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CULTURE AND HERITAGE CAPITAL: MONETISING THE IMPACT OF CULTURE AND HERITAGE ON HEALTH AND WELLBEING

Department for Culture, Media & Sport

A report prepared for the Department for Culture, Media and Sport

12 NOVEMBER 2024

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Acknowledgements

This work was commissioned by the Department for Culture, Media and Sport (DCMS). We worked closely with Harman Sagger, Matthew Bezzano and Krishea Aswani, who helped shape the project and provided important feedback.

Frontier Economics collaborated with the Social Biobehavioural Research Group for this project, particularly Dr Alexandra Burton and Professor Daisy Fancourt. We are grateful for their expertise and input throughout.

Outputs from our work were presented at interim workshops involving a wide range of stakeholders, including individuals from the DCMS; the Department for Levelling Up, Housing and Communities; the Department for Health and Social Care; Historic England; College of the Arts (University of Florida); and the Canadian Government (Department of Canadian Heritage and Statistics Canada). The feedback provided in these workshops was an invaluable input to our work.

Forward by Lord Gus O'Donnell

The significance of culture and heritage in shaping our national identity and enhancing our quality of life is well recognised. From visiting museums and galleries to participating in choirs and watching theatre performances, these activities enrich our lives in countless ways.

This report by Frontier Economics, commissioned by the Department for Culture, Media and Sport (DCMS), represents an important step in demonstrating the profound impact of culture and heritage on health and wellbeing. For instance, the study highlights how cultural engagement can benefit adults' general health, how arts activities can improve children's self-esteem, and how singing in choirs can improve the health of older adults.

It has never been more important to accurately measure the impact of public investment in society. This report, which is part of DCMS's Culture and Heritage Capital Programme, provides a pioneering approach to 'monetising' the economic, social and cultural benefits of culture and heritage. While some outcomes can be difficult to measure and monetise, this research demonstrates the importance and possibility of doing so accurately.

Understanding the monetary value of the health and wellbeing impacts of culture and heritage enhances government's ability to make informed decisions about resource allocation across all parts of the public realm. The findings from this study can also help government to develop policies that integrate public health, education and the development of local communities.

The new government has the opportunity to leverage these insights to shape policies that will preserve and develop our rich cultural heritage and also act as a catalyst for improved national wellbeing and new economic growth.

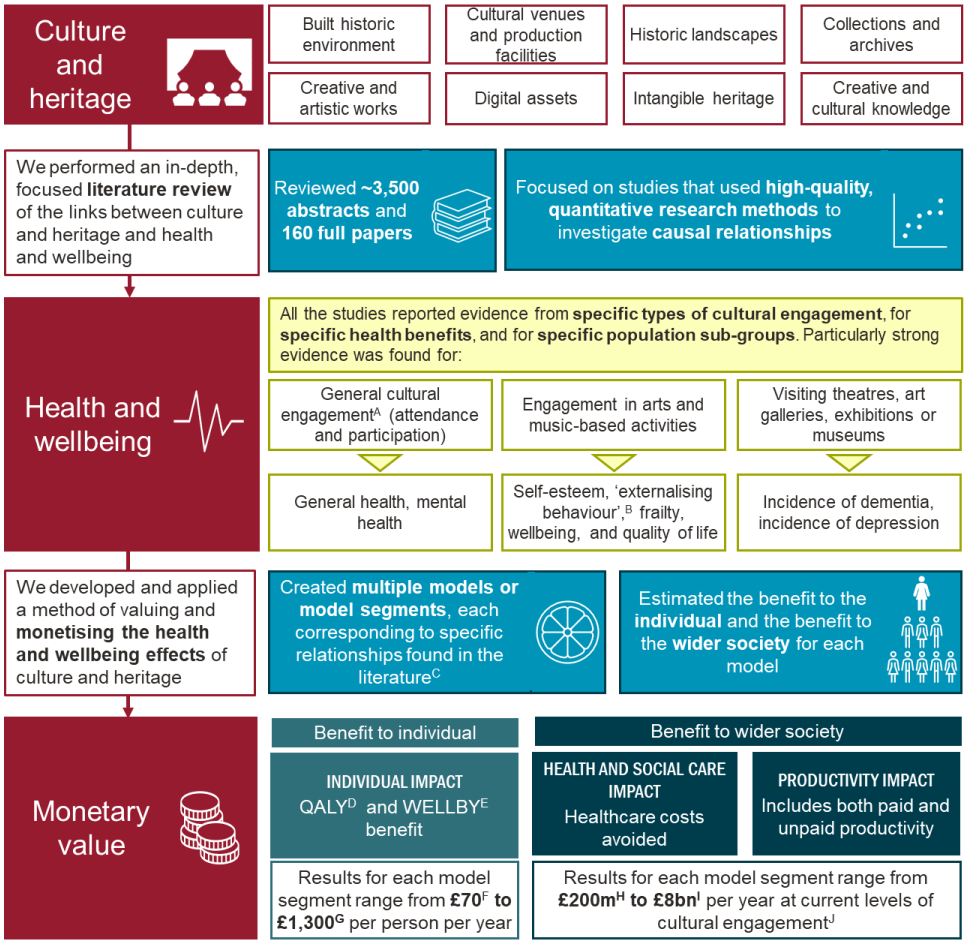
Lord Gus O'Donnell

Former Cabinet Secretary and Head of the British Civil Service

Chair of Frontier Economics

Project Summary

Figure 1 Project summary infographic



References for infographic.

[A] *General cultural engagement is typically defined in the literature as attending or participating in activities involving museums, galleries, heritage sites, theatre, cinema or concerts.*

[B] *Externalising behaviour refers to outward-directed behaviours that are disruptive, hyperactive or aggressive. In this context, it applies to children.*

[C] *An example of a single model segment is the impact of choirs (engagement type) on general health (health benefit type) in older adults (population group).*

[D] *A QALY is a quality-adjusted life year, a measure that combines both the quality and quantity of life lived. This can be valued using established techniques.*

[E] *A WELLBY is a wellbeing-year. It is a measure of subjective wellbeing that captures how people think and feel about their lives: increases in WELLBYs correspond to an increase in life satisfaction.*

[F] *Model 4b, 'Music and self-esteem in children'*

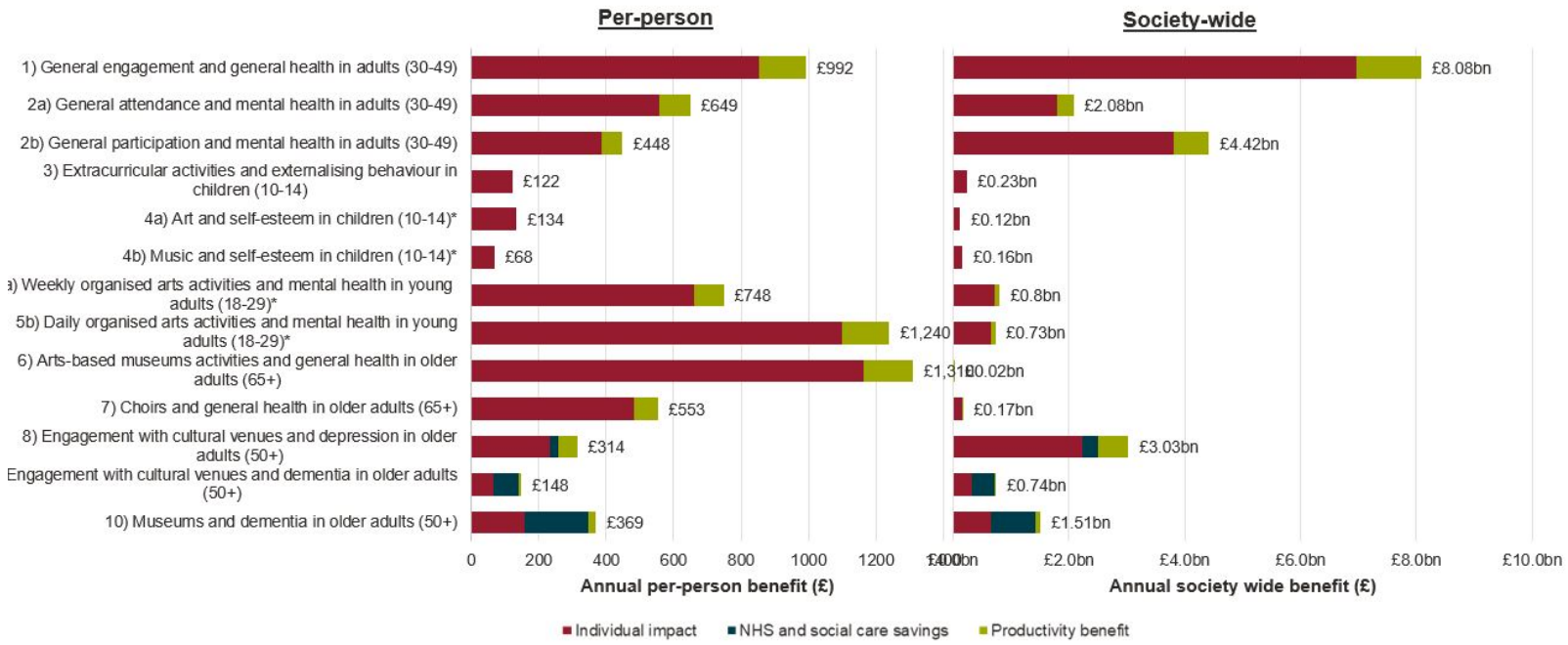
[G] *Model 6, 'Arts-based museums activities and general health in older adults'*

[H] *Model 6, 'Arts-based museums activities and general health in older adults'*

[I] *Model 1, 'General engagement and general health in adults'*

[J] *The proportionality of societal benefits to engagement levels means that, for example, doubling levels of engagement would double the size of the societal benefit.*

Figure 2 Estimated annual benefits across models



Source: *Frontier Economics.*

Note: **Models 4a, 4b, 5a and 5b use WELLBYs rather than QALYs and so are not directly comparable to other models.*

Executive Summary

The significance of the culture and heritage sectors reaches beyond their recognised contribution to the Gross domestic product (GDP). They shape the fabric of our communities, and the creative works and performances they produce enrich our lives, offering not only joy and inspiration but also a sense of identity, belonging and shared history.

The Culture and Heritage Capital (CHC) Programme, launched in 2021 by the Department for Culture, Media and Sport (DCMS), aims to create publicly available statistics and guidance that will allow for improved articulation of the value of the culture and heritage sectors. Central to the CHC Framework is the call for economic analysis within the culture and heritage sectors to extend beyond traditional measures of economic contribution. It advocates for a more holistic approach that captures the broader effects on societal wellbeing, sustainable development and the long-term enhancement of living standards.

As part of the CHC Programme, DCMS is developing a comprehensive framework to value culture and heritage assets (Sagger and Bezzano 2024), supporting and undertaking research to improve the evidence base and providing guidance on how to apply the results. Our work focuses specifically on valuing the health and wellbeing benefits of cultural and heritage engagement. Understanding these benefits allows for improved decision-making within the culture and heritage sectors and interventions in other sectors, such as transport and the environment, that may impact culture and heritage.

There is a growing body of evidence that illustrates the links between cultural and heritage engagement and health and wellbeing. Research by the World Health Organisation (WHO) from 2019 and University College London (UCL) has found that cultural engagement can help to prevent, treat and manage physical and mental health problems.

This report:

1. assesses the body of evidence on the impact of culture and heritage on health and wellbeing and the robustness of the evidence

2. demonstrates how monetary values can be applied to the health and wellbeing benefits of culture and heritage through a set of quantitative models which draw on high-quality evidence

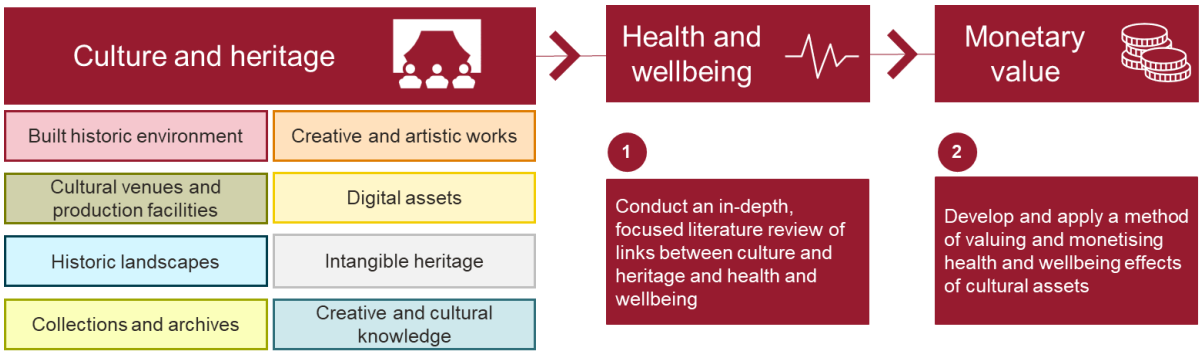
Specifically, the project aims to answer the following research questions:

- What are the main links between culture and heritage and health and wellbeing? In which areas of culture and heritage are these links most evident?
- What is the quality of the evidence that illustrates the link between culture and heritage and health and wellbeing? Does the literature suggest a causal relationship?
- What is the monetary value of the links between culture and heritage and health and wellbeing?

There have been previous attempts to monetise the health and wellbeing impacts of engagement with culture and heritage, including Fujiwara et al. (2014), Tripney et al. (2010) and Colwill (2024). The current research builds on the existing work by using estimates of health and wellbeing values derived from high-quality studies that aim to demonstrate connections to culture and heritage and by adopting a more comprehensive perspective of value across individuals, the NHS, and society. The approach also builds on existing frameworks for valuing non-market benefits in other sectors, such as the Natural Capital Framework. This research provides evidence to support the CHC Framework, which identifies health as a key service that benefits from culture and heritage assets.

Figure 3 provides a summary of the structure of the work.

Figure 3 Project structure



Source: Frontier Economics.

The impact of culture and heritage on health and wellbeing

The literature review included an abstract review of approximately 3,500 papers and a full-text review of approximately 160 papers. Specifically, we focussed on research methods that aimed to identify robust relationships, and where possible, a causal relationship, between culture and heritage and health and wellbeing rather than associations.

The results from these studies underpin the monetisation work to provide robust estimates for the value of culture and heritage. The key results of the literature review are summarised in Table 1. We find substantial evidence of sufficiently high quality for the following types of culture and heritage engagements:

1. general culture and heritage engagement[1]
2. creative and artistic works
3. creative and cultural knowledge[2]
4. cultural venues and production facilities

The 'creative and artistic works' and 'creative and cultural knowledge' categories incorporate similar elements in the evidence base. Therefore, we group them into a single category: creative and artistic works and creative and cultural knowledge. The lack of evidence for the remaining categories does not imply a lack of impact; rather, there is not sufficient evidence to establish whether there is an impact. In addition, although qualitative evidence was excluded from our work, as set out in the CHC Framework, it is nevertheless important in informing decision-making and should be used alongside social cost-benefit analysis and other decision-making tools.

