levels of frequency in cultural leisure significantly predicted greater physical health'.⁷¹ Cultural leisure was taken to embrace concerts, ballet, theatre and museums, and thought to be a palliative means of coping with stress. Drawing upon this research, Bygren's US collaboration delved further into the possible molecular biological explanations for stress and its relationship to diseases including cancer.⁷² This lingered upon the oxidation of DNA to form 8-hydroxydeoxyguanosine (8-OH-dG) – a biomarker for cancer – which is caused by stress, particularly in women.⁷³ More recently, (broadly defined) creative activity undertaken outside of work has been found to hasten recovery from work strain and enhance work-related performance.⁷⁴

⁶⁸ Lennart Welin, Kurt Svärdsudd, S. Ander-Peciva, Gösta Tibblin, Bodil Tibblin, Bo Larsson and L. Wilhemsen, 'Prospective Study of Social Influences on Mortality: The Study of Men Born in 1913 and 1923', *The Lancet*, Vol. 325, No. 8434, 20 April 1985, p. 917.

⁶⁹ Alison Fife, Pamela J. Beasley and Debra L. Fertig, 'Psychoneuroimmunology and cancer: Historical perspectives and current research', *Advances in Neuroimmunology*, Vol. 6, 1996, p. 183.

⁷⁰ Bygren et al, 1996, op cit., p. 1577.

⁷¹ Yoshitaka Iwasaki, Roger C. Mannell, Bryan J.A. Smale and Janice Butcher, 'Contributions of Leisure Participation in Predicting Stress Coping and Health among Police and Emergency Response Services Workers', *Journal of Health Psychology*, Vol 10, No. 1, 2005, p. 94.

⁷² Wilkinson et al, 2007, op cit.

⁷³ Masahiro Irie, Shinya Asami, Shoji Nagata, Masato Ikeda, Masakazu Miyata and Hiroshi Kasai, 'Psychosocial Factors as a Potential Trigger of Oxidative DNA Damage in Human Leukocytes', *Japanese Journal of Cancer Research*, 92, March 2001, pp. 367–376; Masahiro Irie, Shinya Asami, Shoji Nagata, Masato Ikeda, Masakazu Miyata and Hiroshi Kasai, 'Psychosocial Mediation of a Type of Oxidative DNA Damage, 8-Hydroxydeoxyguanosine, in Peripheral Blood Leucocytes of Non-Smoking and Non-Drinking Workers', *Psychotherapy and Psychosomatics*, 71, 2002, pp. 90–6.

⁷⁴ Kevin J. Eschleman, Jamie Madsen, Gene Alarcon and Alex Barelka, 'Benefiting from creative activity: The positive relationships between creative activity, recovery experiences, and performance-related outcomes', *Journal of Occupational and Organizational Psychology*, early view online, 14 April 2014.

Considering cultural activities within the workplace, a team around Töres Theorell at the Stress Research Institute of Stockholm University has speculated that health effects 'could arise (1) because such activities may strengthen cohesiveness between employees and between management and employees resulting in improved psychosocial work environment or (2) because of direct effects of the cultural activities themselves'.⁷⁵ Investigating which of these possibilities was more likely over time, they team found that emotional exhaustion decreased as workplace cultural activities increased, with the latter predictive of the former over a two-year period, independent of other psychosocial factors. In this, the quality and regularity of activities appeared to be significant, and it was suggested that the need for such activities became heightened during periods of high national unemployment.

In exploring the relationship between psychosocial factors and disease, it is helpful to look a little more closely at the relationship between stress and susceptibility.

The quality and regularity of activities appeared to be significant, and it was suggested that the need for such activities became heightened during periods of high national unemployment.

⁷⁵ Töres Theorell, Walter Osika, Constanze Leineweber, Linda L. Magnusson Hanson, Eva Bojner Horwitz and Hugo Westerlund, 'Is cultural activity at work related to mental health in employees?', *International Archives of Occupational and Environmental Health*, 86, 2013, p. 282.

Psycho-Neuroimmunology, Endocrine and Metabolic Effects

Towards the end of the 20th century, it was posited that, rather than being autonomous, self-regulating entities, the nervous, immune and endocrine systems function in a reciprocal way in response to environmental and psychological stimuli. In a study of the impact of psychosocial and behavioural factors upon cancer, it was found that distress negatively influenced three mechanisms central to carcinogenesis, including the ability of cells to repair damaged DNA.⁷⁶ The significance of studies of this kind is that, in making a connection between stress, distress and chronic morbidity via psycho-immunoneurological pathways, they pave the way for an exploration of factors (including arts engagement) which might reduce the negative side of this equation.

It has long been asserted that 'verbally expressing experiences by writing or talking improves physical health, enhances immune function, and is associated with fewer medical visits'.⁷⁷ To take just one example, the lymphocyte count of HIV patients has been found to increase following repeated half-hour bouts of emotional writing, with positive changes in health correlating with the use of positive words, presumed to be a result of raised levels of insight.⁷⁸

In several of the longitudinal studies conducted by Bygren et al, space has been dedicated to psycho-neuroimmunology, taking account of the innervation of lymphoid organs and release of neurotransmitters precipitated by engagement with nonverbal art forms including music and visual art. In rodents, it has been found that 'music can effectively reverse adverse effects of stress on the number and capacities of lymphocytes that are required for an optimal immunological response against cancer'.⁷⁹ This is complemented by research into the beneficial effects of music upon human immunity.⁸⁰ In specific relation to visual art, it has been observed that 'works of art arouse effects which were not observed after a comparable amount of conversation about daily events'.⁸¹

⁷⁶ J.K. Kiecolt-Glaser and R. Glaser, 'Psychoneuroimmunology and Cancer: Fact or Fiction?', *European Journal of Cancer*, Vol. 35, No. 11, 1999, pp. 1603–7.

⁷⁷ Diane S. Berry and James W. Pennebaker, 'Nonverbal and Verbal Emotional Expression and Health', *Psychotherapy and Psychosomatics*, 59, 1993, p. 11.

⁷⁸ Keith J. Petrie, Iris Fontanilla, Mark G. Thomas, Roger J. Booth and James W. Pennebaker, 'Effect of Written Emotional Expression on Immune Function in Patients With Human Immunodeficiency Virus Infection: A Randomized Trial', *Psychosomatic Medicine*, 66, 2004, pp. 272–5.

⁷⁹ María J. Núñez, Paula Mañá, David Liñares, María P. Riveiro, José Balboa, Juan Suárez-Quintanilla, Mónica Maracchi, Manuel Rey Méndez, José M. López and Manuel Freire-Garabal, 'Music, immunity and cancer', *Life Sciences*, 71, 2002, p. 1047.

⁸⁰ Rollin McCraty, Mike Atkinson, Glen Rein and Alan D. Watkins, 'Music Enhances the Effect of Positive Emotional States on Salivary IgA', *Stress Medicine*, Vol. 12, 1996, pp. 167–75.

⁸¹ Britt-Mai Wikström, Töres Theorell, S. Sandström, 'Medical Health and Emotional Effects of Art Stimulation in Old Age: A Controlled Intervention Study concerning the Effects of Visual Stimulation Provided in the Form of Pictures', *Psychotherapy and Psychosomatics*, Vol. 60, Nos. 3-4, 1993, p. 202.

Bygren has been part of two relevant RCTs, excluded from the evidence base due to their short-term design. The first of these sought to differentiate the biomedical and social effects of light physical activity and cultural attendance (at either a film, concert, play or art exhibition once a week for two months) from the more general effects of participating in group activity. As distinct from those engaging in exercise, those taking part in cultural activities showed reduced blood pressure and reduced levels of adrenocorticotropical hormone (part of the HPA axis implicated in stress).⁸²

In a second RCT led by Bygren, mainly female employees of a local government officers' union in the health service of northern Sweden were offered free access to films, concerts, art exhibitions (preceded by an expert introduction where necessary) or singing in a choir once a week for eight weeks. Physical health, social functioning and vitality improved in the group exposed to cultural stimuli. While the effects were less pronounced than in longitudinal studies, they were most noticeable among those participants who visited art exhibitions.⁸³ Notwithstanding the limitations of this study, including its short timeframe, it seems to provide additional evidence of the positive health effects of cultural participation in general and visual art forms in particular.

Physical health, social functioning and vitality improved in the group exposed to cultural stimuli. While the effects were less pronounced than in longitudinal studies, they were most noticeable among those participants who visited art exhibitions.

⁸² Boinkum Benson Konlaan, N Björby, Lars Olov Bygren, Gösta Weissglas, Lena Karlsson, Maria Widmark, 'Attendance at cultural events and physical exercise and health: a randomized controlled study', *Public Health*, Vol. 114, No. 5, Sept 2000b, pp. 316–9.

⁸³ Lars Olov Bygren, Gösta Weissglas, Britt-Mai Wikström, Boinkum Benson Konlaan, Grjibovski, Andrej Grjibovski, Ann-Birth Karlsson, Sven-Olov Andersson and Michael Sjöström, 'Cultural Participation and Health: A Randomized Controlled Trial Among Medical Care Staff', *Psychosomatic Medicine*, 71, 2009b, pp. 469–73.