In general, the high-quality evidence found in the literature review is in the form of observational studies (using data already collected for multiple purposes) and large survey datasets (such as the English Longitudinal Study of Ageing). The evidence is often based on cross-sectional analysis that controls for observable characteristics such as age, ethnicity, and wider socioeconomic factors when assessing the impact of culture and heritage on health and wellbeing. The studies generally do not control for unobservable factors, such as motivation or wider factors that influence how culture and heritage interact with health and wellbeing. We find some examples of randomised controlled trials (RCTs), but these tend to have small sample sizes.

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1 The general culture and heritage category is broad and includes engagement across a wide variety of culture and heritage assets and services across DCMS asset and service categories. It includes activities such as museums, galleries, heritage sites, theatre, cinema and concerts.

2 See Sagger, H. and Bezzano, M. (2024) for definitions of these types of engagements.

Table 1 Summary of literature review findings

DCMS category	Evidence volume	Availability of high-quality evidence	Areas of relative strength in evidence	Impact on health and wellbeing outcomes
General culture and heritage	High	Available	Engagement with several different types of culture (in terms of both attendance and participation)	Improvements in general health and mental health for adults
Collections and archives	Low	Limited	Not applicable	Not applicable
Creative and artistic works and Creative and cultural knowledge	High	Available	Arts and music-based activities	Improvements in 'externalising behaviours' and self-esteem for children; mental health in young adults; general health, frailty, wellbeing, and quality of life for older adults
Cultural venues and production facilities	High	Available	Visiting theatres, art galleries, exhibitions or museums or attending performances	Reduced incidence of depression and dementia in older adults
Digital assets	Medium	Limited	Not applicable	Not applicable
Built historic environment	Low	Limited	Not applicable	Not applicable
Historic landscapes	Medium	Limited	Not applicable	Not applicable
Intangible heritage	Low	Limited	Not applicable	Not applicable

Source: Frontier Economics.

Monetising the health and wellbeing impacts of culture and heritage

We monetise three impacts of cultural engagement:

1. Individual impacts: via a change in the quality of life (QoL) for those affected
2. Health and social care impacts: via avoided health and social care costs
3. Wider societal impacts: via changes to productivity

Generally, we measure quality-of-life changes from cultural engagement through changes in quality-adjusted life years (QALYs).[3] QALYs are used to measure the value of interventions by considering both the quantity and QoL gained. One QALY represents one year of perfect health, and zero QALYs corresponds to death or a health state equivalent to death.

To monetise these impacts, we multiply the estimated changes in QALYs by the established values of a QALY, which are set out in HM Treasury's Green Book (the Green Book recommends using a value of £70k per QALY for appraisal purposes) and used by the National Institute for Health and Care Excellence (NICE) for health technology assessment (HTA).

Health and social care impacts are valued based on NHS treatment costs in cases where health conditions are assumed to be 'avoided' due to cultural engagement. Productivity benefits are calculated using the Department of Health and Social Care (DHSC) guidance on methods for estimating the wider social benefits of interventions (the guidance was developed for NICE but is currently not in use). We include both the impact of interventions on employment and the impact on unpaid productivity, such as volunteering time and labour in the home.

Our monetisation models focus on general culture and heritage, cultural venues and production facilities, and arts and music-based activities, for which high-quality quantitative evidence is available in the literature. However, since the volume and quality of evidence available for the built historic environment, historic landscapes, collections and archives, digital assets, and intangible heritage were limited, these were excluded from the modelling.

The benefits of cultural engagement evidenced in the literature are typically estimated for specific sub-groups of the population (e.g. those aged 60 years and over), for specific health

[3] For the models 'Daily and Weekly organised arts activities and mental health in young adults' and 'Art and self-esteem in children and music' use WELLBYs rather than QALYs to measure quality-of-life changes.

benefits (e.g. anxiety and depression), from specific types of cultural engagement (e.g. singing in a choir) and over specific time periods (e.g. three months). To account for this heterogeneity, we developed ten separate valuation models, each estimating the economic value of the health and wellbeing benefits from a specific type of engagement for a specific health benefit and a defined age group. This means that the beneficiaries in each model are chosen to match the specific population group in the evidence as much as the data allows. Therefore, applying the results from the models to different beneficiary groups would require additional assumptions. See Section 4.2.5 for more details.

Separately, we conducted a clinical 'deep dive' to understand the potential scale of impact of arts interventions delivered as clinical therapy. Specifically, we focus on the impact of visual art therapy on the pain and QoL of individuals diagnosed with cancer. Our monetisation model includes estimates of the QALYs gained from visual art therapy and illustrative scenarios on the potential society-wide benefits of delivering visual art therapy to individuals diagnosed with cancer. See Section 5 for more details on the clinical deep dive.

Table 2 provides a summary of the models.

Table 2 Models overview

#	Model name	Type of engagement	Health-related outcome	Beneficiary age group	Engagement frequency
1	General engagement and general health in adults	Museum, art exhibition or gallery, heritage site or stately home, cinema, theatre, opera, classical music concert or ballet, or concert	General health	Adults aged 30 to 49	Every few months or more
2a	General attendance and mental health in adults	General cultural attendance	Mental health functioning	Adults aged 30 to 49	Once a week
2b	General participation and mental health in adults	General arts and culture participation	Mental health functioning	Adults aged 30 to 49	Once a week or more
3	Extracurricular activities and externalising behaviour in children	Dance, music, art, or performing art classes	Emotional regulation – externalising behaviours and ADHD	Children	Not applicable – the study does not report a frequency
4a	Art and self-esteem in children	Drawing, painting, or making things	Mental health functioning	Children	Most days
4b	Music and self-esteem in children	Listening to or playing music	Mental health functioning	Children	Most days
5a	Weekly organised arts activities and mental health in young adults	Organised activities related to art, music or the theatre. Includes participatory and attendance	Mental health functioning	Young adults aged 18 to 29	Once a week or several times a week

#	Model name	Type of engagement	Health-related outcome	Beneficiary age group	Engagement frequency
5b	Daily organised arts activities and mental health in young adults	Organised activities related to art, music or the theatre. Includes participatory and attendance	Mental health functioning	Young adults aged 18 to 29	Almost every day or daily
6	Arts-based museums activities and general health in older adults	Arts-based activity at a museum	General health	Adults aged 65 and over	Every week for 12 weeks
7	Choirs and general health in older adults	Participating in a choir	General health	Adults aged 65 and over	Every week for 14 weeks
8	Engagement with cultural venues and depression in older adults	Theatre, concert or opera, cinema, art gallery, exhibition or museum	Depression incidence	Adults aged 50 and over	Every few months or more
9	Engagement with cultural venues and dementia in older adults	Theatre, concert or opera, art gallery, exhibition or museum	Dementia incidence	Adults aged 50 and over	Every few months or more
10	Museums and dementia in older adults	Museums, art galleries and exhibitions	Dementia incidence	Adults aged 50 and over	Every few months or more
11	Clinical deep dive: visual art therapy, adults diagnosed with cancer and QoL	Visual art therapy intervention delivered in a clinical setting. The intervention includes drawing, painting and bookmaking as well as some non-art-making components, such as mindfulness.	QoL	Adults aged 18 and over	Participation in a visual art therapy programme delivered in a clinical setting

Findings

Figure 2 summarises the annual monetary benefits associated with culture and heritage engagement per person and the society-wide benefits. Table 3 provides a breakdown of the per-person figures across the benefits to individuals, NHS and social care cost savings, and productivity benefits. We use HM Treasury's Green Book valuation of £70k per QALY for these estimates (results using other valuations are reported below). Benefits range from £68 per year (Music and self-esteem in children) to £1,310 per year (Arts-based museum activities for older people).

The size of the estimated benefits reflects evidence availability and the intensity of the engagement studied: models estimating the impacts of higher-intensity engagements have the highest benefit per person. The largest benefit across most models is the benefit to the individuals themselves. However, this is partly because we have not estimated the avoided health and social care costs and productivity gains for some models (see below).[4] A comparison to the Natural Capital Framework suggests that the health benefits from cultural and heritage engagement are approximately in line with the health benefits from nature-based recreation.

Accounting for health and social care savings

Due to evidence availability, health and social care impacts are estimated only in the models where specific health conditions are assumed to be 'avoided' due to cultural engagement. This estimation applies to the models that focus on either depression or dementia as the health outcome. It means that we do not calculate the costs and savings to health and social care where more general improvements to health and wellbeing do not result in avoiding a specific health condition. We recommend future research focus on this area. In practice, we expect individuals with improved general health and wellbeing to use NHS and social care services less. Our health and social care estimates are, therefore, an **underestimate of the total healthcare costs avoided.**

Annual society-wide benefits range from £18.5 million per year (Arts-based museum activities for older people) to £8 billion per year (General engagement and adults' general health). As expected,

[4] We have estimated productivity impacts for all models except those relating to children.

the largest benefits are estimated from models covering a larger number of individuals engaging. The society-wide benefits are based on current engagement levels, estimated using a combination of the 'Taking Part Survey' and broader literature. If more people engaged with culture and heritage, or if people engaged more frequently, this would increase the total society-wide benefits. More details on the calculation used to estimate engagement levels are available in Annex B

Note that not all the estimates are additive or representative of the health-economic benefits of the sector as a whole, so we do not arrive at a 'total' value figure for the impact of culture and heritage on health and wellbeing. The estimates are produced using different methodologies and data and are not directly comparable. The estimates focus on the health and wellbeing benefits and do not consider the costs associated with culture and heritage services and engagements. See Section 4.2.5 for more information on these issues.

Table 3 Estimated annual benefits from culture and heritage engagement across all models – breakdown of per-person benefits

#	Model name	Individual impacts	NHS and social care savings	Productivity impacts	Total
1	General engagement and general health in adults (30-49)	£854	Not modelled	£138	£992
2a	General attendance and mental health in adults (30-49)	£559	Not modelled	£91	£649
2b	General participation and mental health in adults (30-49)	£386	Not modelled	£63	£448
3	Extracurricular activities and externalising behaviour in children (10-14)	£122	Not modelled	Not modelled	£122
4a	Art and self-esteem in children (10-14)*	£134	Not modelled	Not modelled	£134
4b	Music and self-esteem in children (10-14)*	£68	Not modelled	Not modelled	£68
5a	Weekly organised arts activities and mental health in young adults (18-29)*	£663	Not modelled	£86	£748
5b	Daily organised arts activities and mental health in young adults (18-29)*	£1,098	Not modelled	£142	£1,240
6	Arts-based museum activities and general health in older adults (over 65)	£1,164	Not modelled	£146	£1,310

#	Model name	Individual impacts	NHS and social care savings	Productivity impacts	Total
7	Choirs and general health in older adults (over 65)	£481	Not modelled	£71	£553
8	Engagement with cultural venues and depression in older adults (over 50)	£232	£26	£56	£314
9	Engagement with cultural venues and dementia in older adults (over 50)	£66	£75	£7	£148
10	Museums and dementia in older adults (over 50)	£159	£189	£21	£369

Source: Frontier Economics.

*Note: * Models 4a, 4b, 5a, and 5b use WELLBYs rather than QALYs and are not directly comparable to other models.*

The results in Figure 2 and Table 3 focus on the impact of culture and heritage on health and wellbeing, excluding evidence where arts interventions are delivered as clinical therapy. We also perform a separate rapid-evidence review and modelling exercise on the effects of visual art therapy on pain and the QoL of individuals diagnosed with cancer (for more information, see the Clinical deep dive section). We provide below below. Overall, the model demonstrates significant individual and society-wide benefits.

Summary of visual art therapy model and results

Beneficiaries included: Estimates are calculated for all adults diagnosed with cancer in a given year, with specific estimates made for all adults diagnosed with breast cancer.

Health outcome: QoL.

Type of engagement: Visual art therapy intervention delivered in a clinical setting. The intervention includes non-art-making components, such as mindfulness and psychotherapy. The length of intervention varies across studies (between five to twelve weeks).

Main sources of evidence: Svensk et al. (2009), Jang et al. (2016), and Monti et al. (2013): RCTs studying the impact of Mindfulness-Based Art Therapy (MBAT) on patients with breast cancer. Monti et al. (2006): an RCT focusing on the impact of MBAT on females with cancers (not isolated to breast cancer).

Results:

- Per-person benefits: £730 per year for individuals diagnosed with breast cancer and £450 per year for individuals diagnosed with all other cancers (based on the HTA QALY valuation).
- Societal benefits: Assuming that 10% of newly diagnosed breast cancer patients or all other newly diagnosed cancer patients each year participate in visual art therapy, we expect a benefit of £4.5 million and £16.3 million for breast cancer and all other cancers per year, respectively (using the HTA QALY valuation).

Robustness: The literature focuses on the impact of visual art therapy on females diagnosed with breast cancer, specifically. As a result, we expect our estimates for breast cancer to be more robust than those for all other cancers.

Implications and recommendations of this work

As set out in 'Embedding a Cultural and Heritage Capital Approach' (ECHCA) (Sagger and Bezzano 2024), the importance of the culture and heritage sectors goes well beyond their acknowledged direct contribution to GDP. They shape our cities, and their content and performances enrich our lives and strengthen our global image. They have been proven to be an essential positive force for society, bringing joy, inspiration and opportunity to our lives.

As described in ECHCA, the CHC framework describes how culture and heritage assets create a flow of services (including health services) that, in turn, create welfare outcomes such as increased physical and mental health. This project produces novel monetary estimates of the size of these health and wellbeing benefits by using the CHC framework as its foundation.

The work is an important step towards developing robust methods for fully expressing the economic, social and cultural value of culture and heritage assets.

The work can be used in a number of ways, including:

- **Input into business cases.** Government, cultural organisations, and academics can use our estimates in business case development, particularly in conducting social cost-benefit analyses and value-for-money assessments. This will allow business cases to better incorporate health and wellbeing impacts and, therefore, more robustly make the case for investment in culture and heritage assets.
- **Benchmarks for evaluations of wider societal impacts.** Our estimates can be used as benchmarks to understand the relative impact of culture and heritage in other areas, such as education.
- **Inform areas for further research.** Our work highlights areas where further research could be developed to increase the scope and robustness of the estimates, including research focusing on:
  - The **types of cultural assets or services** for which there was limited high-quality evidence in the literature (built historic environment, digital assets, intangible heritage, and historic landscapes).
  - Increasing the **granularity for which evidence on cultural engagement is collected** (many datasets use broad categories such as combining engagement in museums, galleries, heritage sites, the theatre, cinema and concerts).
  - Research methods that measure impacts using **instruments that can map EQ-5D scores** (a standardised measure of health-related QoL developed by the EuroQol Group and used to estimate QALYs).
  - **Specific aspects of the relationship** between engagement and health and wellbeing. For example, how health and wellbeing impacts vary by demographics (such as geography, ethnicity and gender), how long these impacts last, and how culture and heritage affect 'momentary' (very short-term) happiness or wellbeing (as opposed to the short- or medium-term changes).
  - The extent to which **individuals consider health and wellbeing benefits when answering questions about their willingness to pay** for these assets. Since it is impossible to determine how much our estimates overlap with other non-market valuation techniques, such as use and non-use values estimated through contingent valuation, this would help determine the degree of 'double counting' that would exist if one were to add the results from the current study and the estimates from contingent valuation research.

1 Introduction

The significance of the culture and heritage sectors reaches beyond their recognised contribution to the Gross domestic product (GDP). They shape the fabric of our communities, and the creative works and performances they produce enrich our lives, offering not only joy and inspiration but also a sense of identity, belonging, and shared history.