Epigenetics

Recent research has shown that one's environment has a part to play in determining which genes are switched on or off in the body at any given time. The signals controlling this process are thought to be carried not within the coding part of the genome but within the surrounding material (epigenome). As Bygren explains in a recent singly authored article, 'The molecular and physiological processes following an environmental exposure induce epigenetic changes that cause the genome, with its DNA sequence, to change expression patterns, potentially inducing physiological changes that result in disease or protection from disease'.⁸⁴ In other words, short-term exposure to a range of external factors can cause long-term changes to the phenotype (the body's make-up) without affecting the genotype (the genetic code), bypassing conventional genetics.

One possible mechanism for this is the methylation of cytosine (one of the four nucleotides making up the DNA code), as observed when the body is placed under stress. The introduction of a simple hydrocarbon at certain points within the DNA helix impedes the transcription of messenger RNA and consequent translation of proteins. Methylation may also act in tandem with modification of the histone proteins, which arrange the genetic material into its characteristic chromosomal shape and provide a spool around which the DNA winds itself during transcription. Epigenetic markers have been found in a range of conditions from prostate⁸⁵ and breast⁸⁶ cancers to ADHD.⁸⁷

The relationship between environment and epigenetic modification suggests great potential for arts engagement in mitigating a range of acute morbidities.

⁸⁴ Lars Olov Bygren, 'Intergenerational Health Responses to Adverse and Enriched Environments', *Annual Review of Public Health*, 34, 2013, p. 50.

⁸⁵ Rene Cortese, Andrew Kwan, Emilie Lalonde, Olga Bryzgunova, et al, 'Epigenetic markers of prostate cancer in plasma circulating DNA', *Human Molecular Genetics*, Vol. 21, No. 16, 2012, pp. 3619–31.

⁸⁶ James M. Flanagan, Marta Munoz-Alegre, Stephen Henderson, Thomas Tang, et al, 'Gene-body hypermethylation of ATM in peripheral blood DNA of bilateral breast cancer patients', *Human Molecular Genetics*, Vol. 18, No. 7, 2009, pp. 1332–42.

⁸⁷ Jonathan Mill and Arturas Petronis, 'Pre- and peri-natal environmental risks for attention-deficit hyperactivity disorder (ADHD): the potential role of epigenetic processes in mediating susceptibility', *Journal of Child Psychology and Psychiatry*, Vol. 49, No. 10, 2008, pp. 1020–30.

While a certain amount of reprogramming and repair of the DNA happens when a baby is conceived, it is now thought that complex conditions, triggered by environmental factors, create epigenetic markers that are passed through the generations.⁸⁸ So, for example, it seems that intergenerational transmission of a predisposition to alcoholism is linked to paternal exposure to alcohol prior to conception.⁸⁹ Similar epigenetic mechanisms, stimulated by adverse environmental conditions, are implicated in the intergenerational transmission of major psychoses, such as depressive disorder,⁹⁰ schizophrenia⁹¹ and bipolar disorder,⁹² through the methylation of DNA in the frontal cortex of the brain.⁹³

As Bygren's explanation at the start of this subsection suggests, the converse is also true, and exposure to enriched environments can have a positive epigenetic effect. So, for example, the aforementioned neurological enhancements observed in rodents is transmissible through the generations.⁹⁴ If we conceive cultural activity as a form of environmental enrichment, this has obvious significance in relation to the present analysis.

The relationship between environment and epigenetic modification suggests great potential for arts engagement in mitigating a range of acute morbidities. With demonstrable intragenerational effects, cultural participation may yet prove to moderate the epigenetic transfer of disease susceptibility through the generations. Taking this supposition together with the suspected connection between epigenetic mechanisms and major psychoses (known to worsen through generations), we might begin to explain the role of cultural participation in ameliorating mental disorders, as observed in multifarious arts and health organisations.

If further evidence of these beneficial effects is needed, we shall doubtless have recourse to national and international datasets. Let us turn now to a consideration of their suitability to the task.

⁸⁸ M.E. Pembrey, Lars-Olov Bygren, G. Kaati, S. Edvinsson, K. Northstone, et al, 'Sex-specific, male-line transgenerational responses in humans', *European Journal of Human Genetics*, 14, 2006, pp. 159–66

⁸⁹ J.G. Knezovich and M Ramsay, 'The effect of preconception paternal alcohol exposure on epigenetic remodeling of the H19 and Rasgrf1 imprinting control regions in mouse off-spring', *Frontiers in Genetics*, 2012, 3, pp. 10–15.

⁹⁰ Jonathan Mill and Arturas Petronis, 'Molecular studies of major depressive disorder: the epigenetic perspective', *Molecular Psychiatry*, 12, 2007, 799–814.

⁹¹ Chieko Kato, Arturas Petronis, Yuji Okazaki, Mamoru Tochigi et al, 'Molecular genetic studies of schizophrenia: challenges and insights', *Neuroscience Research*, 43, 2002, pp. 295–304; Arturas Petronis, 'The Origin of Schizophrenia: Genetic Thesis, Epigenetic Antithesis, and Resolving Synthesis', *Biological Psychiatry*, 55, 2004, pp. 965–70.

⁹² Arturas Petronis, 'Epigenetics and Bipolar Disorder: New Opportunities and Challenges', *American Journal of Medical Genetics*, 123C, 2003, pp. 65–75.

⁹³ Jonathan Mill, Thomas Tang, Zachary Kaminsky, Tarang Khare, et al, 'Epigenomic Profiling Reveals DNA-Methylation Changes Associated with Major Psychosis', *The American Journal of Human Genetics*, 82, March 2008, pp. 696–711.

⁹⁴ Naoko Kuzumaki, Daigo Ikegami, Rie Tamura, Nana Hareyama, et al, 'Hippocampal Epigenetic Modification at the Brain-Derived Neurotrophic Factor Gene Induced by an Enriched Environment', *Hippocampus*, 21, 2011, pp. 127–32; Richelle Mychasiuka, Saif Zahira, Nichole Schmoldb, Slava Ilnytskyyc, et al, 'Parental enrichment and offspring development: Modifications to brain, behavior and the epigenome', *Behavioural Brain Research*, 228, 2012, pp. 294–298.

Critical Analysis of the Data Sources Relevant to Explorations of the Long-Term Relationship between Arts Participation and Health

Nordic Datasets

In consulting the studies that constitute the evidence base, it quickly becomes clear that research teams benefited from population data collated over time, largely in the Nordic countries. This is no coincidence, as Hyypä explains:

For epidemiological surveys, it is a major strength that all Nordic countries have for a long time kept comprehensive population registers with unique personal identification numbers for each citizen. The personal identification system is one of the best tools for practicing [sic] scientific epidemiology as it can be utilized for linking data derived from different nationwide sources. Comparative and follow-up data sets with, for example, morbidity and mortality rates are available for investigators, and some of the registered data are available even for laymen on the websites of Statistics Finland and Statistics Sweden.⁹⁵

Since 2005–6, Hyyppä has relied upon the Mini-Finland Health Survey, carried out in 1978–80, which asked a sample of 8,000 people aged between 30 and 99 questions about their attendance at a range of cultural events. Linkage to morbidity and mortality registers has permitted participants to be followed up for disease onset, mortality and cause of death over the intervening years.

A decade earlier, Bygren et al pioneered use of the Swedish Survey of Living Conditions, which was established in 1968 in a bid to explain the inequality and exclusion that persisted at the heart of the country's social democracy.⁹⁶ Annually surveying around 7,600 adults up to the age of 74, a module covering social relations, including questions on arts and cultural participation, is added every eight years, roughly doubling the sample size. The same survey was used by Sundquist et al, while Lennartson and Silverstein used the Swedish Panel Study of Living Conditions of the Oldest Old, which captures participants who have exceeded the age of 74. This way of working facilitates a posteriori analysis, as opposed to a pre-emptive longitudinal design, which means that respondents have been blinded to researchers' as-yet-unformulated interests.

The final study in the evidence base draws upon the HUNT Study, centred on Nord-Trøndelag County in central Norway.⁹⁷ This is a population-based survey conducted in 1984–6, 1995–7, 2006–8 and currently preparing for its fourth wave. At each wave, respondents have completed a comprehensive questionnaire about their lifestyle, health and quality of life and undergone a clinical examination during which anthropometric measurements, blood and DNA samples were taken. At wave 2, two questions about cultural participation were added, concerning frequency of attendance at cultural events and participation in creative or social activities. At the same time, adolescents (aged 13–19 years) were added to the study and asked more detailed questions about their participation in a range of social and cultural activities. Data from the HUNT Study, accumulated within a particular region of Norway, map onto the national picture and could, arguably, be extrapolated to a northern European context more generally. As will be discussed in the next section, there is ample scope to design future biomedical studies of cultural attendance and health drawing on this impressive resource.