The Culture and Heritage Capital (CHC) Programme, launched in 2021 by the Department for Culture, Media and Sport (DCMS), aims to create publicly available statistics and guidance that will allow for improved articulation of the value of the culture and heritage sectors. Central to the CHC Framework is the call for economic analysis within the culture, and heritage sectors to extend beyond traditional measures of economic contribution. It advocates for a more holistic approach that captures the broader effects on societal wellbeing, sustainable development, and the long-term enhancement of living standards.

As part of the CHC Programme, DCMS is developing a comprehensive framework to value culture and heritage assets, supporting and undertaking research to improve the evidence base, and providing guidance on how to apply the results. Our work focuses on valuing the health and wellbeing benefits of cultural and heritage engagement. Understanding these benefits allows for improved decision-making within the culture and heritage sectors and potential interventions in other sectors, such as transport and the environment, that may impact culture and heritage.

There is a growing body of evidence that illustrates the links between cultural and heritage engagement and health and wellbeing. Research by the World Health Organisation (WHO) and University College London (UCL) has found that cultural engagement can help to prevent, treat, and manage physical and mental health problems.

This report:

1. assesses the body of evidence on the impact of culture and heritage on health and wellbeing and the robustness of the evidence

2. demonstrates how monetary values can be applied to the health and wellbeing benefits of culture and heritage through a set of quantitative models which draw on high-quality evidence.

Specifically, the project aims to answer the following research questions:

- What are the main links between culture and heritage and health and wellbeing? In which areas of culture and heritage are these links most evident?

- What is the quality of the evidence that illustrates the link between culture and heritage and health and wellbeing? Does the literature suggest a causal relationship?
- What is the monetary value of the links between culture and heritage and health and wellbeing?

This project was undertaken between November 2023 and July 2024. It was commissioned by DCMS and led by Frontier Economics, with expert input from the UCL Social Biobehavioural Research Group.

2 Project background

This report monetises the link between culture and heritage and health and wellbeing. It demonstrates how monetary values can be applied to the health and wellbeing benefits of culture and heritage through a set of quantitative models. Figure 3 provides a summary of the project structure.

When defining the culture and heritage categories to include in our work, we adopt the DCMS culture and heritage categories of assets and services (updated in 2024). Table 4 sets out the assets, their definitions, and a number of examples. In terms of the benefits created by culture and heritage, we are focussed specifically on the welfare effects that impact health and wellbeing. These can derive from many different services, including health services, inspiration and creative services, identity services or aesthetic services.

The categories were developed by grouping assets and services with similar characteristics and methodological challenges. It is important to note that this is not an exhaustive category list but rather a set of cultural and heritage assets and services appropriate for producing monetary estimates.

Table 4 Culture and heritage categories in scope

Asset	Definition	Examples
Collections and Archives	Managed groups of objects (both movable and immovable) with cultural, heritage or historical interest, which may store knowledge.	▪ Archives, library collections, art, museum collections, plaques, and steam trains.
Creative & Artistic Works	Creative or artistic outputs by individuals or groups.	▪ Paintings, crafts, sculptures, textiles, and fashion ▪ Films, TV and radio productions, music, video games, and publications ▪ Theatre and dance productions and exhibitions
Creative & Cultural Knowledge	Creative and cultural skills, abilities and knowledge, and the information and knowledge required to safeguard them.	▪ Skills and knowledge that enable the creation of creative and artistic content (e.g. drawing, painting and designing)

Asset	Definition	Examples
		▪ Knowledge of culture and heritage and creative practices (contemporary and historical)
Cultural Venues & Production Facilities	Buildings that provide venues for cultural activities and culture and creative production.	▪ Cultural venues including theatres, cinemas, concert halls, libraries, museums, and other heritage attractions ▪ Production and post-production facilities such as cinemas, recording studios, theatres, and dance studios
Digital Assets	The digitalisation of collections, archives, and creative or artistic content, as well as born-digital content.	▪ Digital archives, digital collections, and online creative content
Built Historic Environment	Buildings and structures of heritage or historical significance or use.	▪ Listed and unlisted historic buildings and structures ▪ Other structures of significance, including places of worship and sports heritage sites
Historic Landscapes	Land and nature of cultural, heritage or historical significance.	▪ Landscapes (including protected landscapes such as national parks), fieldscapes, seascapes, and woodlands ▪ Designed cultural landscapes such as parks, gardens and trails ▪ Land used for cultural or creative activities, such as festivals ▪ Archaeological sites and deposits, battlefields, and shipwrecks
Intangible Heritage	Cultural heritage that is living and practised.	▪ Traditions and social practices, including folklore, stories, traditions, and other cultural practices.

Source: DCMS, Valuing Culture and Heritage Capital: A framework towards informing decision making. Available here.

Our work is structured in two stages:

1. An in-depth **literature review** of the links between culture and heritage and health and wellbeing
2. Development of methods for **valuing and monetising** the impact of culture and heritage on health and wellbeing

The literature review aims to identify evidence that can be used to monetise the link between culture and heritage and health and wellbeing. The literature review uses a protocol to identify relevant evidence of robust causal links. We aim to understand the direction and magnitude of the links between culture and heritage and health and wellbeing, as well as the transmission mechanisms and examples of more nuanced relationships, such as threshold and dose effects. The review considers how the evidence differs according to the culture and heritage assets and services, health and wellbeing outcomes, and sociodemographic factors.

For each combination of culture and heritage type, health outcome, and beneficiary, where we found evidence of sufficient quality, we developed a bespoke model that produces a 'monetary estimate' of the impact of culture and heritage on health and wellbeing. We refer to this as a 'segment-based' approach. Models that estimate the benefits for different age groups or cultural assets are additive since there is no risk of double-counting when summing these benefits. For example, it would be possible to sum the benefits from Models 1, 2, 5 and 11 (see Table 9) since they refer to different age groups. However, not all models are additive, nor are they representative of the sector as a whole, so we do not arrive at a 'total' value figure for the impact of culture and heritage on health and wellbeing. Instead, each model estimates the value of the health and wellbeing benefits from a specific type of engagement for a specific health and wellbeing benefit and defined age group. The results from each model can be included in the Culture and Heritage Capital Evidence Bank.

The following chapters provide more details on the literature review, monetisation process and how the models can be applied.

3 Literature review

3.1 Literature review protocol

The literature review focuses on answering the following research questions:

- What are the main links between culture and heritage and health and wellbeing? In which areas of culture and heritage are these links most supported?
- What is the quality of the evidence that illustrates the link between culture and heritage and health and wellbeing? Does the literature suggest a causal relationship?

This literature review contributes to a wider body of literature focusing on the links between culture and heritage and health and wellbeing, such as research by WHO, UCL, and the What Works Centre for Wellbeing. Our work differs from the existing reviews in two key ways. First, it focuses on studies employing methods that can demonstrate robust, causal impacts on health and wellbeing. Second, it focuses on studies that use instruments for measuring health and wellbeing outcomes that can be converted into monetary values using established methods. The literature review follows a three-step process:

- **Evidence identification.** We identify evidence using three main methods. First, we conduct academic searches on PubMed using defined search terms (see Table 5 and Annex A for a summary of the scope of our review and the search terms used). Second, we review key policy papers and reports by international organisations and the references within these papers. Finally, we conduct a grey literature search from the websites of key organisations, including Arts Council England, the National Centre for Creative Health, and the All-Party Parliamentary Group on Arts, Health and Wellbeing (see Annex A for a full list of organisations).
- **Abstract review.** We conduct an abstract review of the evidence identified in step one to determine whether it should be included in the full review. This consists of assessing the study's relevance to the project regarding its context and methods. In the main modelling, we exclude papers where arts interventions are delivered as medical or clinical therapy, such as visual art therapy, medical music and dance therapy, as they are considered separately (see the Clinical deep dive section). A list of our inclusion and exclusion criteria in terms of culture and heritage assets is provided in Table 5. Table 6 provides a list of our inclusion and exclusion criteria in terms of health and wellbeing outcomes.
- **Full review.** We conduct a full review of the relevant studies, identified in step two. This includes extracting information on the culture and heritage assets and services assessed

in the paper, the research methods (including the general methods, data sources, and counterfactual approach), the results (including the estimated impact on health and wellbeing and how these impacts vary by beneficiary type or wider factors), and a robustness assessment.

Our literature review includes an abstract review of 3,548 papers and a full review of 164 papers.

Table 5 Inclusion and exclusion criteria – culture and heritage assets

Culture and heritage assets	Inclusions	Exclusions
General Culture and Heritage[5]	Culture, heritage, heritage sites, and cultural engagement	Not applicable
Collections and Archives	Artwork, archives, museum collections, library collections, sculptures, plaques, and steam trains	Art therapy and art at home
Creative and Artistic Works	Paintings, film, TV, radio, music, theatre, dance, exhibitions, writing, and video games.	Interventions that are delivered as a medical intervention or therapy (e.g. music therapy, medical music or art therapy, see Section 5)
Creative and Cultural Knowledge	Skills and knowledge that enable the creation of creative and artistic content (e.g. drawing, painting, and designing)	Not applicable
Cultural Venues and Production Facilities	Theatres, cinemas, concert halls, libraries, and museums	Not applicable
Digital Assets	Digital artwork, digital collections and online creative content	Social media

[5] 'General culture and heritage' refers to our broad search terms (e.g. culture or heritage), rather than a particular category of DCMS assets and services.

Culture and heritage assets	Inclusions	Exclusions
Historic Built Environment	Historic buildings and structures, listed buildings, and commemorative structures	Not applicable
Historic Landscapes	Archaeological sites, battlefields, natural landscapes, parks, and community gardens	Not applicable
Intangible Heritage	Traditions, folklore, rituals, customs, and storytelling	Not applicable

Source: Frontier Economics.

Table 6 Inclusion and exclusion criteria – health and wellbeing outcomes

Health and wellbeing outcomes	Inclusions	Exclusion
General health and wellbeing	Physical health, mental health, wellbeing, prevention, and mortality	Not applicable
Health services and clinical terms	Primary care, general practice, and appointment attendance	Not applicable
Social determinants of health or life experiences	Health behaviours, health inequalities, and social capital	Education (a focus point for future CHC research)
Physical and mental health conditions	Wide range of physical and mental health conditions	Measured outcomes that are specific and clinical (e.g. brain wave frequency)

Source: Frontier Economics.

3.2 Robustness assessment

We assess the robustness of the collected evidence using the Maryland Scientific Methods Scale (SMS). The scale ranges from level 1 to level 5 and highlights evidence by using a method more likely to suggest causality. The SMS is summarised in Table 7.

When assessing the robustness of the evidence and producing the Red, amber, and green (RAG) rating, we include an assessment of the data sources used, sample sizes, and the evidence's applicability to a UK setting.

Our findings report evidence that is level 3 and above on the SMS, or high-quality level 2 evidence that is particularly relevant to this project.

Table 7 Maryland Scientific Methods Scale Summary

SMS Level	Methods to identify counterfactual	Example methods	RAG Rating
1	Does not control for observable or unobservable characteristics	Before and after analysis without controls	
2	Comparisons between treated and untreated individuals, without considering the different characteristics that influence the outcome	Cross-sectional regressions	
3	Control for selection on observable characteristics, and through a before and after comparison, eliminate any fixed unobservable difference between treatment and control groups	Difference in difference, panel data methods, and propensity score matching (PSM)	
4	Randomness that has not been deliberately imposed but arises because of some other reason	Includes instrumental variables, regression discontinuity design	
5	Required full randomisation or programme participants	Randomised control trials (RCTs) that: - Have successful randomisation - Attrition carefully addressed - Contamination is not an issue	

Source: Frontier Economics.

3.3 Literature review findings

We group our literature review findings by the DCMS asset and service categories. We have combined the categories 'Creative and cultural knowledge' and 'Creative and artistic works' into a single category (Creative and cultural knowledge and Creative and artistic works). Our findings are summarised in Table 8 and more details are available in Annex A

Table 8 Literature review findings

DCMS category	Evidence volume	Availability of high-quality evidence	Areas of relative strength in evidence	Impact on health and wellbeing outcomes
General culture and heritage	High	Available	Engagement with several different types of culture (in terms of both attendance and participation)	Improvements in general health and mental health for adults
Collections and archives	Low	Limited	Not applicable	Not applicable
Creative and artistic works and creative and cultural knowledge	High	Available	Arts and music-based activities	Improvements in 'externalising behaviours' and self-esteem for children; mental health in young adults; general health, frailty, wellbeing and QoL for older adults
Cultural venues and production facilities	High	Available	Visiting theatres, art galleries, exhibitions or museums; or attending performances	Reduced incidence of depression and dementia in older adults

DCMS category	Evidence volume	Availability of high-quality evidence	Areas of relative strength in evidence	Impact on health and wellbeing outcomes
Digital assets	Medium	Limited	Not applicable	Not applicable
Built historic environment	Low	Limited	Not applicable	Not applicable
Historic landscapes	Medium	Limited	Not applicable	Not applicable
Intangible heritage	Low	Limited	Not applicable	Not applicable

Source: Frontier Economics.

In general, the evidence is in the form of observational studies (that is, data already collected for multiple purposes) and uses large survey datasets, such as the English Longitudinal Study of Ageing. The evidence is often based on cross-sectional analysis that controls for observable characteristics, such as age, ethnicity and wider socioeconomic factors when assessing the impact of culture and heritage on health and wellbeing. The studies generally do not control for unobservable factors, such as motivation or wider factors that influence how culture and heritage interact with health and wellbeing. We find some examples of randomised control trials (RCTs), but these tend to have small sample sizes.

The availability of high-quality evidence is limited for the categories, collections and archives, digital assets, built historic environment, historic landscape and intangible heritage. Therefore, these papers are excluded from the modelling. Our literature review findings for the excluded categories are included in Annex A It is important to note that the lack of evidence does not imply a lack of impact; rather, there is insufficient evidence to establish whether there is an impact that can be monetised.

We find a more substantial volume of sufficiently high-quality evidence for the following types of culture and heritage engagements:

1. general culture and heritage engagement
2. creative and artistic works
3. creative and cultural knowledge
4. cultural venues and production facilities

The 'creative and artistic works' and 'creative and cultural knowledge' categories incorporate similar evidence. Therefore, we group them into a single category: Creative and cultural knowledge and Creative and artistic works.

We summarise the findings from our review for these categories below. More details are provided in Annex A .

3.3.1 General culture and heritage

The general culture and heritage category is broad and includes evidence across multiple DCMS CHC asset and service categories. The evidence in this category often uses survey evidence that asks individuals broad questions about their engagement with culture and heritage. For example, a survey might ask an individual how frequently they engage in culture and heritage activities, including visiting museums, galleries, heritage sites, theatres, cinemas and concerts annually. As a result, we are not able to attribute the impact reported in these studies to a particular type of culture and heritage engagement. Instead, we attribute the impact estimated in these studies to engagement in culture and heritage as a whole.

We find evidence, in Elsden et al. (2022) and Cuypers et al. (2012), that the general culture and heritage category focuses on adults between the ages of 30 and 49 (rather than older adults, young adults or children). For these adults, general cultural engagement is associated with improvements in social functioning, physical health, and anxiety and depression.

We also find evidence of dose effects. That is, the impact of general engagement on health and wellbeing depends on the frequency of engagement. Similarly, we find that the type of engagement affects the impacts, meaning the impacts of attendance (e.g. visiting a museum) and participation (e.g. engaging in a painting workshop at a museum) are different. Of the two, participation generally has a greater impact on health and wellbeing.

Models in this category

- Model 1: General engagement and general health in adults
- Model 2a: General attendance and mental health in adults
- Model 2b: General participation and mental health in adults

3.3.2 Creative and artistic works and creative and cultural knowledge

The creative and artistic works and creative and cultural knowledge category includes evidence for engagement (both attendance and participation) with theatre, drama, opera,

cinema, singing, dancing and music. We find a large volume of high-quality evidence regarding children, young adults, and older adults.

There is evidence specific to children and young adults. Evidence from Bone et al. (2023) suggests that young adults' engagement in artistic, musical, and theatrical organisations increases self-esteem. However, this impact is only statistically significant in metropolitan areas. Further, the evidence from Mak and Fancourt (2019) and Block et al. (2022) suggests that participation in extracurricular arts activities is associated with improvements in self-esteem and mental health for this group. We also find evidence for drawing, painting and art making improving children's self-esteem. This study uses propensity score matching (PSM) analysis to establish the impact.

We find high-quality evidence relating to music, singing and choirs for adults and older adults. Using Daykin et al. (2018) and Viola et al. (2023),we find that adults' participation in music and singing has a significant impact on depression and cognitive and psychological functioning. The evidence from Irons et al. (2020) suggests that group singing can help improve pain measures for adults with long-term health conditions associated with persistent pain. According to Coulton et al. (2015), for older adults, community group singing was found to have a significant positive effect on mental-health-related QoL.

Models in this category

- Model 3: Extracurricular activities and externalising behaviour in children
- Model 4a: Art and self-esteem in children
- Model 4b: Music and self-esteem in children
- Model 5a: Daily performing arts and mental health in young adults
- Model 5b: Weekly performing arts and mental health in young adults
- Model 6: Arts-based museum activities and general health in older adults
- Model 7: Choirs and general health in older adults

3.3.3 Cultural venues and production facilities

The cultural venues and production facilities category includes, evidence specifically relating to attendance at museums, concert halls, theatres, libraries, and exhibitions. The evidence

tends to focus on older adults.[6] For example, evidence from Fancourt and Steptoe (2019), Fancourt and Tymoszuk (2019), Tymoszuk et al. (2020) and Fancourt et al. (2020) suggests that older adults who generally engage with cultural venues have a lower risk of depression, loneliness and dementia. Beauchet et al. (2021), Schall et al. (2018) and Hayashi et al. (2023) find that participation in activities delivered in museums results in significant improvements in frailty, wellbeing, and QoL. These findings are based on evidence that uses RCTs with small sample sizes and relate to specifically designed interventions. This specificity reduces their applicability to other settings.

Models in this category

- Model 8: Engagement with cultural venues and depression in older adults
- Model 9: Engagement with cultural venues and dementia in older adults
- Model 10: Museums and dementia in older adults

[6] There is evidence relating to the impact of engagement with collections and moveable heritage on health and wellbeing in the general engagement category. However, as this evidence cannot be separated to understand the specific impact of collections and moveable heritage, it is included in the more general category, general cultural engagement.

4 Monetising the impact on health and wellbeing

This section sets out the approach used to estimate culture and heritage's monetary impacts on health and wellbeing. We provide a high-level outline for all models before providing more details on individual models and their results. Annex B provides details on the monetisation methodology, including the inputs used, results of sensitivity checks and a detailed model-by-model methodology.

4.1 Modelling approach

We take a segment-based approach to monetising the impact on health and wellbeing. In the literature, cultural engagement benefits are estimated for specific population sub-groups, specific health benefits and specific types of cultural engagement. Consequently, it is impossible to calculate the total benefit from cultural engagement. In addition, evidence that focuses on the impact of cultural engagement on dementia, for example, is likely to include benefits that are also captured in evidence regarding the impact of cultural engagement on mental health for older adults. As a result, we risk double counting if we were to estimate a total impact figure of cultural engagement on health and wellbeing. For these reasons, we report our estimates separately for each model. Each model estimates the economic value of the health and wellbeing benefits from a specific type of engagement for a specific health benefit and a defined age group. We discuss the application of model results in sections 4.2.5 and 6.1.

For the modelling, we define four age groups designed to maximise the population coverage while using sensible assumptions about applying the available evidence to these groups. The age groups are:

- children aged 10 to 14
- young adults aged 18 to 29
- adults aged 30 to 49
- adults aged 50 years and over
- adults aged 65 years and over

While the age groups have typically been designed not to overlap, the benefits within an age group are not additive, as noted above.

Table 9 summarises the models we estimate, setting out the type of engagement, beneficiaries, health outcomes and engagement frequency. These models are grouped into the DCMS CHC asset categories. The health outcome, engagement type and beneficiary type combinations included in the modelling reflect the availability of quantitative, monetisable evidence identified in the literature review. In some instances, quantitative evidence is not monetisable as it is impossible to map the reported outcomes to changes in Quality-adjusted life years (QALYs) or Wellbeing-adjusted life years (WELLBYs). For example, we do not model the impact of cultural engagement on depression risk for young adults: this does not mean these benefits do not exist, but that evidence for monetisation is not available.

Table 9 Overview of the models

#	Model name	Type of engagement	Health-related outcome	Beneficiary age	Engagement frequency
1	General engagement and general health in adults	Museum, art exhibition or gallery, heritage site or stately home, cinema, theatre, opera, classical music concert or ballet, concert	General health	30-49	Every few months or more
2a	General attendance and mental health in adults	General cultural attendance	Mental health functioning	30-49	Once a week or more
2b	General participation and mental health in adults	General arts or culture participation	Mental health functioning	30-49	More than once a week
3	Extracurricular activities and externalising behaviour in children	Dance, music, arts, or performing art classes	Emotional regulation – externalising behaviours and ADHD	Children	Not applicable – study does not report required frequency
4a	Art and self-esteem in children	Drawing, painting or making things	Mental health functioning	Children	Most days
4b	Music and self-esteem in children	Listening to or playing music	Mental health functioning	Children	Most days

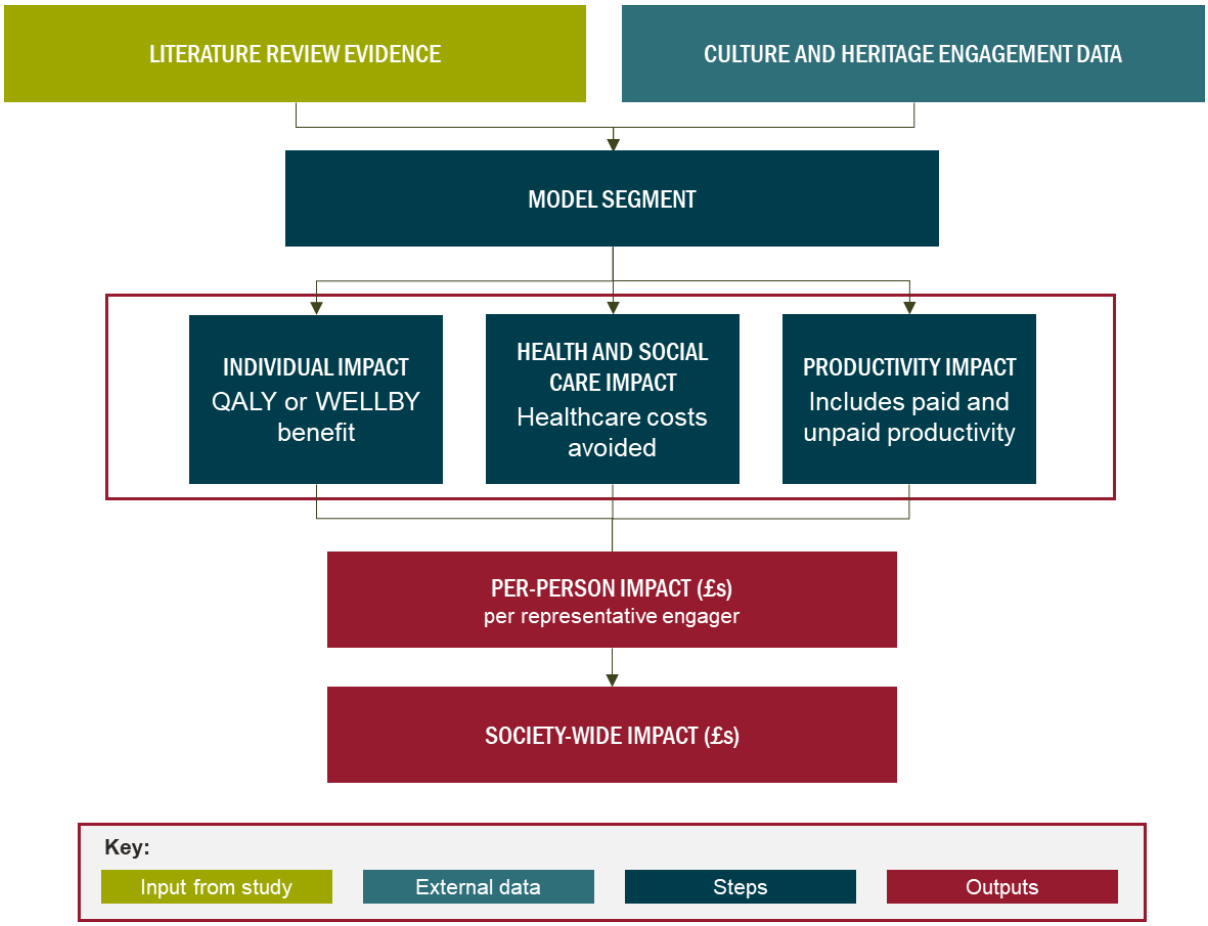
#	Model name	Type of engagement	Health-related outcome	Beneficiary age	Engagement frequency
5a	Weekly organised arts activities and mental health in young adults	Organised activities related to art, music, or the theatre. Includes participatory and attendance	Mental health functioning	18-29	Once a week
5b	Daily organised arts activities and mental health in young adults	Organised activities related to art, music, or the theatre. Includes participatory and attendance	Mental health functioning	18-29	Almost every day or daily
6	Arts-based museum activities and general health in older adults	Arts-based activity at a museum	General health	65+	Every week for 12 weeks
7	Choirs and general health in older adults	Participating in a choir	General health	65+	Weekly for 14 weeks
8	Engagement with cultural venues and depression in older adults	Theatre, concert or opera, cinema, art gallery, exhibition, or museum	Depression incidence	50+	Every few months or more
9	Engagement with cultural venues and dementia in older adults	Theatre, concert or opera, art gallery, exhibition, or museum	Dementia incidence	50+	Every few months or more
10	Museums and dementia in older adults	Museums, art galleries, and exhibitions	Dementia incidence	50+	Every few months or more

Source: Frontier Economics.

4.1.1 Modelling steps

Figure 4 provides an overview of our modelling approach across all models, including the inputs used and the estimated impact areas.

Figure 4 Overview of modelling approach



Source: Frontier Economics.

Inputs

The modelling has two key inputs:

- Literature review evidence: We use key findings from the literature, such as the reduction in the risk of developing a given condition or improvements in standard health and wellbeing survey instruments.

- Culture and heritage engagement data: Alongside evidence reported in the literature, we used the Taking Part survey to estimate engagement and participation numbers.[7]

Additional data sources we used include UK population figures, inflation, average QALYs for a person living with various health conditions, QALYs for the population as a whole, and health and social care costs for various health conditions. A detailed list of sources is set out in Annex B

Impacts monetised

We monetise three impacts of cultural engagement: individual impacts via a change in the QoL for those affected, health and social care impacts via avoided health and social care costs, and the wider social impacts of changes to paid and unpaid productivity (the 'productivity impact'). The models do not include all the 'spillover' health and wellbeing impact areas we expect from cultural engagement (positive externalities). For example, due to limited evidence, we have not included wider household impacts that could result from an improvement in a household member's health and wellbeing.

Technical terms used for health improvements

QALYs are used to measure the value of interventions by considering both the quantity and QoL gained, where one QALY represents one year of perfect health, and 0 corresponds to death or a health state equivalent to death.

WELLBYs are a measure of subjective wellbeing that captures how people think and feel about their lives: increases in WELLBYs correspond to an increase in life-satisfaction. WELLBYs are measured using a 0-to-10 Likert scale.

Table 33 in Annex B provides a more thorough list of all health measures and questionnaires.

[7] We use the Taking Part survey rather than the updated Participation Survey because the Taking Part survey previously included a longitudinal element that is used in our sustained engagement assumptions. In addition, the Participation Survey may be affected by the impact of COVID-19 during 2021, so we use the pre-COVID-19 Taking Part data.

Our work typically measures quality-of-life changes from cultural engagement through changes in QALYs. The method used to calculate the QALY impact varies across each model. Generally, we followed two main steps:

1. **Calculate the QALY improvement for each individual who engages with culture and heritage**. We use two different approaches depending on the study evidence:

    (a) Where the studies reported outcomes in terms of reduced likelihood of having a specific condition, such as depression, we compare the average QALY for an individual with and without the condition to arrive at a change in QALYs.

    (b) Where the studies reported outcomes in terms of changes in other survey instruments (non-QALY), we convert these changes into QALYs using existing conversion techniques from the database compiled by the Health Economics Research Centre at the University of Oxford.

2. **Multiply the change in QALYs by the monetary value of a QALY**. We provide two estimates for the economic value of improvements to an individual's QoL. The first is based on HM Treasury's Green Book valuation of £70k per QALY. The second is based on a value of £20k per QALY, the lower end of the range used in the National Institute for Health and Care Excellence (NICE) health technology assessments (HTA), the 'HTA' valuation. We provide two estimates so that the work can be interpreted and used across both government and the wider healthcare sector, which tend to use different QALY valuations. However, we consider the Green Book valuation to be the most relevant given that our work concerns the welfare value, as opposed to HTA and clinical guidelines. Therefore, we use the Green Book valuation to report one estimate (for example, in our summary graphs).

The exceptions are models 4a, 4b, 5a and 5b, in which we use WELLBYs to monetise the self-esteem and mental health outcomes reported in the studies. Due to the unavailability of appropriate QALY-based evidence for these health outcomes, we convert the changes in health to a standard wellbeing scale (Short-form Warwick Edinburgh Mental Wellbeing Scale [SWEMWBS]) and then monetise these impacts using WELLBYs. Therefore, the results from these models are less comparable to other models.

Health and social care impacts are estimated only where health conditions are assumed to be avoided due to cultural engagement. This applies to our models that focus on depression or dementia as the health outcome. We calculate these benefits using the expected per-person cost to the NHS and social care providers to treat these conditions (we use data from Public Health England to estimate healthcare costs and wider literature to estimate social care costs. See Annex B for more details). This means that we do not calculate costs and savings to

health and social care the improvements to health and wellbeing are more general and do not result in avoiding a specific health condition (see Table 12 Annual benefits and engagement across models). In practice, we expect individuals with improved general health and wellbeing to use NHS and social care services less. This is likely to be true to varying extents across all models, but we have not considered evidence on the extent to which these benefits apply under each model. Our health and social care estimates are, therefore, an underestimate of the total healthcare costs avoided.