⁹⁶ See: <http://snd.gu.se/en/catalogue/study/389>

⁹⁷ Steinar Krokstad, Arnulf Langhammer, K. Hveem, TL. Holmen, K. Midthjell, TR. Stene, G. Bratberg, Jon Heggland and Jostein Holmen, 'Cohort Profile: The HUNT Study, Norway', *International Journal of Epidemiology*, 42, 2013, pp. 968–77.

UK-Based Datasets

In the ACE evidence review mentioned in the introduction, it was noted that ‘there is huge untapped potential in existing data sets to explore relationships between arts engagement and participation and a whole host of other personal and societal outcomes, which would make an important contribution to the UK-based evidence about the social and economic contribution of the arts’.⁹⁸ As a necessary prelude to recommendations for future research, let us take a look at the most appropriate of these in turn.

British Cohort Study 1970 (BCS70)

BCS70 follows the lives of more than 17,000 people born in England, Scotland and Wales during a single week in 1970. Typical of birth cohort studies, this adopts a life course approach, seeking to ‘understand influences of early-life exposures and development on later disease outcome and the processes occurring in the intervening years of life that link them’.⁹⁹ Since the original birth survey, there have been seven ‘sweeps’ of cohort members at ages 5, 10, 16, 26, 30, 34, 38 and 42. The DCMS overview mentioned in the methodology notes the relevance to studies of arts engagement of the sweeps conducted at ages 10, 16 and 34. When consulted in relation to the present investigation, researchers responsible for the survey pointed to those conducted at ages 16 and 42, at which fairly extensive questions were asked with regard to cultural participation; at the same time, the researchers affirm that physical and mental health have been key concerns of the study over its duration.

Referring to the relevant questionnaires, it becomes clear that the 16-year-old participants were asked how often they took part in any of 47 different leisure activities. These included: listening to or making music, sewing, knitting, drawing, painting, writing and visiting museums/galleries, the theatre or cinema. At the same time, the teenage participants were asked about the frequency with which various forms of physical and psychological discomfort were experienced, and their cognitive aptitudes were tested. When respondents reached the age of 42, leisure questions were the first to appear in the questionnaire, spanning similar categories as before, followed by questions about exercise and diet. At question 31, the full Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS) was inserted. The existence of BCS70 enables associations between mental wellbeing and arts participation to be studied on a much larger scale.

English Longitudinal Study of Ageing (ELSA)

ELSA is drawn from people who took part in the Health Survey for England (HSE, an annual, nationally representative cross-sectional household survey) in 1998, 1999 or 2001, who were born before March 1952. Since 2002–3, participants aged 50+ have been followed up with a face-to-face interview, self-completion questionnaire every two years and a nurse’s visit every other wave.

⁹⁸ Arts Council England, 2014, op cit., p. 41..

⁹⁹ Chris Power, Diana Kuh and Susan Morton, ‘From Developmental Origins of Adult Disease to Life Course Research on Adult Disease and Aging: Insights from Birth Cohort Studies’, *Annual Review of Public Health*, 34, 2013, p. 8.

While DCMS deems ELSA irrelevant to studies of participation in the arts or museums/ galleries, the frequency of attendance at: cinemas; art galleries/museums; theatres/ concerts/operas has been assayed. At the same time, participants have been asked whether they would like to undertake any of these activities more often. Considerable data about disease, disability and self-rated health have been gathered alongside a consideration of life satisfaction, wellbeing, self-perception and social networks. Wave 6 (to be released in autumn 2014) solicited information about participation in education, arts or music groups or evening classes. Overall, this dataset permits analysis of creative engagement in relation to a number of health variables over time.

National Child Development Study (NCDS)

NCDS follows the lives of 17,000 people born in England, Scotland and Wales in a single week of 1958. Since birth, all cohort members have taken part in further sweeps at ages 7, 11, 16, 23, 33, 42, 46, 50 and 55. In 2003 (age 45), 9,000 cohort members also participated in a special biomedical survey, in a bid to elucidate how development, environments and lifestyles affected health.

DCMS identifies sweeps 2, 4 and 5 as being relevant to arts research, with sweep 5 additionally capturing museums and gallery data. More specifically, sweep 5 asked about the activities of children aged between six and ten, including whether they had access to a musical instrument, read for pleasure, were encouraged to develop and maintain hobbies, engaged in the music/arts/dance/drama or visited a museum/ musical/theatrical performance. While the biomedical survey of 2003 promises detailed health data, participants were only asked about their children's arts engagement activities, rather than their own, which limits its relevance to this study.

Taking Part

In 2005, a report commissioned by ACE analysed survey data concerning arts participation and health, generated by the Office for National Statistics (ONS) in 2001, 2002 and 2003. Taking self-rated health as the outcome measure and excluding participants who reported a long-term illness, this showed that,

'Allowing for age and other socio-demographic characteristics, better health was more likely to be reported by people who:

- Attended performing arts events
- Attended non-performing arts or cultural events or venues
- Participated in dance activities
- Accessed artforms through CDs, mini discs, tapes or records
- Listened to the arts through the radio
- Viewed the arts on television, videos or DVDs'¹⁰⁰

¹⁰⁰ Joy Windsor, *Your health and the arts: a study of the association between arts engagement and health* (London: Arts Council England, 2005), p.10.

Consulted for this study, ONS claimed not to be exploring cultural participation any further. To fill the gap, DCMS partnered with ACE, English Heritage and Sport England to devise the annual Taking Part survey, implemented by TNS BMRB. The survey includes a wide range of questions about attendance at arts and cultural events and participation in creative activities. It also includes questions about self-rated health, enduring illness and its debilitating effects. In addition to this, respondents are asked to rate their happiness on a ten-point scale from extremely unhappy to extremely happy, and three questions are posed about subjective wellbeing as follows:

- Overall, how satisfied are you with your life nowadays?
- Overall, to what extent do you feel that the things you do in your life are worthwhile?
- On a scale where nought is 'not at all anxious' and 10 is 'completely anxious', overall, how anxious did you feel yesterday?

In 2010, multivariate analysis of the 2007–8 wave was undertaken by researchers from TNS BMRB, in a bid to determine the predictors of cultural engagement, which were found to be: age, education, health and ethnicity alongside professional status and prosperity.¹⁰¹ In the same year, the Culture and Sport Evidence (CASE) programme – a three-year programme led by DCMS, with the Taking Part partners plus the Museums, Libraries and Archives Council – analysed data in Taking Part and the British Household Panel Survey (mentioned in the next subsection). This study undertook to calculate the monetary value of short-term improvements in subjective wellbeing resulting from participation in culture and sport (with consideration of long-term value confined to sport). In 2013, Fujiwara attempted an analysis of cross-sectional Taking Part data from 2005–11, with a focus on self-rated health and subjective wellbeing (centred on the happiness question).¹⁰³ This found being an audience to the arts to have a monetary value of around £2,000 per person per year and the value of participating in the arts to be comparable to sport if health was controlled for (£1,500 per person per year).

Initially intended to be cross-sectional, Taking Part became longitudinal in 2013–4,¹⁰⁴ creating scope for assessments of the impact of arts engagement upon illness and subjective wellbeing over time.

¹⁰¹ Geoff Inglis and Joel Williams, *Models of sporting and cultural activity: Analysis of the Taking Part Survey*, August 2010.

¹⁰² CASE: The Culture and Sport Evidence Programme, *Understanding the value of engagement in culture and sport: Summary Report*, July 2010.

¹⁰³ Daniel Fujiwara, *Museums and happiness: the value of participating in museums and the arts*, commissioned by the Happy Museum, April 2013a.

¹⁰⁴ TNS BMRB, *Taking Part Survey 2012/13 Longitudinal Development Report*, 2012.

Understanding Society/United Kingdom Household Longitudinal Study (UKHLS)

In 1991, the British Household Panel Survey (BHPS) embarked upon a longitudinal study of British households (initially around 5,500 households and 10,300 individuals, growing to just over 8,000 households). At wave 18, BHPS participants were asked if they would consider joining a new, wider-ranging survey called Understanding Society, and almost 6,700 participants did so from wave 2 of 2010–11.¹⁰⁵

Since 2009, Understanding Society has annually captured important information about the social and economic circumstances and attitudes of people living in 40,000 UK households, approximately half of whom also take part in a detailed health questionnaire. DCMS points to wave 2 uniquely soliciting data about arts participation and museum/gallery attendance. Indeed, questions pertaining to leisure, culture and sport, adapted from Taking Part, were included, in a bid to ascertain whether, at any point during the preceding year, respondents participated in creative activity or attended cultural events and, if so, how often. Also at wave 2, a questionnaire was inserted for use by nurses conducting health checks. This sought to gather data on medical history and prescribed medicines; blood pressure and a blood sample were also taken and waist circumference and lung function measured.