Productivity benefits are calculated using the Department of Health and Social Care (DHSC) guidance developed for NICE.[8] These benefits include paid and unpaid productivity impacts and are based on QALY improvements estimated in the 'Individual impact' component of our modelling. Paid productivity is valued as the additional wages generated by improved QoL, calculated by combining estimates of an individual's productivity improvement due to changes in QALYs (using DHSC productivity functions) with average working hours and wages by age. Unpaid productivity relates to volunteering time and labour in the home. The methodology assumes that unpaid productivity increases at the same rate as productivity and is valued at the average net wage of people in work. We do not calculate productivity benefits for children.

Estimating cultural and heritage engagement

In order to estimate a society-wide impact, for each model, we develop an estimate of the number of individuals who engage in culture and heritage at the frequency and engagement type specified by the literature. For example, for Model 10 (Museums and dementia in older adults), our society-wide calculations require estimating the number of adults who visit museums every few months or more. We combine data on the number of adults aged 50 years and over in the population with data from the Taking Part survey on the percentage of adults aged 45 years and over who visit museums at this frequency. We downscale this estimate so our figure includes only those engaging in a sustained way. More details on the sustained engagement adjustment and method for calculating engagement levels for the other models are provided in Annex B

Model outputs

Each model produces two key estimates:

[8] It is important to note that this guidance was not implemented by NICE due to concerns about included productivity benefits in a health technology assessment setting.

1. **The benefit per person**. This is the sum of the individual impact (quality-of-life impact), the avoided costs to health and social care impact, and the productivity impact.

    - This represents the value to society from the 'average' individual who engages with culture and heritage at an assumed level (see each model's results for further detail) and does not mean that each individual engaging is expected to experience these benefits. For example, for Model 8 (Engagement with cultural venues and depression in older adults), we only calculate benefits from avoided depression: those who avoid depression will experience a much larger benefit per person, while a significant group of people will not avoid depression, and so we do not calculate any benefits. The figure is an average of these two groups, weighted by the group size.

2. **The societal benefit.** We calculate the benefit to society by multiplying the benefit per person with our estimate of engagement across the population.

Assumptions

Across our models, we adopt a conservative approach when determining model assumptions. This means that, in practice, we expect the impacts reported to underestimate the 'true' value. For example, we calculate health and social care benefits for 'avoided conditions' and not where there are wider general improvements to health and wellbeing. We present alternative scenarios that explore the potential impact of culture and heritage using less conservative assumptions.

Throughout our modelling, two key areas where we make conservative assumptions due to the lack of data are 'impact persistence' and 'sustained engagement'. These are discussed individually below.

Impact persistence

We find that the literature is limited in enabling an understanding of how engaging with culture and heritage impacts the health and wellbeing of an individual over time. A number of studies in our modelling estimate the benefits of short-term engagement (for example, joining a choir for 12 weeks). These studies typically do not have long enough follow-up periods to understand the lasting impacts, so we draw from a wider literature base to estimate this. Where this is relevant in our modelling, we assume the impact of cultural engagement to last up to six months following the engagement.

If individuals were to engage again within the year or for a longer period, they are likely to see higher benefits. For example, if an individual rejoined a choir after the six months modelled,

we may expect them to see further benefits. However, the evidence is not available to understand the potential size of these benefits.

We discuss the assumptions and underlying evidence in more detail in the relevant model subsections and include scenarios that vary our persistence assumptions, where applicable.

Sustained engagement

A number of the studies used in our modelling estimate the impact of engagement over multiple years on health. Evidence suggests that people's engagement with culture over a short period is roughly constant, meaning that an individual's engagement with culture is unlikely to change significantly throughout the study, and an individual's engagement with culture at the beginning of the study is likely highly correlated with their engagement before the study. This means it is impossible to attribute the impact on health to engagement in any given year. While the literature is limited, evidence suggests that the benefits of engagement are felt only by those with sustained engagement.

Therefore, where relevant, we assume that the benefits estimated in the study are experienced only by those who engage with culture in a sustained way, i.e. those who consistently engage over multiple years. For an individual who engages for only one year and never again, we assume that there are no health benefits. Individuals need to engage regularly over an extended period for health benefits to be included in our modelling. In the relevant models, we reduce our estimates of engagement levels by 25% to account for the fact that not all people engaging at the required level in a given year will engage at that level over multiple years. The size of this reduction is based on evidence from the Taking Part longitudinal survey. Annex B presents figures that vary the sustained engagement assumption to test the effect on society-wide impact.

4.1.2 Model-specific details

The following tables present the evidence used to inform each model (Table 10) and a summary of the methodology and limitations (Table 11). Detailed explanations of the methodology can be found in Annex B and definitions of key terms (such as SF-36 and EQ-5D) are included in Table 33.

Some limitations common across the models include:

- Several models use evidence which does not control for individuals' unobserved characteristics, which might be correlated with both health and engagement with culture and heritage, such as genetics and general enjoyment of culture and heritage. This means the results may not accurately reflect the causal impact of engagement.

- Many models use our above (discussed above). Therefore, the society-wide benefits calculated may be an underestimate of the true benefits.
- We used conservative, simplifying assumptions regarding the impact of engagement with culture and heritage on dementia since much is unknown about the condition.
- For some models, we are unable to map to QALYs because the evidence is measured on a scale for which there is no direct mapping. Instead, we convert to the SWEMWBS, which can be monetised using WELLBYs.

Table 10 Evidence base supporting each model

#	Model	Main source of evidence	Supporting evidence
1	General engagement and general health in adults	Elsden, E., Bu, F., Fancourt, D. et al. Frequency of leisure activity engagement and health functioning over a 4-year period: a population-based study amongst middle-aged adults. 2023.	■ Wider high-quality evidence base to support the link between general engagement and adult's general health. ■ Jensen, Pirouzifard and Lindström (2023) find that general cultural engagement has a significant effect on crude mortality, cardio-vascular disease mortality and other-cause mortality. ■ Cuypers et al. (2011) finds that general engagement has a significant positive effect on perceived health, life satisfaction, anxiety, and depression. ■ Cuypers et al. (2011) also finds that the link between general engagement and health varies by gender and engagement type: men who engaged specifically in receptive (such as visiting a museum), rather than creative (such as painting), cultural activities, reported better health related outcomes.
2a and 2b	General attendance and participation and mental health in adults	Wang S, Wan Mak, H., Fancourt, D. Arts, mental distress, mental health functioning & life satisfaction: fixed-effects analyses of a nationally-representative panel study. 2020.	■ Wider evidence base to support a link between cultural engagement and adult's mental health. ■ Cuypers et al. (2011) finds that general engagement has a significant positive effect on perceived health, life satisfaction and anxiety, and depression. ■ Block, Wong and Kataoka (2022) find that participation by young adults (aged 18 to 28) in performing arts, visual arts, and writing

#	Model	Main source of evidence	Supporting evidence
			positively impacts mental health. The effect size differs by frequency of participation (dose effect), where more frequent participation results in a larger impact.
3	Extracurricular activities and externalising behaviour in children	Fluharty M, Bone J, Bu F, Sonke J, Fancourt D, Paul E. Associations between extracurricular arts activities, school-based arts engagement, and subsequent externalising behaviours: Findings from the Early Childhood Longitudinal Study. 2023.	■ Wider evidence base exploring the link between participation in cultural extracurriculars and children's externalising behaviour and mental health is more limited. No additional high-quality evidence was found.
4a and 4b	Art and music and self-esteem in children	Mak HW, Fancourt D. Arts engagement and self-esteem in children: results from a propensity score matching analysis. 2019.	■ More limited evidence base exploring the link between participation in cultural activities and children and mental health. ■ A systematic review by Zarobe and Bungay (2017) found evidence for improving wellbeing for children and young people following involvement with nature-based art-interventions. ■ Zarobe and Bungay (2017) find there is some support for providing structured group arts activities to help build resilience and contribute to positive mental wellbeing of children and young people.
5a and 5b	Weekly and daily organised arts activities and mental health in young adults	Bone JK, Bu F, Sonke JK, Fancourt D. Longitudinal Associations Between Arts Engagement and Flourishing in Young Adults: A Fixed Effects Analysis of the Panel Study of Income Dynamics. 2023.	■ More limited evidence base exploring the link between participation in cultural activities and young adults' mental health. ■ Block, Wong and Kataoka (2022) find that participation in arts, visual arts and writing at least once a week has a positive impact on mental health.

#	Model	Main source of evidence	Supporting evidence
6	Arts-based museums activities and general health in older adults	Beauchet et al. Participatory art-based activity, community-dwelling older adults and changes in health condition: Results from a pre–post intervention, single-arm, prospective and longitudinal study. 2020.	■ A wider evidence base that supports the link between general cultural engagement, engagement with cultural venues (which includes arts-based activities) and older adults and general health has been outlined in Models 1, 8 and 9. ■ Hayashi et al. (2023) study a similar arts-based museum activity and find a significant effect on QoL.
7	Choirs and general health in older adults	Coulton S et al. Effectiveness and cost-effectiveness of community singing on older people's mental health-related quality of life: Randomised controlled trial. British Journal of Psychiatry. 2018	■ Wider, high-quality literature base that supports the link between music participation and older adults' general health. ■ Daykin et al. (2018) found through a systematic review that music and signing reduce anxiety. ■ Viola et al. (2023) found that active music participation has beneficial effects on both cognitive and psychosocial functioning.
8	Engagement with cultural venues and depression in older adults	Fancourt D, Steptoe A. Cultural engagement and mental health: Does socio-economic status explain the association? 2019.	■ Wider high-quality literature base supporting the link between general cultural engagement and older adults' mental health. ■ Fancourt and Tymoszuk (2019) find a significant reduction in depression risk for older adults who engage with culture and heritage. The response is dose dependent: the more regular attendance, the greater the reduction in risk.
9	Engagement with cultural venues and dementia in older adults	Fancourt D, Steptoe A, Cadar D, Community engagement and dementia risk: time-to-event analyses from a national cohort study. 2020	■ Wider high-quality literature base that supports the link between general cultural engagement and older adults' health.

#	Model	Main source of evidence	Supporting evidence
			■ Tymoszuk, Perkins and Fancourt (2020) find a significant reduction in loneliness for older adults from general cultural engagement, varying by the frequency of engagement and type of cultural engagement. ■ Fancourt and Rogers (2020) find that cultural engagement has a significant effect on frailty incidence and progression. ■ Noice, Noice, and Staines (2004) find that the cognitive functioning of older adults improves significantly following a randomised control trial of a theatre and visual arts intervention.
10	Museums and dementia in older adults	Fancourt D, Steptoe A, Cadar D. Cultural engagement and cognitive reserve: museum attendance and dementia incidence over a 10-year period. 2018.	■ See Model 9 above ■ In addition, Schall, Tesky, Adams, and Pantel (2018) found, through an RCT, significant improvements in QoL for individuals with dementia and their carers following guided art tours and art-making at a museum.

Source: Frontier Economics.

Table 11 Summary of methodology and limitations by model

#	Model	Methodology	Limitations
1	General engagement and general health in adults	■ Estimated impact on general health from main evidence source mapped to EQ-5D using Ara and Brazier (2008).	■ Evidence from the literature does not control for unobserved characteristics.

#	Model	Methodology	Limitations
		■ Engagement estimated using population data and evidence from the main evidence source, downscaled for sustained engagement (see above).	■ Figures likely to be underestimated due to assumptions made around sustained engagement (see above).
2a and 2b	General attendance and participation and mental health in adults	■ Estimated impact on mental health from main evidence source mapped to EQ-5D using Lindkvist and Feldman (2016). ■ Engagement estimated using population data and evidence from the main evidence source.	■ There are few limitations: high robustness as the literature controls for unobserved characteristics
3	Extracurricular activities and externalising behaviour in children	■ Estimated impact on externalising behaviour from main evidence source mapped to CHUY-9D using Boyer et al. (2016). ■ Impact is calculated per activity; we map this to a 'per person' benefit using the average number of activities per child. ■ Engagement estimated using population data and evidence from the main evidence source.	■ Evidence from the literature does not control for unobserved characteristics ■ Based on data from the US; we make the simplifying assumption that benefits and engagement levels are the same in the UK. ■ Uses a binary indicator for participation, but we expect impacts to vary with participation levels. Results based on average level of participation for a child who participates
4a and 4b	Art and music and self-esteem in children	■ Estimated impacts are reported in 'standardised effect sizes', whereby they are scaled to reflect the variation in the results. These are converted to non-standardised effect sizes using the standard deviation (see Annex B). ■ Estimated improvement in Rosenberg self-esteem scale mapped to SWEMWBS using correlation between self-esteem and SWEMWBS.	■ Non-standardised effect sizes approximated based on available data. Required standard deviations are not available in the main evidence source and so must be estimated using data from the Millenium Cohort Study (see Annex B). ■ Monetisation based on WELLBYs rather than QALYs (no direct mapping from Rosenberg self-esteem scale to QALYs). Conservation assumption made about the link between self-esteem and

#	Model	Methodology	Limitations
		■ SWEMWBS monetised using WELLBYs, based on estimated values by Fujiwara et al. (2021). ■ Engagement estimated using population data and evidence from the main evidence source.	WELLBYs, and sensitivities presented for various valuations.
5a and 5b	Weekly and daily organised arts activities and mental health in young adults	■ Estimated improvement in flourishing-languishing from participation mapped to SWEMWBS using correlation between flourishing-languishing and SWEMWBS. ■ SWEMWBS monetised using WELLBYs, based on estimated values by Fujiwara et al. (2021). ■ Engagement estimated using population data and evidence from the main evidence source.	■ Monetisation based on WELLBYs rather than QALYs (no direct mapping from flourishing-languishing scale to QALYs). Conservation assumption made about the link between self-esteem and WELLBYs and sensitivities presented for various valuations. ■ Based on data from the US; we make the simplifying assumption that the benefits and engagement levels are the same in the UK.
6	Arts-based museums activities and general health in older adults	■ Simplifying assumptions used to convert impact of arts-based museum activities on general health from the main evidence source to EQ-5D. Impact is assumed to be linear over the period of the study (12 weeks) ■ Impacts estimated from week 12 to week 36 assuming a 10% decay in benefits each week. No impacts estimated after week 36 (month six). ■ Engagement estimated using population data and Taking Part survey alongside an assumption that 25% of	■ Evidence from the literature does not control for unobserved characteristics or use a control group in the experiment ■ Simplifying assumptions needed to map the effect on health over time ■ 'What if' scenario used to estimate engagement levels

#	Model	Methodology	Limitations
		weekly participants attend arts-based activities ('what if' scenario).	
7	Choirs and general health in older adults	■ Impact reported using EQ-5D, in terms of QALYs, so no mapping is needed. ■ Benefits assumed to be linear over the course of the study (6 months). No impacts estimated after month 6. ■ Engagement estimated using population data and Taking Part survey.	■ Small sample size for the RCT (184 participants) ■ Simplifying assumptions needed to map the effect on health over the course of the study.
8	Engagement with cultural venues and depression in older adults	■ Estimated reduction in depression risk from engagement from main evidence source, combined with increase in QALYs for an individual avoiding depression (see Table 31). ■ NHS savings estimated using expected cost to the NHS per depression case each year. No effect on social care costs estimated. ■ Engagement estimated using population data and evidence from the main evidence source, downscaled for sustained engagement (see above).	■ High robustness as the literature controls for unobserved characteristics. ■ Figures likely to be underestimated due to assumptions made around sustained engagement (see above).
9	Engagement with cultural venues and dementia in older adults	■ Estimated reduction in dementia incidence and average years of dementia delay from engagement (both from main evidence source) used to estimate number of years of dementia avoided. ■ Individual impacts combine dementia years avoided with the increase in QALYs for an individual avoiding dementia in a given year (see Table 31).	■ Difficulties modelling dementia incidence and onset means lower robustness. Conservative assumptions used to counteract risk of over-estimation. ■ Annual benefits assumed to be linear over the 10-year study period so may be over-estimated in early years and under-estimated in later years.