While the DCMS overview only goes as far as wave 4, the same cultural questions were also included in the survey during wave 5, but the Understanding Society team advises that these questions will not be carried again in their current form. Taking account of the above, there is scope for cross-sectional analysis of wave 2 data, with any of the biometric variables taken as dependent and cultural attendance as independent, adjusting for a variety of socio-demographic confounders. In April 2014, DCMS published two cross-sectional analyses of wave 2 data – commissioned from a team centred on the London School of Economics – a report on the financial benefits of cultural and sporting engagement (including health) and an analysis of the impact of such engagement upon subjective wellbeing. The first of these found that ‘Those engaging with the arts as an audience member were 5.4% more likely to report good health’, which translates as a saving to the NHS.¹⁰⁶ The second analysis, which took life satisfaction as an indicator of subjective wellbeing, noted that, after adjusting for a range of potential confounders, ‘Arts engagement was found to be associated with higher wellbeing. This is valued at £1,084 per person per year, or £90 per person per month’.¹⁰⁷ Leadbetter and O’Connor suggest that ‘Further research could be carried out using longitudinal data from Understanding Society to explore the direction of causality’.¹⁰⁸ So, for example, wave 2 data could be compared with data from wave 5 to establish the health value of continued cultural participation (akin to Johansson et al, 2001). Additionally, there is much more scope for analysis of physical health data – including waist circumference – in relation to arts participation.

¹⁰⁵ <https://www.iser.essex.ac.uk/bhps>

¹⁰⁶ Fujiwara et al, 2014a, op cit., p. 9.

¹⁰⁷ Daniel Fujiwara, Laura Kudrna and Paul Dolan, *Quantifying and Valuing the Wellbeing Impacts of Culture and Sport* (London: Department of Culture, Media and Sport, 2014b), p. 9.

¹⁰⁸ Leadbetter and O’Connor, op cit., p. 17.

Scottish Household Survey

In a report commissioned by the Scottish Government, called *Healthy Attendance? The Impact of Cultural Engagement and Sports Participation on Health and Satisfaction with Life in Scotland*, Leadbetter and O'Connor note that:

*In Scotland, questions on participation in culture and sport have been included in the Scottish Household Survey since 2007. Questions on life satisfaction and self-assessed health were added in 2009. This means that, for the first time at a population level, data is available to statistically explore the relationship between taking part in cultural and sporting activities, attending cultural places and key quality of life measures in Scotland.*¹⁰⁹

This survey captures attendance at cultural events or places of culture, including cinemas, libraries and live music events, and participation in activities such as reading for pleasure, dancing and crafts. Drawing on previous research (including Cuypers, 2011), Leadbetter and O'Connor included the control variables of age, economic status, income, area deprivation, education qualification, disability/or long standing illness and smoking in their analysis; life satisfaction and self-assessed health were also used as independent variables, in a bid to account for any connection between health and overall satisfaction with life. They found that, 'after controlling for other factors including socio-economic factors, participation in culture and sport are independently and significantly associated with good health and high life satisfaction'.¹¹⁰ More specifically, 'Significant associations were found between health and attendance at cinema, art exhibitions, craft exhibitions, street art and theatre. There is also a relationship between attendance at individual cultural places and high life satisfaction, with significant associations found for attendance at museums, cinema, historical places and ballet/dance'.¹¹¹ While its cross-sectional design precludes any determination of causality, this validates associations observed elsewhere and paves the way for further research. At the same time, attention must be paid to inequalities of access to the arts and culture, alongside issues of access to health resources.

¹⁰⁹ Ibid, p. 5

¹¹⁰ Ibid, p. 14.

¹¹¹ Ibid, p. 15.

Recommendations for Future Research

This research has permitted identification of the key studies to have been conducted in relation to the longitudinal association between arts participation and health. While it is clearly untrue that ‘We lack longitudinal studies of the health benefits of participation in arts and culture’,¹¹² it might be argued that ‘More prospective studies on large populations are needed to answer questions on causality’.¹¹³ Hyppä categorically states that:

[...] cross-sectional surveys and studies cannot establish the direction of the causal link between social capital and population health. Prospective longitudinal studies with repeated measurements of both social capital [or arts engagement] and population health outcomes are urgently needed to solve the fundamental problem of the direction of causality. Such long-term surveys, however, are very costly and technically demanding, and what is the most important issue from an epidemiological perspective, they require huge data sources and opportunities (and rights) for researchers to link personal data from several different information sources.¹¹⁴

Even if all these conditions are met, establishing a causal link between arts engagement and health will be incredibly challenging.

As will be clear from the evidence base, the two greatest obstacles to attributing causality are reverse causation and residual confounders. In the first case, it is generally assumed (by all but Fujiwara et al) that people with poor health tend to take a diminished part in cultural activities, thereby skewing the results. Interestingly, researchers on the HUNT Study have given consideration to the biases that might arise through non-participation in surveys, and found socio-economic status and disease to be the two main reasons for non-response.¹¹⁵ In the second case, ‘there is the unavoidable problem of possible unknown or latent confounders’.¹¹⁶ We have seen the wide range of potential health-affecting factors that have been included in the studies in the evidence base – from age and gender to income and residential status. In the attempt to establish causality, this effort will need to be substantiated and broadened.

¹¹² Arts Council England, op cit., p. 4; Carnwath and Brown, op cit., p. 2.

¹¹³ Cuypers et al, 2011, op cit., p. 22.

¹¹⁴ Hyppä, 2010, op cit., p. 70.

¹¹⁵ Arnulf Langhammer, Steinar Krokstad, Pål Romundstad, Jon Heggland and Jostein Holmen, ‘The HUNT study: participation is associated with survival and depends on socioeconomic status, diseases and symptoms’, *BMC Medical Research Methodology*, 2012, 12, 143.

¹¹⁶ Hyppä, 2010, op cit., p. ix.

Most of the datasets underlying the international evidence base are available for re-examination. Beginning with the study conducted in Gothenburg in 1963 and 1973, used by Welin et al, data gathered around attendance at the cinema, theatre, concerts, museums and exhibitions could be revisited in relation to actual and perceived ill health. Analyses of data from the Mini-Finland Survey that paid attention to art form specificity would be pertinent to the present study, as would closer inspection of the biochemical measurements taken during the baseline survey. Data from the HUNT Study remain under-analysed due to the commitment of funds to conducting the periodic survey and maintaining the impressive biomedical facility required to store the samples gathered. Scope exists to replicate the studies of Bygren et al, with respect to cultural participation and all-cause mortality from wave 2 onwards. Data from Young-HUNT 1 could also be followed up with respect to continued cultural engagement and psychological health, medication and hospital admissions into adulthood.

The relevance of the various UK data sources has been discussed above. The longitudinal departure of the Taking Part survey opens up the potential to test Bygren et al's theory about cultural stimulation being a 'perishable commodity', while data gathered around cultural participation within Understanding Society could be analysed in relation to physical health metrics over time. The universal weakness of UK, as compared to Nordic, datasets is their inability to be cross-referenced to other databases regarding morbidity and mortality, but birth cohort studies might provide a way around this. So, BCS70 at ages 16 and 42 could be analysed with respect to cultural participation and mental wellbeing, while the biomedical data gathered as part of NCDS in 2003 could be analysed together with data on cultural participation from several years on either side. Equally, ELSA could be used to analyse participation against a range of physical and psychological health measures over time. In this endeavour, attention will need to be paid to the widest range of possible confounders.

Beyond the analysis of extant data, there is scope for intervention into the questions making up the surveys, and researchers at both the HUNT Study and DCMS (pertaining to Taking Part) indicated their willingness to consider this. Questions relating to cultural participation tend to be centred on frequency – how often a particular activity was undertaken – sometimes also encompassing barriers to participation. If we are to understand the association between arts engagement and health – and any mediating mechanisms – much more consideration needs to be given to the qualitative nature of participation.¹¹⁷ Focus groups and semi-structured interviews go some way towards addressing this, potentially elucidating the human value of culture in relation to stress, problem-solving, cognition and critical thinking. In this regard, the Quality Metrics Pilot, funded by ACE in Manchester, warrants close scrutiny.¹¹⁸

Perhaps the most exciting area of future development is that of molecular biology. Genetic data from the HUNT Study could be analysed to determine whether cultural engagement has an association with stress markers such as oxidised DNA. Beyond this, an ambitious new study could be designed that would take account of epigenetic phenomena (such as the methylation of DNA or blood RNA), their relationship to health conditions (such as schizophrenia) and extent to which this is mitigated by cultural participation through the generations.

¹¹⁷ See Theo Stickley (ed), *Qualitative Research in Arts and Mental Health* (Ross-on-Wye: PCCS Books, 2012).

¹¹⁸ http://www.artscouncil.org.uk/what-we-do/our-priorities-2011-15/quality-metrics/quality-metrics-pilot/?dm_i=QNP;2ICCR,GBX71V,951MM,1

Concluding Remarks

Several of the studies in the evidence base acknowledge the intrinsic value of the arts and culture. Beyond this, it suggested that engagement with the arts variously permits people to lose themselves in creative activity and gain perspective upon their individual condition as part of a societal whole. As a consciously chosen leisure activity, engagement in the arts is generally shown to have a positive impact upon the body's physiology, in turn improving health and quality of life.