#	Model	Methodology	Limitations
		■ NHS and social cost savings combine dementia years avoided with expected NHS and social care costs per dementia case each year ■ Engagement estimated using population data and evidence from the main evidence source, downscaled for sustained engagement (see above).	■ Figures likely to be underestimated due to assumptions made around sustained engagement (see above).
10	Museums and dementia in older adults	■ Per-person impacts used same methodology as 'Engagement with cultural venues and dementia in older adults' (Model 9). ■ Engagement estimated using population data and the Taking Part survey, downscaled for sustained engagement (see above).	■ See Model 9 above.

Source: Frontier Economics

Note: 'Main evidence source' is defined in Table 10.

4.2 Overall results

In this subsection, we present the estimated engagement levels, as well as the estimated benefits per person and for society as a whole using the Green Book QALY valuation (see Table 12). Annex B presents the results for the HTA QALY valuation. All estimates are annual and presented in 2024 prices.

4.2.1 Benefits per person

Figure 5 presents the annual per-person benefits.

Benefits per person range from £68 per year (Music and self-esteem in children) to £1,310 per year (Arts-based museum activities and general health for older people).

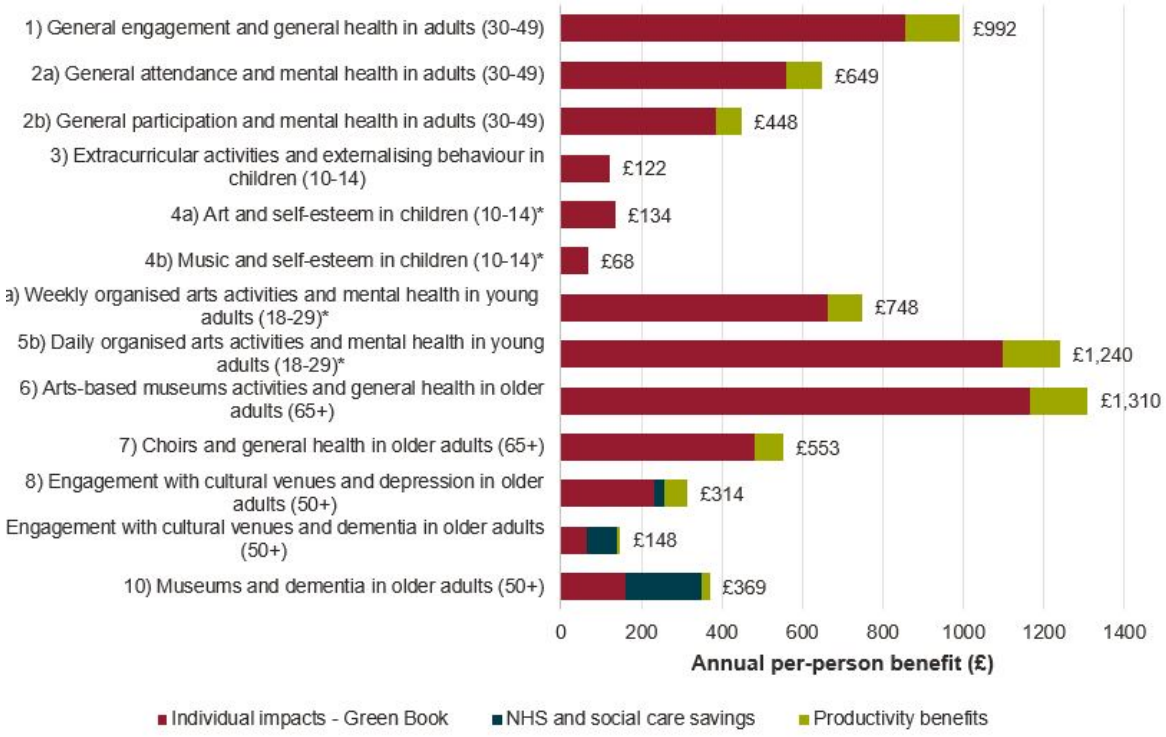
Typically, models estimating the impact of higher engagement frequencies have the highest benefit per person. These include 'Organised arts activities and mental health in young adults' (weekly and daily) and 'Arts-based museum activities and general health in older adults'. One exception is the 'General engagement and general health in adults' model, where the frequency of engagement is relatively low (every few months or more), but the definition of health is broad, which likely explains the large benefits.

Our estimated benefits from disease avoidance (in depression and dementia) are typically lower than estimated benefits from disease improvements that are measured by changes reported using standard health surveys. This difference is likely because the impacts of disease improvement include benefits from complete disease avoidance and general health improvements. For example, we would expect to estimate larger total benefits when including mental health improvements for everyone, as opposed to limiting this to people who avoid depression.

Our models report that the impact of engagement is smaller for children compared to other age groups. However, this is not a direct comparison since models involving children include different and more specific health benefits (such as a focus on self-esteem rather than a broader focus on general health) and engagement types to models involving adults. For example, it is possible that children experience similarly sized benefits to those estimated for adults in the 'General engagement and general health in adults' models. In addition, we do not consider additional benefits that are most relevant for children, such as engagement in anti-social behaviour.

It is generally impossible to conclude the relative impacts of different engagement types on health since we do not have models looking at similar age groups and health outcomes for different types of engagement. The exception is when comparing the benefits from the 'Museums and dementia in older adults' model to those of our 'Engagement with cultural venues and dementia in older adults' model. The evidence relied on in these models used a similar technique and the same data source (the longitudinal analysis of the English Longitudinal Study of Ageing), making this comparison fairly robust. Our estimates show that the benefits of the 'Museums and dementia in older adults' model are more extensive. This suggests that museums may have a larger impact on dementia incidence than other types of engagement.

Figure 5 Annual per-person benefits across models

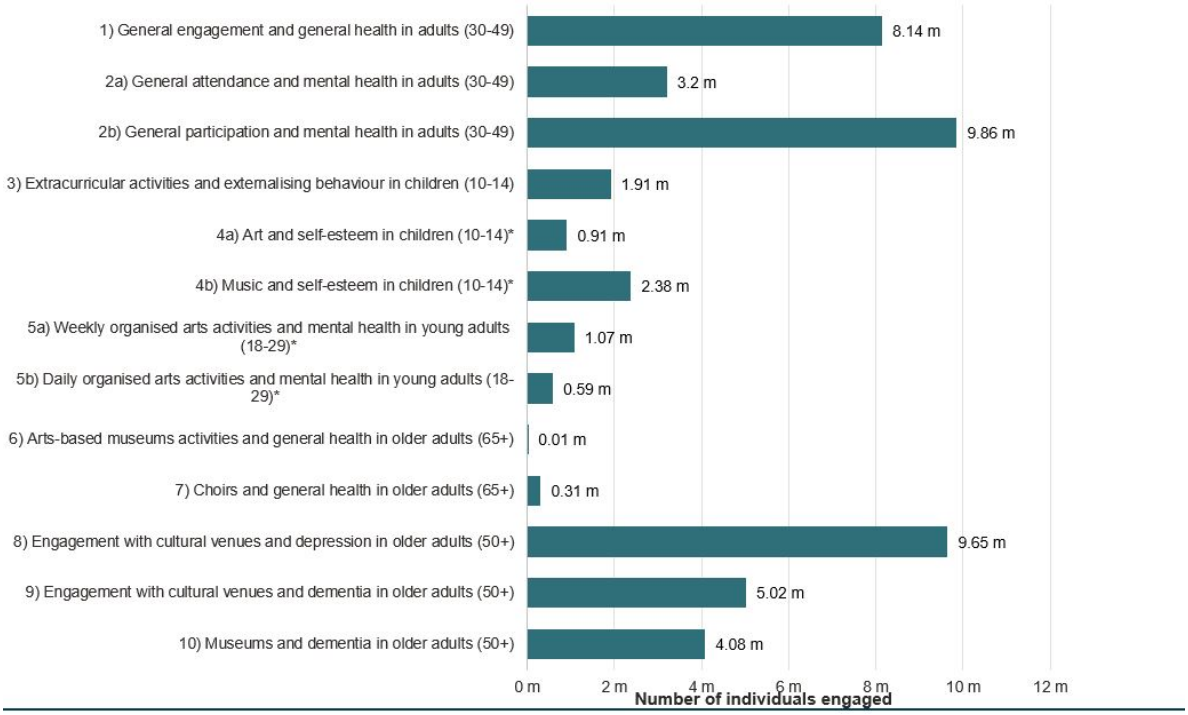


Source: *Frontier Economics.*
Note: **Models 4a, 4b, 5a, and 5b use WELLBYs rather than QALYs and so are not directly comparable to other models.*

4.2.2 Engagement levels

Figure 6 presents estimated engagement figures across models. In the next subsection, we discuss the impact of engagement levels on the estimated society-wide benefits.

Figure 6 Annual engagement levels across models



Source: Frontier Economics.

4.2.3 Society-wide benefits

Figure 7 presents the annual society-wide benefits.

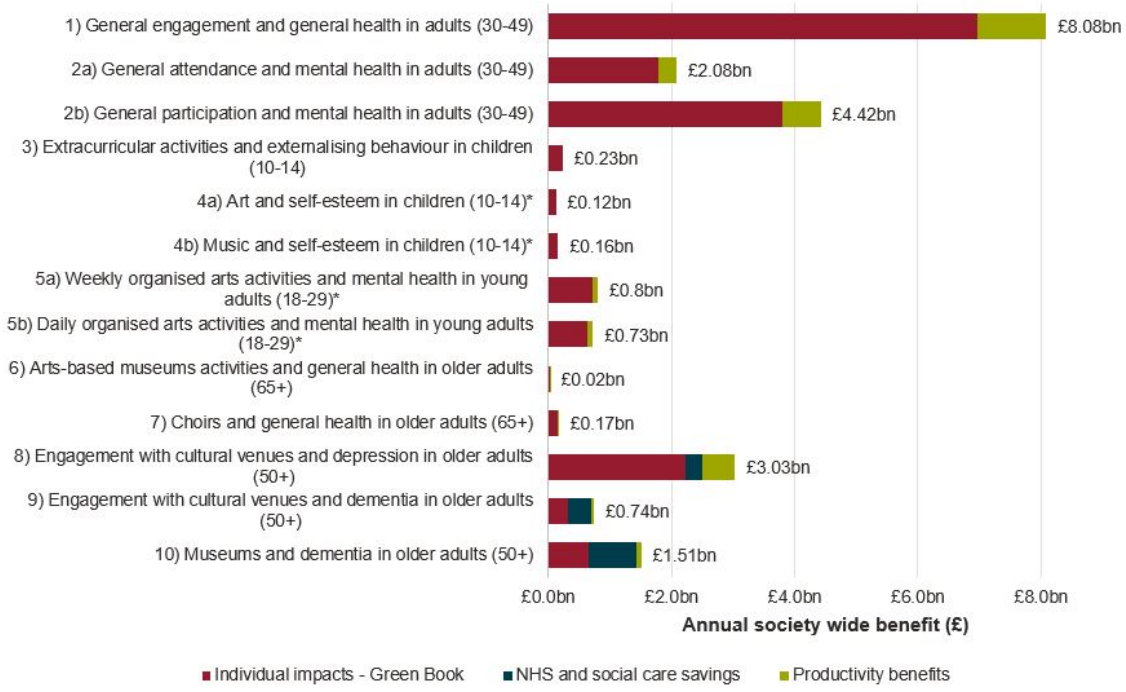
Society-wide benefits range from £18.5 million per year (Arts-based museum activities and general health for older people) to £8 billion per year (General engagement and general health in adults). Most models produce benefits below £1 billion per year.

Society-wide benefits depend on the per-person benefits and the engagement figures. There is typically a trade-off between these two factors: models with very high engagement frequency often have the highest per-person benefit but fewer participants at the required engagement level. This means models with higher per-person benefits do not necessarily have the highest society-wide benefit.

The largest society-wide benefits are from models that use broad measures of engagement such as 'Participation and mental health in adults' and 'General engagement and general health in adults' since the general measures capture the highest engagement levels.

In addition, the size of the society-wide benefit is directly proportionate to that of the population over which potential benefits can occur. The group of individuals aged 50 years and over is the largest (38% of the population), so benefits from these models can be expected to be higher. In contrast, the size of the population aged 10 to 14 years (our 'Children' group) is the smallest group studied.

Figure 7 Annual society-wide benefits across models



Source: *Frontier Economics.*

Note: **Models 4a, 4b, 5a, and 5b use WELLBYs rather than QALYs and so are not directly comparable to other models.*

Table 12 Annual benefits and engagement across models

		Per-person benefits					Society-wide benefits			
#	Model name	Individual impacts	NHS and social care savings	Productivity impacts	Total	Estimated number of engagers	Individual impacts	NHS and social care savings	Productivity impacts	Total
1	General engagement and general health in adults (30-49)	£854	*Not modelled*	£138	£992	8,103,000	£6.92bn	*Not modelled*	£1.12bn	£8.04bn
2a	General attendance and mental health in adults (30-49)	£559	*Not modelled*	£91	£649	3,201,000	£1.79bn	*Not modelled*	£0.29bn	£2.08bn
2b	General participation and mental health in adults (30-49)	£386	*Not modelled*	£63	£448	9,855,000	£3.8bn	*Not modelled*	£0.62bn	£4.42bn
3	Extra-curricular activities and externalising behaviour in children (10-14)	£122	*Not modelled*	*Not modelled*	£122	1,911,000	£0.23bn	*Not modelled*	*Not modelled*	£0.23bn

		Per-person benefits					Society-wide benefits			
#	Model name	Individual impacts	NHS and social care savings	Productivity impacts	Total	Estimated number of engagers	Individual impacts	NHS and social care savings	Productivity impacts	Total
4a	Art and self-esteem in children (10-14)*	£134	*Not modelled*	*Not modelled*	£134	911,000	£0.12bn	*Not modelled*	*Not modelled*	£0.12bn
4b	Music and self-esteem in children (10-14)*	£68	*Not modelled*	*Not modelled*	£68	2,380,000	£0.16bn	*Not modelled*	*Not modelled*	£0.16bn
5a	Weekly organised arts activities and mental health in young adults (18-29)*	£663	*Not modelled*	£86	£748	1,074,000	£0.71bn	*Not modelled*	£0.09bn	£0.8bn
5b	Daily organised arts activities and mental health in young adults (18-29)*	£1,098	*Not modelled*	£142	£1,240	586,000	£0.64bn	*Not modelled*	£0.08bn	£0.73bn
6	Arts-based museums activities and general health in older adults (over 65)	£1,164	*Not modelled*	£146	£1,310	14,000	£0.02bn	*Not modelled*	£0.0bn	£0.02bn

		Per-person benefits					Society-wide benefits			
#	Model name	Individual impacts	NHS and social care savings	Productivity impacts	Total	Estimated number of engagers	Individual impacts	NHS and social care savings	Productivity impacts	Total
7	Choirs and general health in older adults (over 65)	£481	*Not modelled*	£71	£553	307,000	£0.15bn	*Not modelled*	£0.02bn	£0.17bn
8	Engagement with cultural venues and depression in older adults (over 50)	£232	£26	£56	£314	9,646,000	£2.24bn	£0.26bn	£0.54bn	£3.03bn
9	Engagement with cultural venues and dementia in older adults (over 50)	£66	£75	£7	£148	5,018,000	£0.33bn	£0.38bn	£0.04bn	£0.74bn
10	Museums and dementia in older adults (over 50)	£159	£189	£21	£369	4,077,000	£0.65bn	£0.77bn	£0.09bn	£1.5bn

Source: *Frontier Economics*

Note: **Models 4a, 4b, 5a, and 5b use WELLBYs rather than QALYs and so are not directly comparable to other models.*

Sensitivities

We have performed a sensitivity analysis to understand the size of the society-wide benefits if the benefits from some models apply to the entire adult population aged 18 to 65 years. We only consider models which refer to more general health benefits (ignoring specific conditions such as depression) for ages 30 to 49. We do not believe the benefits for children or older adults are applicable to other age groups, and the nature of the young adult model (high-frequency participation or attendance based on US data) means we do not think it is sensible to replicate it for a broader age group in the UK.