The majority of studies in the evidence base emphasise the public health implications of their findings. Between 2002 and 2004, the Swedish National Institute of Public Health conducted a review of the national and international literature around cultural participation and health, in their broadest definitions.¹¹⁹ Acknowledging the distinct remit of the National Council for Cultural Affairs, the report pointed to the role of culture in fulfilling public health objectives. This followed the inclusion of cultural activities and health in the 2001 Swedish Governmental Commission for Public Health, and was followed by a governmental commission on culture, which included a section on the societal implementation of cultural activities and health.¹²⁰ As we have seen, various levels of government in the Nordic countries have chosen to heed this evidence and increase their support of the arts.

Contrary to more obviously instrumental attempts to harness the arts and culture to the economy, through their presumed second-order contribution to tourism and entrepreneurialism, health effects are inseparable from the act of engaging, becoming amplified when engagement is increased and sustained. Perhaps, then, it is only when governments attempt to account for individual and social benefits in economic terms and attempt to prescribe or proscribe certain forms of engagement that we can speak of instrumental approaches in relation to the arts and health.

¹¹⁹ Swedish National Institute of Public Health, op cit.

¹²⁰ Cuyppers et al, 2011, op cit.

Responsibility for public health in the UK rests with Public Health England and Wales, the Scottish Public Health Network, the Public Health Agency for Northern Ireland and the local authorities. Feedback received during the annual conference of the Faculty of Public Health suggests that there is willingness, in the public health milieu, to think laterally about the beneficial effect of accessing high-quality arts. This ethos is being enacted by, amongst others, Dudley Public Health.¹²¹

By contrast, at the local authority level, there is a tendency to instrumentalise the potential public health benefits of arts engagement. So, for example, a report produced by the Chief Culture and Leisure Officers Association on behalf of the National Leisure and Culture Forum in March 2014, suggests that 'Local authorities will also need to work more closely with the health sector to monitor clinical outcomes to establish the interventions and programmes that are the most successful in terms of improving and maintaining health'.¹²² As will hopefully be clear, this tendency towards clinical outcomes and interventions contradicts the evidence demonstrating better individual and societal health through engagement with the arts far beyond the clinical environment.

From a cultural perspective, population-level research of the kind represented in the evidence base potentially exempts arts organisations from continually having to justify their value to the public purse. Added to this, the fact that the quality of arts projects is taken to be paramount in manifesting health effects may ultimately serve to focus attention away from quantitative measurements of cultural value.

As a consciously chosen leisure activity, engagement in the arts is generally shown to have a positive impact upon the body's physiology, in turn improving health and quality of life.

¹²¹ Director of Public Health, *Arts & Health: Dudley Annual Report*, 2013.

¹²² Iain Varah and Mark Taylor, Chief Culture and Leisure Officers Association, *The role of culture and leisure in improving health and wellbeing*, 2014, p. 3.

Bibliography

Agahi, Neda and Marti G. Parker, 'Leisure Activities and Mortality: Does Gender Matter?', *Journal of Aging and Health*, 20, 2008, pp. 855–71.

Alluri, Vinoo, Petri Toiviainen, Iiro P. Jääskeläinen, Enrico Glerean, Mikko Sams and Elvira Brattico, 'Large-scale brain networks emerge from dynamic processing of musical timbre, key and rhythm', *NeuroImage*, 59, 2012, pp. 3677–89.

Arts Council England, *The Value of Arts and Culture to People and Society: An Evidence Review* (London: Arts Council England, 2014).

Asakawa, K., 'Flow experience and autotelic personality in Japanese college students: how do they experience challenges in everyday life?' *Journal of Happiness Studies*, 5, 2004, pp. 123–54.

Asakawa, K., 'Flow experience, culture, and well-being: how do autotelic Japanese college students feel, behave, and think in their daily lives?' *Journal of Happiness Studies*, 11, 2010, pp. 205–23.

Baum, Frances E., Robert A. Bush, Carolyn C. Modra, Charlie J. Murray, Eva M. Cox, Kathy M. Alexander and Robert C. Potter, 'Epidemiology of participation: an Australian community study', *Journal of Epidemiology and Community Health*, 54, 2000, pp. 414–23.

Baum, Frances E. and A.M. Ziersch, 'Social capital', *Journal of Epidemiology and Community Health*, 57, 2003, pp. 320–3.

Berkman, Lisa F. and S. Leonard Syme, 'Social Networks, Host Resistance and Mortality: A Nine-Year Follow-Up of Alameda County Residents', *American Journal of Epidemiology*, Vol. 109, No. 2, 1979, pp. 186–204.

Berkman, Lisa F. 'The Role of Social Relations in Health Promotion', *Psychosomatic Medicine*, 57, 1995, pp. 245–54.

Berkowitz, Aaron L. and Daniel Ansari, 'Generation of novel motor sequences: The neural correlates of musical improvisation', *NeuroImage*, 41, 2008, pp. 535–43.

Berry, Diane S. and James W. Pennebaker, 'Nonverbal and Verbal Emotional Expression and Health', *Psychotherapy and Psychosomatics*, 59, 1993, pp. 11–9.

Bourdieu, Pierre, 'Cultural Reproduction and Social Reproduction' in *Knowledge, Education, and Social Change: Papers in the Sociology of Education* (London: Tavistock, 1973), pp. 71–112.

Bygren, Lars Olov, Boinkum Benson Konlaan and Sven-Erik Johansson, 'Attendance at Cultural Events, Reading Books or Periodicals, and Making Music or Singing in a Choir as Determinants for Survival: Swedish Interview Survey of Living Conditions', *British Medical Journal*, 313, 21–28 December 1996, pp. 1577–80.

Bygren, Lars Olov, Sven-Erik Johansson, Boinkum Benson Konlaan, Andrej M Grijbovski, Anna V Wilkinson and Michael Sjöström, 'Attending Cultural Events and Cancer Mortality: A Swedish Cohort Study', *Arts & Health*, 1, no. 1, March 2009, pp. 64–73.

Bygren, Lars Olov, Gösta Weissglas, Britt-Mai Wikström, Boinkum Benson Konlaan, Grijbovski, Andrej Grijbovski, Ann-Birth Karlsson, Sven-Olov Andersson and Michael Sjöström, 'Cultural Participation and Health: A Randomized Controlled Trial Among Medical Care Staff', *Psychosomatic Medicine*, 71, 2009, pp. 469–73.

Bygren, Lars Olov, 'Intergenerational Health Responses to Adverse and Enriched Environments', *Annual Review of Public Health*, 34, 2013, pp. 49–60.

Carnwath, John D. and Alan S. Brown, *Understanding the Value and Impacts of Cultural Experience: A Literature Review* (London: Arts Council England, 2014).

CASE: The Culture and Sport Evidence Programme, *Understanding the drivers, impact and value of engagement in culture and sport: An over-arching summary of the research*, July 2010.

CASE: The Culture and Sport Evidence Programme, *Understanding the value of engagement in culture and sport: Summary Report*, July 2010.

Cassel, John, 'The Contribution of the Social Environment to Host Resistance', *American Journal of Epidemiology*, Vol. 104, No. 2, 1976, pp. 107–23.

Cortese, Rene, Andrew Kwan, Emilie Lalonde, Olga Bryzgunova, et al, 'Epigenetic markers of prostate cancer in plasma circulating DNA', *Human Molecular Genetics*, Vol. 21, No. 16, 2012, pp. 3619–31.

Cuypers, Koenraad Frans, Margunn Skjei Knudtsen, Maria Sandgrenc, Steinar Krokstad, Britt Maj Wikström and Töres Theorell, 'Cultural activities and public health: research in Norway and Sweden: An overview', *Arts & Health*, Vol. 3, No. 1, March 2011, pp. 6–26.

Cuypers, Koenraad, Karin De Ridder, Kirsti Kvaløy, Marguun Skjei Knudtsen, Steinar Krokstad, Jostein Holmen and Turid Lingaas Holmen, 'Leisure Time Activities in Adolescence in the Presence of Susceptibility Genes for Obesity: Risk or Resilience against Overweight in Adulthood?' The HUNT Study', *BMC Public Health* 12, no. 820, 2012.

Cuypers, Koenraad, Steinar Krokstad, Turid Lingaas Holmen, Margunn Skjei Knudtsen, Lars Olov Bygren and Jostein Holmen, 'Patterns of receptive and creative cultural activities and their association with perceived health, anxiety, depression and satisfaction with life among adults: the HUNT study, Norway', *Journal of Epidemiology and Community Health*, 66, 2012, pp. 698–703.

De Manzano, Örjan, Simon Cervenka, Anke Karabanov, Lars Farde and Fredrik Ullén, 'Thinking Outside a Less Intact Box: Thalamic Dopamine D2 Receptor Densities Are Negatively Related to Psychometric Creativity in Healthy Individuals', *PLOS one*, May 2010, Vol. 5, No. 5, e10670.

De Manzano, Örjan, Simon Cervenka, Aurelija Jucaite, Oscar Hellenäs, Lars Farde and Fredrik Ullén, 'Individual differences in the proneness to have flow experiences are linked to dopamine D2-receptor availability in the dorsal striatum', *NeuroImage*, 67, 2013, pp. 1–6.

Director of Public Health, *Arts & Health: Dudley Annual Report*, 2013.

Eschleman, Kevin J., Jamie Madsen, Gene Alarcon and Alex Barelka, 'Benefiting from creative activity: The positive relationships between creative activity, recovery experiences, and performance-related outcomes', *Journal of Occupational and Organizational Psychology*, September 2014, Vol. 87, Issue 3, pp. 579–98.

Fife, Alison, Pamela J. Beasley and Debra L. Fertig, 'Psychoneuroimmunology and cancer: Historical perspectives and current research', *Advances in Neuroimmunology*, Vol. 6, 1996, pp. 179–90.

Flanagan, James M., Marta Munoz-Alegre, Stephen Henderson, Thomas Tang, et al, 'Gene-body hypermethylation of ATM in peripheral blood DNA of bilateral breast cancer patients', *Human Molecular Genetics*, Vol. 18, No. 7, 2009, pp. 1332–42.

Fujiwara, Daniel, *Museums and happiness: the value of participating in museums and the arts*, commissioned by the Happy Museum, April 2013.

Fujiwara, Daniel, Laura Kudrna and Paul Dolan, *Quantifying the Social Impacts of Culture and Sport* (London: Department of Culture, Media and Sport, 2014).

Hibberd, Carina, Joyce L.W. Yau and Jonathan R. Seckl, 'Glucocorticoids and the ageing hippocampus', *Journal of Anatomy*, 197, 2000, pp. 553–62.

House, James S., Cynthia Robbins and Helen L. Metzner, 'The Association of Social Relationships and Activities with Mortality: Prospective Evidence from the Tecumseh Community Health Study', *American Journal of Epidemiology*, Vol. 116, No. 1, 1982, pp. 123–40.

Hyyppä, Markku T. and Juhani Mäki, 'Why do Swedish-speaking Finns have longer active life? An area for social capital research', *Health Promotion International*, Vol. 16, No. 1, 2001, pp. 55–64.

Hyyppä, Markku T. and Juhani Mäki, 'Individual-Level Relationships between Social Capital and Self-Rated Health in a Bilingual Community', *Preventive Medicine*, 32, 2001, pp. 148–55.

Hyyppä, Markku T. and Juhani Mäki, 'Social participation and health in a community rich in stock of social capital', *Health Education Research*, Vol. 18, No. 6, 2003, pp. 770–9.

Hyyppä, Markku T., Juhani Mäki, Olli Impivaara and Arpo Aromaa, 'Leisure-Based Participation Predicts Survival: A Population-Based Study in Finland', *Health Promotion International*, 21, no. 1, 2006, pp. 5–12.

Hyypä, Markku T., Juhani Mäki, Olli Impivaara and Arpo Aromaa, 'Individual-Level Measures of Social Capital as Predictors of All-Cause and Cardiovascular Mortality: A Population-Based Prospective Study of Men and Women in Finland', *European Journal of Epidemiology*, 22, 2007, pp. 589–97.

Hyypä, Markku T., *Healthy Ties, Social Capital, Population Health and Survival* (Dordrecht: Springer, 2010).

Inglis, Geoff and Joel Williams, *Models of sporting and cultural activity: Analysis of the Taking Part Survey*, August 2010.

Irie, Masahiro, Shinya Asami, Shoji Nagata, Masato Ikeda, Masakazu Miyata and Hiroshi Kasai, 'Psychosocial Factors as a Potential Trigger of Oxidative DNA Damage in Human Leukocytes', *Japanese Journal of Cancer Research*, 92, March 2001, pp. 367–76.

Irie, Masahiro, Shinya Asami, Shoji Nagata, Masato Ikeda, Masakazu Miyata and Hiroshi Kasai, 'Psychosocial Mediation of a Type of Oxidative DNA Damage, 8-Hydroxydeoxyguanosine, in Peripheral Blood Leucocytes of Non-Smoking and Non-Drinking Workers', *Psychotherapy and Psychosomatics*, 71, 2002, pp. 90–6.

Ishimura, I. and M.Kodama, 'Dimensions of flow experience in Japanese college students: relation between flow experience and mental health', *Journal of Health Psychology*, 13, 2006, pp. 23–34.

Iwasaki, Yoshitaka, Roger C. Mannell, Bryan J.A. Smale and Janice Butcher, 'Contributions of Leisure Participation in Predicting Stress Coping and Health among Police and Emergency Response Services Workers', *Journal of Health Psychology*, Vol. 10, No. 1, 2005, pp. 79–99.

Johansson, Sven-Erik, Boinkum Benson Konlaan and Lars Olov Bygren, 'Sustaining habits of attending cultural events and maintenance of health', *Health Promotion International*, 16, no. 3, 2001, pp. 229–34.

Kaplan, George A., Jukka T. Salonen, Richard D. Cohen, Richard J. Brand, S. Leonard Syme and Pekka Puska, 'Social Connections and Mortality from all Causes and from Cardiovascular Disease: Prospective Evidence from Eastern Finland', *American Journal of Epidemiology*, Vol. 128, No. 2, 1988, pp. 370–80.

Kato, Chieko, Arturas Petronis, Yuji Okazaki, Mamoru Tochigi et al, 'Molecular genetic studies of schizophrenia: challenges and insights', *Neuroscience Research*, 43, 2002, pp. 295–304.

Kiecolt-Glaser, J.K. and R. Glaser, 'Psychoneuroimmunology and Cancer: Fact or Fiction?', *European Journal of Cancer*, Vol. 35, No. 11, 1999, pp. 1603–7.

Knezovich, J.G. and M Ramsay, 'The effect of preconception paternal alcohol exposure on epigenetic remodeling of the H19 and Rasgrf1 imprinting control regions in mouse off-spring', *Frontiers in Genetics*, 2012, 3, pp. 10–15.

Konlaan, Boinkum Benson, Lars Olov Bygren and Sven-Erik Johansson, 'Visiting the Cinema, Concerts, Museums or Art Exhibitions as Determinant of Survival: A Swedish Fourteen-Year Cohort Follow-Up', *Scandinavian Journal of Public Health*, 28, 2000, pp. 174–8.

Konlaan, Boinkum Benson, N Björby, Lars Olov Bygren, Gösta Weissglas, Lena Karlsson, Maria Widmark, 'Attendance at cultural events and physical exercise and health: a randomized controlled study', *Public Health*, Vol. 114, No. 5, Sept 2000, pp. 316–9.

Koskinen, Jussi Vahtera, Anne Kouvonen and Mika Kivimäki, 'Engagement in Cultural Activities and Cause-Specific Mortality: Prospective Cohort Study', *Preventive Medicine*, 49, 2009, pp. 142–7.

Kouvonen, Anne, Judy Anne Swift, Mia Stafford, Tom Cox, Jussi Vahtera, Ari Väänänen, Heponiemi, Tarja, Roberto De Vogli, Amanda Griffiths and Mika Kivimäki, 'Social Participation and Maintaining Recommended Waist Circumference: Prospective Evidence From the English Longitudinal Study of Aging', *Journal of Aging and Health*, 24, no. 2, 2012, pp. 250–68.

Krokstad, Steinar, Arnulf Langhammer, K. Hveem, TL. Holmen, K. Midthjell, TR. Stene, G. Bratberg, Jon Heggland and Jostein Holmen 'Cohort Profile: The HUNT Study, Norway', *International Journal of Epidemiology*, 42, 2013, pp. 968–77.

Kuzumaki, Naoko, Daigo Ikegami, Rie Tamura, Nana Hareyama, et al, 'Hippocampal Epigenetic Modification at the Brain-Derived Neurotrophic Factor Gene Induced by an Enriched Environment', *Hippocampus*, 21, 2011, pp. 127–32.

Lajunen, Hanna-Reetta, Anna Keski-Rahkonen, Lea Pulkkinen, Richard J Rose, Aila Rissanen and Jaakko Kaprio, 'Leisure Activity Patterns and Their Associations with Overweight: A Prospective Study among Adolescents', *Journal of Adolescence*, 32, no. 5, October 2009, pp. 1089–1103.

Langhammer, Arnulf, Steinar Krokstad, Pål Romundstad, Jon Heggland and Jostein Holmen, 'The HUNT study: participation is associated with survival and depends on socioeconomic status, diseases and symptoms', *BMC Medical Research Methodology*, 2012, 12, 143.

Leadbetter, Clare and Niamh O'Connor, *Healthy Attendance? The Impact of Cultural Engagement and Sports Participation on Health and Satisfaction with Life in Scotland* (Edinburgh: Scottish Government, 2013).

Lennartsson, Carin and Merrill Silverstein, 'Does Engagement With Life Enhance Survival of Elderly People in Sweden? The Role of Social and Leisure Activities', *Journal of Gerontology*, 56B, no. 6, 2001, pp. S335–42.