Table 13 presents the estimated society-wide benefits, assuming that per-person impacts and engagement levels estimated for adults aged 30 to 49 years are the same across the entire adult population aged 18 to 65 years. These figures are intended only to be indicative because:

- Per-person benefits may be higher or lower for specific age groups. For example, older adults may experience larger benefits from cultural engagement because attending or participating reduces loneliness. If this were true, these figures would be underestimated.
- Participation levels may be higher or lower for different age groups. For example, older adults may have more free time, compared to other age groups, due to retirement and would be able to engage with culture more often.

Table 13 Society-wide benefits assuming benefits apply across the entire adult population

#	Model name	Per person impacts	Engagement rate	Engagement level	Society-wide benefit
1	General engagement and general health in adults	£992	46%	18,780,000	£18.64bn
2a	Attendance and mental health in adults	£649	18%	7,383,000	£4.79bn
2b	Participation and mental health in adults	£448	56%	22,731,000	£10.19bn

Source: Frontier Economics.

4.2.4 Comparison to Natural Capital Framework

As a benchmark to compare our results against, we looked at the Natural Capital Framework by the Department for Environment, Food & Rural Affairs (Defra), which estimates the value of health benefits from nature-based recreational activities in the UK. Adjusting the benefits calculated to make them comparable to the results presented in Figure 5 estimates an 'individual impact' per person of £3,953 per year (compared to benefits of up to £1,164 per year in our models). This suggests that benefits from natural capital and engagement with culture and heritage are similar orders of magnitude. While the estimated benefit from the Natural Capital Framework is larger than the benefits estimated in each of our models, nature-based recreation does not necessarily have a more significant impact on health because the two methodologies are not directly comparable. Amongst other differences, our segment-based approach means that the models only estimate the benefits from specific health outcomes, typically looking at only one health aspect. In addition, the benefits from natural capital are based on 120 minutes a week or more of engagement, while most of our models are concerned with much lower engagement frequencies, such as participating every few months.

4.2.5 Applicability and result limitations

Our work presents a significant step forward in monetising the health and wellbeing benefits of individuals' engagement with culture and heritage. This section sets out how the results can be applied and, in the absence of more data and evidence, the additional assumptions that may need to be made in the application calculations.

The work provides a strong basis for understanding the average impact of culture and heritage on health and wellbeing. For example, Model 1, 'General engagement and general health in adults', uses evidence from a study that reports average impacts for adults who engage 'every few months or more'. Further, a number of the models use evidence from studies reporting benefits for 'bundles' of culture and heritage engagement. For example, Model 1 reports the benefits of engagements such as visiting museums, galleries, heritage sites, theatre, cinema and concerts.

Decision-makers often want to know the impact of marginal changes: the value of one additional culture or heritage engagement. New investment is often designed to create more engagement, and it is natural to want to understand the value of the added engagement (the marginal value). Currently, the evidence does not allow us to estimate these marginal values. As a result, to develop an estimate of the benefit from a single culture and heritage

engagement for an individual, one or more of the following assumptions are required (depending on the model):

- **An assumption on the exact frequency of engagement.** For example, for a model that reports results for adults who engage 'every few months or more', an assumption on what this means for the exact engagement frequency is required. One could assume that 'every few months or more' equals six engagements. This could be informed by engagement data: an average number of engagements could be calculated for all individuals attending the culture and heritage site more than four times a year.
- **An assumption on the relative contribution of each subsequent engagement (the first engagement compared to the second, third and fourth engagements).** A simple assumption may be that the benefits of culture and heritage engagement are linear, meaning each subsequent engagement results in the same level of benefit. For example, if a model estimates the benefits for engagement four times a year is £500 per person, a linear assumption would mean dividing this figure by four to arrive at the marginal benefit (£125). In reality, there is likely to be a degree of non-linearity. For example, a minimum level of engagement may be required for benefits to occur (meaning that one engagement may have no health benefits) or benefits per engagement might fall as engagement increases (the first engagement might be worth £200, the second £150, and so on).
- **An assumption on the relative contributions of different cultural and heritage assets.** A simple assumption may be that the benefits of culture and heritage are constant across all engagement types. For example, in Model 1, where an individual is assumed to benefit from 'frequent' engagement (at least four times per year) across a bundle of engagement types, using this simple assumption to calculate the benefit per engagement means assuming the same benefit arises from engagement with any museum, gallery, heritage site, theatre, cinema or concert.

Unless otherwise stated, models are based on engagement with the relevant cultural asset in a general sense rather than engagement with a specific asset. For example, the estimated benefits of attending a museum relate to attendance at any museum rather than a specific museum or the use of specific services at a museum. In addition, across all models, benefits apply to the entire subgroup mentioned, not just those with a specific condition or suffering from specific problems. For example, the benefit of reduced depression risk applies to the whole age group, not just individuals with depression.

Some examples of how to apply specific models are given below. However, the ways in which these models can be applied will depend upon the data available in each specific instance.

Applying Model 1 – General engagement and general health in adults

Researchers looking to use Model 1, 'General engagement and general health in adults', to monetise the general health benefits of visiting an art gallery for adults aged 30 to 49 years should follow the approach below.

The inputs and assumptions for the monetisation are:

- The benefits per person (as they appear in this report). We calculate that the monetary value of the health benefits of attendance every few months or more is £992.
- The number of adults aged 30 to 49 years who attend the art gallery every few months or more over three years or more. Where this data is not available, it can be estimated by combining the number of adults aged 30 to 49 years who attend the art gallery every few months or more with an assumption about the proportion who engage over three years or more (for example 75%, as used in this report). See the above section for more details on this assumption.

These inputs can be combined to give the total monetary value of benefits for this specific group.

If a researcher would like to develop an estimate for the benefit of a 'single visit' to the art gallery, they would require the following data and assumptions:

- The benefits per person (as they appear in this report). We calculate that the monetary value of the health benefits of attendance every few months or more is £992.
- The data or an assumption on the exact engagement frequencies (for example, an individual attends an art gallery four times a year).
- An assumption on the relative contribution of each engagement. The researcher could assume a linear impact of the frequency of engagement, which would result in an estimate of £249 (£992 divided by 4) for the general health benefits arising from an adult visiting an art gallery.

The researcher could also combine these figures with findings for other groups, for example:

- Model 8 – Engagement with cultural venues and depression in older adults. This model studies adults aged 50 to 64 years and will not overlap with Model 1. However, it may overlap with Model 9.
- Model 9 – Engagement with cultural venues and dementia in older adults. This model studies adults aged 50 to 64 years and will not overlap with Model 1. However, it may overlap with Model 8.

Applying Model 6 – Arts-based museum activities and general health in older adults

Researchers looking to use Model 6, 'Arts-based museum activities and general health in older adults', to monetise the general health benefits of arts-based activities in a given museum for adults aged 65 years and over could use the following approach.

The inputs needed for this monetisation are:

- The benefits per person (as they appear in this report). We calculate that the monetary value of the health benefits of participation every few months or more is £1,310.
- The number of adults aged 65 and over participating weekly in arts-based museum activities at the venue. This must be in the form of a workshop similar to that studied by Beauchet et al. (2020), and engagers must be involved for at least 12 consecutive weeks to see benefits. While adults participating for more than 12 weeks may see higher benefits, evidence is not available to assess the size of these benefits.

This would allow researchers to apply the figures from this report to a scenario in which a museum delivers a 12-week programme.

Further assumptions could be made to approximate the benefit of a single workshop (for cases with different programme lengths). In particular:

- An assumption about the relative contribution of each workshop. Researchers could assume a linear impact of each engagement. This would allow them to estimate approximately £109 (£1,310 divided by 12) for the general health benefits for older adults engaging in a museum workshop-style activity.

5 Clinical deep dive

Our main literature review focuses on the impact of culture and heritage on health and wellbeing, excluding evidence where arts interventions are delivered as a clinical therapy. However, a large body of evidence illustrates the impact of arts interventions delivered as clinical therapy across a broad range of populations and health outcomes. As a result, we conduct a separate clinical deep dive to understand the potential scale of the impact of arts interventions delivered as clinical therapy.

This section presents a separate clinical deep dive involving a rapid literature review (summarised in Table 14) and a model to illustrate the potential monetary impact of arts and creative therapies in clinical settings. Specifically, our clinical deep dive focuses on the impact of visual art therapy on pain and the quality of life (QoL) of individuals diagnosed with cancer.

Table 14 Rapid literature review – initial searches summary

Type of therapy	Key patient populations	Key outcomes
Visual art therapy	Mental health conditions	Mental health, wellbeing, and QoL
Music therapy	Dementia	Cognition
Drama therapy	Cancer or terminal illness	Pain
Dance therapy	Developmental disability, such as autism	Social skills and social functioning

Source: Frontier Economics.

Note: The type of art therapies included are based on information from Mind.

We conduct a specific literature review on the impact of creative art therapy (including all the types of therapy included in Table 14) on the QoL and pain levels of individuals diagnosed with cancer as an example of the potential impact that creative art therapy can have in clinical settings. This literature review aims to inform a monetisation model illustrating the potential impact of creative art therapy in clinical settings. We find the following:

- We focus our clinical deep dive on the impact of visual art therapy on the QoL and pain levels of individuals diagnosed with cancer. This is because the evidence base is

strongest for visual art therapy, specifically, with a number of studies investigating the impact of visual art therapy on pain and the QoL in individuals with cancer.[9] More broadly, the literature base includes different types of therapies, such as music therapy, dance therapy, and visual art therapy. A meta-analysis of RCTs focusing on creative art therapies, including music therapy, dance therapy, and visual art therapy, found that these therapies significantly reduced anxiety, depression, and pain and improved participants' QoL. There is also emerging evidence of creative art therapies' positive impact on the QoL of children and young adults with cancer. In addition, a range of dance therapies is found to improve the QoL and physical activity levels for female breast cancer survivors.

- Visual art therapy is often termed mindful-based art therapy (MBAT) in the literature. MBAT interventions are often broadly defined and include non-art-making components such as psychotherapy as well as art-making components such as drawing, painting and bookmaking. As a result, the modelling estimates include non-art-making components. They should be interpreted as the benefits of a wider intervention that includes but is not limited to, visual art therapy.
- The literature defines specific beneficiaries of visual art therapy. That is, the evidence often focuses on individuals with a specific cancer type, individuals of a specific gender, and individuals who are currently receiving a specific treatment (such as chemotherapy or radiotherapy). There is more evidence about females diagnosed with breast cancer. This differs from the wider literature review, where beneficiaries were generally defined by age category. As a result, the modelling includes an estimate of the monetary impact of visual art therapy for females diagnosed with breast cancer specifically and a more general estimate across all other cancers. We expect that the estimate for breast cancer is more substantial, given that it is informed by tailored evidence.
- For females with breast cancer, we generally find that creative art therapies improve pain and QoL. The evidence of the QoL health outcome measures is more consistent than the pain measures. For children, the findings are less clear, and the results are generally not statistically significant. As a result, our model focuses on monetising the quality-of-life improvements from visual art therapy for adults only.
- We find that the evidence is generally high quality and based on RCTs. However, these trials are often based on small sample sizes.

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9 Monti et al. (2006), Monti et al. (2008), Svensk et al. (2009), and Crane-Okada et al.

5.1 Visual art therapy model

Summary of the visual art therapy model and results

Beneficiaries included: Estimates calculated for all adults diagnosed with a new cancer in a year and specific estimates for all adults diagnosed with breast cancer.

Health outcome: QoL.

Type of engagement: Visual art therapy intervention delivered in a clinical setting. The intervention includes some non-art-making components, such as mindfulness and psychotherapy. The length of intervention varies across studies (between five and twelve weeks).

Main sources of evidence: Monti et al. (2006): an RCT focusing on the impact of MBAT on females with cancer (not isolated to breast cancer). Svensk et al. (2009), Jang et al. (2016), and Monti et al. (2013): RCTs studying the impact of MBAT on patients with breast cancer.

Results:

- Per individual: **£730 per year for individuals** diagnosed with breast cancer undergoing visual art therapy and **£450 per year for individuals** diagnosed with all other cancers, using the HTA QALY valuation.
- Societal: Using the HTA QALY valuation and assuming that 10% of new cancer patients participate in visual art therapy each year, we would expect a benefit of £4.5 million per year for breast cancer patients and £16.3 million per year for all other cancer patients.

Robustness: The literature focuses on the impact of visual art therapy on females diagnosed with breast cancer. As a result, we expect our estimates for breast cancer to be more robust than our estimates for all other cancers.

5.1.1 Literature informing this model

The clinical deep dive uses evidence from four separate RCT studies (listed below) that aim to assess the causal impact of visual art therapy on the QoL of individuals with cancer. However, the studies are based on small sample sizes, and the trials generally focus on individuals in a particular hospital or a small geographic area.

- Monti et al. (2006) is an RCT on the impact of MBAT on the QoL for women with cancer in the United States. MBAT includes drawing, painting, bookmaking, and meditation. The

study finds a significant improvement in pain and QoL from the intervention compared to the control group.

- Monti et al. (2013) is an RCT assessing the impact of MBAT on the QoL for women with breast cancer in the United States. The study finds a significant improvement in pain levels and QoL from the intervention compared to the control group. This finding is consistent across different ethnic groups.
- Svensk et al. (2009) is an RCT on the impact of visual art therapy (defined as painting, drawing, collage making, crafting with paper, writing and psychotherapy) on women undergoing treatment for breast cancer in Sweden. The study finds a significant improvement in the QoL at six months following the intervention compared to the control group.
- Jang et al. (2016) is an RCT examining the impact of MBAT on pain and the QoL for women with breast cancer in South Korea. The study finds a significant improvement in the QoL for the individuals who received MBAT versus the control.