Liikanen, Hanna-Liisa, *Art and Culture for Well-being* (Helsinki: Publications of the Ministry of Education and Culture, Finland 2010).

Lin, Nan, 'Inequality in Social Capital', *Contemporary Sociology*, Vol. 29, No. 6, Nov 2000, pp. 785–95.

McCraty, Rollin, Mike Atkinson, Glen Rein and Alan D. Watkins, 'Music Enhances the Effect of Positive Emotional States on Salivary IgA', *Stress Medicine*, Vol. 12, 1996, pp. 167–75.

Mill, Jonathan and Arturas Petronis, 'Molecular studies of major depressive disorder: the epigenetic perspective', *Molecular Psychiatry*, 12, 2007, 799–814.

- Mill, Jonathan and Arturas Petronis, 'Pre- and peri-natal environmental risks for attention-deficit hyperactivity disorder (ADHD): the potential role of epigenetic processes in mediating susceptibility', *Journal of Child Psychology and Psychiatry*, Vol. 49, No. 10, 2008, pp. 1020–30.
- Mill, Jonathan, Thomas Tang, Zachary Kaminsky, Tarang Khare, et al, 'Epigenomic Profiling Reveals DNA-Methylation Changes Associated with Major Psychosis', *The American Journal of Human Genetics*, 82, March 2008, pp. 696–711.
- Mychasiuka, Richelle, Saif Zahira, Nichole Schmoldb, Slava Ilnytskyyc, et al, 'Parental enrichment and offspring development: Modifications to brain, behavior and the epigenome', *Behavioural Brain Research*, 228, 2012, pp. 294–8.
- Nieminen, Tarja, Ritva Prättälä, Tuija Martelin, Tommi Härkänen, Markku T Hyypä, Erkki Alanen and Seppo Koskinen, 'Social capital, health behaviours and health: a population-based associational study', *BMC Public Health*, 13, 613, 2013.
- Núñez, María J., Paula Mañá, David Liñares, María P. Riveiro, José Balboa, Juan Suárez-Quintanilla, Mónica Maracchi, Manuel Rey Méndez, José M. López and Manuel Freire-Garabal, 'Music, immunity and cancer', *Life Sciences*, 71, 2002, pp. 1047–57.
- Olsson, Tommy, Abdul K. Mohammed, Lucy F. Donaldson and Jonathan R. Seckl, 'Transcription factor AP-2 gene expression in adult rat hippocampal regions: effects of environmental manipulations', *Neuroscience Letters*, 189, 1995, pp. 113–6.
- Orth-Gomér, Kristina and Jeffrey V. Johnson, 'Social Network Interaction and Mortality: A Six-Year Follow-Up Study of a Random Sample of the Swedish Population', *Journal of Chronic Disease*, Vol. 40, No. 10, 1987, pp. 949–57.
- Pembrey, M.E., Lars-Olov Bygren, G. Kaati, S. Edvinsson, K. Northstone, et al, 'Sex-specific, male-line transgenerational responses in humans', *European Journal of Human Genetics*, 14, 2006, pp. 159–66
- Petrie, Keith J., Iris Fontanilla, Mark G. Thomas, Roger J. Booth and James W. Pennebaker, 'Effect of Written Emotional Expression on Immune Function in Patients With Human Immunodeficiency Virus Infection: A Randomized Trial', *Psychosomatic Medicine*, 66, 2004, pp. 272–5.
- Petronis, Arturas, 'Epigenetics and Bipolar Disorder: New Opportunities and Challenges', *American Journal of Medical Genetics*, 123C, 2003, pp. 65–75.
- Petronis, Arturas, 'The Origin of Schizophrenia: Genetic Thesis, Epigenetic Antithesis, and Resolving Synthesis', *Biological Psychiatry*, 55, 2004, pp. 965–70.
- Putnam, Robert, *Bowling Alone: The Collapse and Revival of American Community* (London: Simon & Schuster, 2001).
- Power, Chris, Diana Kuh and Susan Morton, 'From Developmental Origins of Adult Disease to Life Course Research on Adult Disease and Aging: Insights from Birth Cohort Studies', *Annual Review of Public Health*, 34, 2013, pp. 7–28.

- Rasmuson, Sigbritt, Tommy Olsson, Bengt G. Henriksson, Paul A.T. Kelly, Megan C. Holmes, Jonathan R. Seckl and Abdul H. Mohammed, 'Environmental enrichment selectively increases 5-HT1A receptor mRNA expression and binding in the rat hippocampus', *Molecular Brain Research*, 53, 1998, pp. 285–90.
- Särkämö, Teppo, Mari Tervaniemi, Sari Laitinen, Ava Numminen, Merja Kurki, Julene K. Johnson and Pekka Rantanen, 'Cognitive, Emotional, and Social Benefits of Regular Musical Activities in Early Dementia: Randomized Controlled Study', *The Gerontologist*, 2014, pp. 634–50.
- Schoenbach, Victor J., Lisa Fredman and David G. Kleinbaum, 'Social Ties and Mortality in Evans County, Georgia', *American Journal of Epidemiology*, Vol. 123, No. 4, 1986, pp. 577–91.
- Seeman, Teresa E., 'Social Ties and Health: The Benefits of Social Integration', *Annals of Epidemiology*, Vol. 6, No. 5, September 1996, pp. 442–51.
- Skrabski, Á., M. Kopp and I. Kawachi, 'Social capital in a changing society: cross sectional associations with middle aged female and male mortality rates', *Journal of Epidemiology and Community Health*, 57, 2003, pp. 114–9.
- Stickley, Theo (ed), *Qualitative Research in Arts and Mental Health* (Ross-on-Wye: PCCS Books, 2012).
- Sundquist, Kristina, Martin Lindström, Marianne Malmström, Sven-Erik Johansson and Jan Sundquist, 'Social Participation and Coronary Heart Disease: A Follow-up Study of 6900 Women and Men in Sweden', *Social Science & Medicine*, 58, 2004, pp. 615–22.
- Szreter, Simon and Michael Woolcock, 'Health by association? Social capital, social theory, and the political economy of public health', *International Journal of Epidemiology*, 33, 2004, pp. 650–67.
- Swedish National Institute of Public Health, *Kultur för hälsa* [Culture for Health], (Stockholm: Swedish National Institute of Public Health, 2005).
- Theorell, Töres, Walter Osika, Constanze Leineweber, Linda L. Magnusson Hanson, Eva Bojner Horwitz and Hugo Westerlund, 'Is cultural activity at work related to mental health in employees?', *International Archives of Occupational and Environmental Health*, 86, 2013, pp. 281–8.
- TNS BMRB, Taking Part Survey 2012/13 Longitudinal Development Report, 2012.
- Väänänen, Ari, Michael Murray, Aki Koskinen, Jussi Vahtera, Anne Kouvonen and Mika Kivimäki, 'Engagement in Cultural Activities and Cause-Specific Mortality: Prospective Cohort Study', *Preventive Medicine*, 49, 2009, pp. 142–7.
- Varah, Iain and Mark Taylor, Chief Culture and Leisure Officers Association, *The role of culture and leisure in improving health and wellbeing*, 2014.
- Wang, Hui-Xin, Anita Karp, Bengt Winblad and Laura Fratiglioni, 'Late-Life Engagement in Social and Leisure Activities Is Associated with a Decreased Risk of Dementia: A Longitudinal Study from the Kungsholmen Project', *American Journal of Epidemiology*, 155, no. 12, 2002, pp. 1081–7.
- Watkins, A.D., 'Perceptions, emotions and immunity: an integrated homeostatic network', *Quarterly Journal of Medicine*, 88, 1995, pp. 283–94.

Welin, Lennart, Kurt Svärdsudd, S. Ander-Peciva, Gösta Tibblin, Bodil Tibblin, Bo Larsson and L. Wilhemsen, 'Prospective Study of Social Influences on Mortality: The Study of Men Born in 1913 and 1923', *The Lancet*, Vol. 325, No. 8434, 20 April 1985, pp. 915–8.

Welin, Lennart, Bo Larsson, Kurt Svardsudd, Bodil Tibblin and Gösta Tibblin, 'Social Network and Activities in Relation to Mortality from Cardiovascular Diseases, Cancer and Other Causes: A 12 Year Follow up of the Study of Men Born in 1913 and 1923', *Journal of Epidemiology and Community Health*, 46, 1992, pp. 127–32.

Wikström, Britt-Mai, Töres Theorell, S. Sandström, 'Medical Health and Emotional Effects of Art Stimulation in Old Age: A Controlled Intervention Study concerning the Effects of Visual Stimulation Provided in the Form of Pictures', *Psychotherapy and Psychosomatics*, Vol. 60, Nos. 3-4, 1993, pp. 195–206.

Wilkinson, Anna V., Andrew J. Waters, Lars Olov Bygren and Alvin R. Tarlov, 'Are Variations in Rates of Attending Cultural Activities Associated with Population Health in the United States?', *BMC Public Health*, 31 August 2007.

Windsor, Joy, *Your health and the arts: a study of the association between arts engagement and health* (London: Arts Council England, 2005).

Zimmermann, Aurelia, Markus Stauffacher, Wolfgang Langhans and Hanno Würbel, 'Enrichment-dependent differences in novelty exploration in rats can be explained by habituation', *Behavioural Brain Research*, 121, 2001, pp. 11–20.

Illustrative Table

| Authors, Year, Country | Dataset, Population Sample Size, Age | Outcome Measure | Confounders | Cultural Activities | Results |
|---|--|--|---|--|--|
| Welin et al, 1992, Sweden | Men born in Gothenburg in 1913 (selected in 1963 and 1973), n = 769 60-year-olds; 220 50-year-olds | Mortality from cardio-vascular diseases, cancer and other causes to 1985 | Smoking, alcohol consumption, previous stroke or heart attack, marital status, household size, income | Reading, cinema, theatre, concerts, museums/galleries | Middle-aged men with a good 'social network' may be partly protected against non-cancer mortality |
| Bygren, Konlaan and Johansson, 1996, Sweden | Swedish Survey of Living Conditions 1982–3, n = 15,198 (12,675) participants aged 16–74 years | Survival to 31 December 1991 | Age, gender, education level, income, long-term disease, social network, smoking, physical exercise | Cinema, theatre, concerts, live music, art/other exhibitions, museums, reading, music-making, singing in a choir | Attending cultural events at least once a week has a positive effect upon survival |
| Konlaan, Bygren and Johansson, 2000, Sweden | Swedish Survey of Living Conditions 1982–3, n = 10,609 aged 25–74 | Survival to 31 December 1996 | Age, gender, cash buffer, educational level, long-term disease, smoking, physical exercise | Cinema, theatre, concerts, live music, art exhibitions, museums, music-making, reading | 'Attendance at cultural events may have a beneficial effect on longevity' (p. 174) |
| Johansson, Konlaan and Bygren, 2001, Sweden | Swedish Survey of Living Conditions 1982–3 and 1990–1, n = 3,793 aged 25–74 | Self-reported health | Baseline health status, type of residence, geographical region of domicile, socio-economic status (level of education) | Baseline health status, type of residence, geographical region of domicile, socio-economic status (level of education) | 'Those who became culturally less active between the first and second occasion, or those who were culturally inactive on both occasions, ran a 65% excess risk of impaired perceived health compared with those who were culturally active on both occasions' (p. 229) |
| Bygren et al, 2009, Sweden | Swedish Survey of Living Conditions 1990–1, n = 9,011 aged 25–74 | Cancer incidence in Swedish public death register to 31 December 2003 | Age, gender, chronic conditions, disposable income, educational attainment, smoking status, leisure time physical activity, urban/non-urban residency | Cinema, theatre, live music, art gallery, museum | Rare and moderate cultural attendees were 3.23 and 2.92 (respectively) times more likely to die of cancer than regular attendees in urban areas |
| Lennartsson and Silverstein, 2001, Sweden | Swedish Panel Study of Living Conditions of the Oldest Old 1992 n = 537 (463 non-institutionalised) aged 75+ | Survival to 1996 | Age, gender, educational level, functional impairment, presence of heart or circulatory problems, tobacco use | Cinema, cultural events, reading books or newspapers, hobbies | Solitary–active participation (e.g. gardening, hobbies) reduce mortality risk, particularly in men |

| Authors, Year, Country | Dataset, Population Sample Size, Age | Outcome Measure | Confounders | Cultural Activities | Results |
|--|--|--|--|---|---|
| Wang et al, 2002, Sweden | Kungsholmen Project 1987–9, n = 1,810 aged 75+ | Onset of dementia between first follow-up (1991–3), and second follow-up (1994–6) | Age, gender, education, cognitive functioning, comorbidity, depressive symptoms, physical functioning at baseline | Theatre, concerts, art exhibitions (social), painting, drawing (mental), sewing, knitting, crocheting, weaving (productive) | 'Engagement in mental, social, or productive activities was inversely related to dementia incidence' (p. 1081) |
| Sundquist et al, 2004, Sweden | Swedish Annual Level-of-Living Survey 1990–1, n = 6,861, 35–74 years | Coronary heart disease morbidity or mortality to 31 December 2000 | Socio-economic and educational status, housing tenure, smoking, age, gender, marital status, geographical region | Cinema, theatre, concerts, art exhibitions and museums, choir | An association found between low social participation and increased incidence of coronary heart disease morbidity and mortality. Attendance at the cinema, theatre, concerts, art exhibitions and museums had (by far, in most cases) the most significance within the social participation index |
| Hyppä, Mäki, Impivaara and Aromaa, 2006, Finland | Mini-Finland Health Survey 1978–80, n = 5,087, 30–59 years | Survival during 20 years of follow-up (first three years excluded) | Residential stability, socio-economic status, marital status and relations, trusting relationships, alcohol consumption, smoking; mental health, self-reported chronic diseases or disabilities, self-rated overall health | Theatre, cinema, concerts, art exhibitions, reading, listening to music, drama, singing, photography, painting and handicraft | 'Leisure participation predicts survival in middle-aged Finnish men and its effect is independent of demographic features, of health status and of several other health-related factors' (p. 5) |
| Hyppä, Mäki, Impivaara and Aromaa, 2007, Finland | Mini-Finland Health Survey 1978–80, n = 7,217, 30–99 years | Survival during 24 years of follow-up (first five excluded) with attention to all-cause and cardiovascular mortality (including strokes) up to November 2004 | Residential stability, socio-economic status, marital status and relations, trusting relationships, alcohol consumption, smoking; mental health, self-reported chronic diseases or disabilities, self-rated overall health | Theatre, cinema, concerts, art exhibitions, reading, listening to music, drama, singing, photography, painting and handicraft | Leisure participation is associated with reduced all-cause mortality in women and men (related to economic status in the latter case) |

| Authors, Year, Country | Dataset, Population Sample Size, Age | Outcome Measure | Confounders | Cultural Activities | Results |
|-------------------------------|---|--|--|---|---|
| Agahi and Parker, 2008 | Swedish Annual Level-of-Living Survey 1990–1 and Swedish Panel Study of Living Conditions of the Oldest Old 1992, n = 1,246 men and women aged 65 to 95 | Survival to 31 December 2003 | A range of symptoms and diseases, functional status, age, gender, educational level (as a measure of socio-economic position), smoking, alcohol, body mass index | Reading books, hobby activities (e.g. knitting, sewing, carpentry or painting), cultural activities (going to the cinema, theatre, concerts, museums or exhibitions), dancing, playing musical instruments, and choir singing | Women demonstrated a dose-response relationship between overall participation and survival; men did not. 'Gender-specific analyses revealed that participation in cultural activities was the only activity that was significantly related to survival in both men and women' (p. 865) |
| Lajunen et al, 2009, Finland | FinnTwin12 study all twins born in Finland 1983–7 n = 5,184 twins aged 11–12 years | Becoming overweight during follow-up at 14 and 17 years | Pubertal timing, socio-economic status of family | Television and video viewing, computer games, listening to music, playing musical instruments, reading, arts (drawing or painting, handicrafts, woodwork, building scale models) | Engagement in the arts in boys was detrimental to the maintenance of recommended weights. Among girls, few individual leisure activities predicted becoming overweight. However, the 'passive and solitary' cluster carried the greatest risk of becoming overweight in late adolescence |
| Väänänen et al, 2009, Finland | Still Working survey (conducted by Finnish Institute of Occupational Health) 1986, n = 7,922, working age | Survival 1986–2004 | Socio-demographic factors, socio-economic status, work stress, social characteristics, diabetes, hypertension | | High cultural engagement independently associated with decreased all-cause mortality and external causes of death (with solitary activities related to the former and socially shared cultural activities to the latter) |
| Kouvonen et al, 2012, UK | English Longitudinal Study of Ageing waves 2 and 4, n = 4,280 age 50+ | Waist circumference at follow-up | Gender, age, ethnicity, marital status, total wealth, longstanding limiting illness, depressive symptoms, smoking status and physical activity | Arts or music group | No association was found between social participation and waistline measurement in women. Men with an initial waist measurement in the recommended range who participated in education, arts or music groups or evening classes and in charitable associations were more likely to maintain their waist circumference |
| Cuypers et al, 2012, Norway | HUNT Study 1995–7, n = 8,408 13–19 years, followed up 2006–8, n = 1,450 24–30 years | Obesity (body mass index, waist circumference, waist-hip ratio and natural development of the body over the life course) | Physical activity, socio-economic status, pubertal timing and genetic proclivity to obesity | Reading a book, listening to or playing music, doing homework, watching television | Participation in cultural activities guarded girls against being overweight. This was amplified when considering those who were at the recommended weight at baseline and when television was excluded as an activity |



MANCHESTER
SCHOOL OF ART

www.art.mmu.ac.uk



www.miriad.mmu.ac.uk



www.artsforhealth.org



www.ahrc.ac.uk

<http://longitudinalhealthbenefits.wordpress.com>

© Rebecca Gordon-Nesbitt and Arts for Health, 2015