5.1.2 Methodology

Per-person impact

Each study provides an estimated change in the QoL of cancer patients engaging in visual art therapy. We convert these changes in QoL to a consistent quality-of-life measure (QALYs).[10] We calculate the impact of visual art therapy for individuals with breast cancer and all other cancers separately. We estimate the change in the QoL for individuals with breast cancer who engage in visual art therapy by using the average quality-of-life change across the studies. For our estimate for all cancers, excluding breast cancer, we take the quality-of-life change directly from Monti et al. (2006), as this is the only study that contains a broader set of cancers beyond breast cancer. We report the estimated QALY impact using HM Green Book and HTA QALY valuations.

We assume that visual art therapy impacts the QoL of an individual up to six months after the start of the intervention (our impact persistence assumption is detailed in section 4.1). This is a conservative assumption based on the literature. Evidence suggests that visual art therapy

[10] The mapping studies used involve the following: Kim et al. (2012), Ara and Brazier (2008), and Wee et al. (2018).

impacts the QoL for at least six months, but it is not measured at later intervals, so we have not included additional impact post-six months.[11]

We have not included estimates for NHS and social care costs or savings, nor any wider societal estimates, such as changes to productivity. Changes to NHS and social care costs can only be calculated where there is a change in the stage of cancer diagnosis or the cancer diagnosis itself, which we do not expect from the visual art therapy intervention. We also do not expect that the change in QoL due to visual art therapy will be sufficient to result in increased productivity levels.

Society-wide impact

Our society-wide calculations are based on what-if scenarios. Unlike most the other models, we do not have engagement data with which to estimate the society-wide impact. Instead, we use cancer incidence data (from Cancer Research UK) to estimate the number of new cancer diagnoses in 2024 and apply what-if scenarios to understand the potential societal benefits. For example, we apply a what-if scenario in which 10% of individuals newly diagnosed with cancer undergo visual art therapy.

5.1.3 Results and what-if scenarios

Table 15 presents the estimated benefits for each individual undergoing visual art therapy and Table 16 presents the potential society-wide benefits if a given proportion of individuals diagnosed with cancer undergoes visual art therapy.

For individuals with breast cancer, we estimate a benefit of £2,550 per individual per year using the Green Book QALY valuation, and a benefit of £730 per individual per year using the HTA QALY valuation. The society-wide potential benefits range from £2.28 million per year to £31.89 million per year. This depends on the valuation we use and the percentage of the relevant population that receives visual art therapy.

[11] Svensk et al. (2009) find an impact on QoL at six months post-intervention, and Gellaritry et al. (2010) find an impact on quality of life at six months post-intervention. Both studies do not measure QoL at further intervals. Rosenberg (2002) finds an impact from expressive disclosure at six months on physical symptoms (including physical pain) and health care utilisation, but not in psychological variables.

- £2.28 million if 5% of individuals with a new breast cancer diagnosis receive visual art therapy (using the HTA QALY valuation)
- £31.89 million if 20% of individuals with a new breast cancer diagnosis receive visual art therapy (using the Green Book QALY valuation)

For individuals with all other cancers (excluding breast cancer), we estimate a benefit of £1,600 per individual per year, using the Green Book QALY valuation, and a benefit of £450 per individual per year using the HTA QALY valuation. The society-wide potential benefits range from £8.13 million per year to £28.46 million per year. This depends on the valuation we use and the percentage of the relevant population that receives visual art therapy.

- £8.13 million if 5% of individuals with a new cancer diagnosis (excluding breast cancer) receive visual art therapy (using the HTA QALY valuation)
- £28.46 million if 20% of individuals with a new cancer diagnosis (excluding breast cancer) receive visual art therapy (using the Green Book QALY valuation)

Table 16 presents the what-if results using the Green Book QALY valuation. Annex C presents the results for the HTA QALY valuation.

A value for all cancers combined can be calculated by summing the results for breast cancer and all other cancers.

Table 15 Annual estimated values per individual undergoing visual art therapy

	Per individual with breast cancer	Per individual with all other cancers
Individual impacts – Green Book	£2,550	£1,600
Individual impacts – HTA	£730	£450

Source: *Frontier Economics.*

Note: *These figures are annual figures in 2024£s. 'All other cancers' excludes breast cancer. Individual impacts are reported using a Green Book QALY valuation (£70,000) and a HTA QALY valuation (£20,000).*

Table 16 What-if scenarios – annual estimated values – Green Book QALY valuation

	Breast cancer		All other cancers	
Individuals with new cancer diagnoses receiving visual art therapy	**Individuals receiving visual art therapy**	**Benefit**	**Individuals receiving visual art therapy**	**Benefit**
5%	3,100	£7.97 million	17,900	£28.46 million
10%	6,200	£15.94 million	35,800	£56.91 million
20%	12,400	£31.89 million	71,500	£113.82 million

Source: *Frontier Economics*

Note: *These figures are annual figures in 2024£s. 'All other cancers' exclude breast cancer. Individual impacts are reported using a Green Book QALY valuation (£70,000). Results with a HTA QALY valuation (£20,000) are available in Annex C*

6 Implications and recommendations

6.1 Implications of this project

This project produces novel monetary estimates of the impact of culture and heritage on health and wellbeing. This is an important advancement in DCMS's CHC Programme. It allows us to begin illustrating the value of culture and heritage benefits to health and wellbeing, which extend beyond the revenue earned by the assets and visitors' willingness to pay.

Similar to the stock of natural assets or the stock of human knowledge, culture and heritage assets have impacts beyond those measured in the current annual GDP. These assets support the creation of future wealth by supporting a healthier, happier and more productive population. Their influence spans a decade or more. If the assets are degraded, that impact will be felt over time. This report is an important step towards developing robust methods for valuing the contribution of culture and heritage assets.

The primary applications of this work are to input into business cases and provide benchmarks for considering wider societal impacts. Government, cultural organisations and academics can use our estimates in business case development when conducting social cost-benefit analyses and value-for-money assessments within the culture and heritage sector. This will allow business cases to incorporate wider societal impacts better, specifically health and wellbeing impacts, and more robustly make the case for investment in culture and heritage assets or for decisions which will impact culture and heritage.

It is important to note that for several models, a number of assumptions are required to develop estimates on the health and wellbeing benefits of a specific culture and heritage engagement. This is because the literature often provides evidence for 'sustained engagement' and groups different types of culture and heritage engagement. See Section 4.2.5 for a detailed discussion of this issue.

Because the estimates are in a comparable format (pounds and pence), they can be used as benchmarks to understand the impact of health and wellbeing outcomes relative to other outcomes (such as educational outcomes). Furthermore, the estimates can be used to inform resource allocation decision-making across sectors.

The results can complement contingent valuation (CV) studies, where researchers use surveys to estimate the economic value of non-market goods or services by asking people how much they are willing to pay (WTP) for specific benefits. We note that it is impossible to

determine from our research the extent to which our estimates would overlap with estimates from CV studies. Further work could investigate the extent to which individuals consider health and wellbeing benefits when answering questions about their willingness to pay for these assets (this is currently being explored by the CHC Programme). This would help to determine the degree of 'double counting' that would exist if one were to add together the results from the current study and the estimates from CV research.

In addition to the above, our work can be used:

- **To further develop the links between government policy and academic research.** Our work largely draws on the outputs of academic research to estimate monetary values that can be used to inform policy decisions. Consequently, the methods we have developed as part of this project can be used in other monetisation work to bring the latest academic thinking into evidence-based policy recommendations.
- **To inform areas for further research.** Our work highlights areas in which further research could be developed to increase the scope and robustness of the monetary estimates. Below, we have included the areas that we recommend further research.

6.2 Recommendations for further work

We grouped our suggested areas for future work into two categories. First, we suggest additional research that focuses on improving our understanding of the link between culture and heritage and health and wellbeing. This involves expanding the evidence we collected as part of the literature review. Second, we suggest further work on monetising the impact of culture and heritage on health and wellbeing.

6.2.1 Research focusing on improving our understanding of the link between culture and heritage and health and wellbeing

As part of our literature review, we explored the large body of evidence that examines the link between culture and heritage and health and wellbeing. However, we found that a very small subset of the literature could be used as an input to our modelling. The recommendations below highlight areas where the literature base could be expanded to allow for a richer body of evidence to be included in future monetisation work.

- Our literature review found that evidence was more limited regarding the volume of availability and quality for the built historic environment, digital assets (including video games), intangible heritage, and historic landscapes. Therefore, we did not include

models that monetise the link between engagement in these categories and health and wellbeing. We recommend that **additional research be conducted to expand the assets and services that can be monetised**.

- We found that evidence is grouped into broad categories of culture and heritage engagement. For example, several studies have combined cultural engagement in museums, galleries, heritage sites, theatres, cinemas, and concerts to produce impact estimates. This meant that our models could not estimate the impact of specific types of engagement with culture and heritage but instead produce more general estimates for general engagement. This generalisation limits the applicability of our estimates in business cases, which often focus on a specific type of cultural and heritage asset or service. These broad categories are often a result of the datasets they are based on (such as the English Longitudinal Study of Ageing). However, we recommend that the estimated impact of culture and heritage on health and wellbeing is **reported at a more granular level** where possible (such as in primary data collection).

- Further, the evidence often reports the impact of culture and heritage on the health and wellbeing of broad demographic groups. This results in the monetisation models producing estimates that can be applied to age groups, but are not tailored to the distributional impact of culture and heritage. Where possible, we recommend that future studies **explore how these impacts vary by demographics** (such as geography, ethnicity and gender).

- We found that the literature focuses on establishing the impact of culture and heritage across a broad set of health outcomes. However, in many cases, despite the good quality of evidence, we could not produce monetary estimates due to the lack of an established method to convert the findings into comparable quality-of-life measures (QALYs and WELLBYs). In some models, we have produced monetary estimates, and our approach includes several assumptions to convert the health outcome used in the study (for example, models 4a, 4b, 5a, and 5b). Where possible, we suggest that researchers choose health outcomes that have established methods that map their measures to EQ-5D scores. Using measures such as the 36-item Short Form Health Survey Instrument (SF-36), Generalised Anxiety Disorder Assessment (GAD-7), and Patient Health Questionnaire (PHQ-9) will allow studies to monetise consistently and comparably.

- We found that the literature is limited in enabling an understanding of how the impact of engagement with culture and heritage impacts the health and wellbeing of an individual over time. For example, models that estimate the benefits of short-term cultural

engagement typically do not have long enough follow-up periods to understand how long that impact is expected to last. As a result, we have made 'impact persistence' assumptions. Where possible, we suggest that studies **include more extended follow-up periods** that allow for an understanding of how the impact evolves over time.

6.2.2 Further work monetising the impact of culture and heritage on health and wellbeing

Our models are designed to provide initial examples of how to monetise the impact of culture and heritage on health and wellbeing. The recommendations below highlight areas where the modelling could be expanded to develop additional estimates.

- Our modelling produces single estimates of the impact of culture and heritage on health and wellbeing that apply to specific age groups. There is potential for some estimates that explore the **distributional impacts** of culture and heritage impacts. For example, engagement data collected as part of the Taking Part Survey suggests that individuals from particular demographics are more likely to engage with culture and heritage than others. This will allow for business cases to use monetary estimates that are more tailored to specific populations. However, as noted in 6.2.1, the literature exploring distributional impacts is limited. This means that few estimates could be calculated based on demographics other than age (such as ethnicity, income groups and geography).

- We only included health and social care impacts where health conditions are avoided due to culture and heritage engagement. This means that we do not calculate the **cost savings to health and social care where there are more general improvements** in health and wellbeing. This is a conservative assumption as we expect that individuals with improved general health and wellbeing will use NHS and social care services less. Additional work could focus on developing an estimate of the potential savings to the NHS and social care sector from general health and wellbeing improvements. This work would need to explore what changes to health and wellbeing result in a change to health and social care demand and to what extent these demand changes result in cost savings to the NHS or social care services.

- Our modelling estimates the benefits of engagement with culture and heritage on health and wellbeing and does not include the **associated costs**. Estimating the cost of engagement with culture and heritage is challenging. An analysis of costs associated with a single museum visit would have to understand the costs that would have occurred regardless of engagement (e.g. the cost of curating a museum collection) and the costs

added costs due to engagement (e.g. an individual's travel costs). Such an analysis could potentially expand our work.

- The link between culture and heritage and health and wellbeing is complex. Our work considers dose effects (instances in which the impact varies depending on engagement frequency) and the type of engagement (such as the difference between attendance and participation). However, other **complexities could be incorporated** into the monetisation work. There are externalities (benefits to individuals who are not directly engaging) of engagement with culture and heritage, such as changes in the number of hours required to care for an individual (informal care), that could be incorporated into future monetisation work.

- Our work focuses on monetising the impact of culture and heritage on health and wellbeing, where the impact on health and wellbeing is such that it produces a measurable change in a health outcome in the short- or medium-term. It does not include changes in **momentary happiness or wellbeing**. Future work could explore the impact of momentary interactions. We expect the impact would be material, given the frequency in which these momentary interactions occur in the population.

- Our work explores some culture and heritage engagement types in relation to some health outcomes in some populations. It does not provide an overall assessment of the monetary value of culture and heritage engagement to individuals or society as a whole. Further research on how these estimates interact with other valuation techniques is crucial to demonstrating a substantial return on investment in the sector.

- Finally, our work provides an example of the health and wellbeing benefits of culture and heritage interventions that are delivered in a clinical setting. Specifically, we focused our clinical deep dive on the impact of visual art therapy on pain and the QoL of individuals diagnosed with cancer. We found that there is a large body of evidence that illustrates the impact of arts interventions delivered as clinical therapy across a broad range of populations and health outcomes. Additional research could provide further monetary value for the benefits of clinical art therapies.

7 Glossary

Table 17 Glossary

Term	Definition
Average treatment effect on the treated (ATT)	The average impact of being 'treated' (engaging in culture) on the dependent variables (the health outcome).
Causality or causal impacts	When one event is the result of another, rather than simply occurring with that event. Specifically, we want to understand whether improved health outcomes are a result of engagement with culture and heritage or simply occurring regardless improved health outcomes.
Coefficients	Represent the value by which a 1-unit increase in the independent variable (e.g. level of cultural engagement) impacts the dependent variable (e.g. the health or wellbeing measure used).
Confounders	These are variables that influence both the dependent variable (e.g. health and wellbeing outcomes) and the independent variable (e.g. level of cultural engagement). For example, socioeconomic status is likely to impact levels of engagement with culture and heritage and health and wellbeing status.
Social Cost Benefit Analysis (CBA)	Assesses the impact of different options on social welfare. All relevant costs and benefits are valued in monetary terms, unless it is not proportionate or possible to do so (according to the Green Book).
Counterfactual	The outcome that would have occurred absent the intervention. In other words, what would have occurred if an individual had not engaged with culture.

Term	Definition
Cross-sectional analysis	An analysis using data from a given point in time (e.g. health and culture at one point in time), rather than considering data over time.
Dose-effect or Dose-response	When an effect size varies by the frequency of a variable (e.g. the impact of culture on wellbeing varies by the frequency of interaction with culture).
EuroQol five dimensions (EQ-5D)	Used to measure the QoL across five dimensions: mobility, self-care, usual activities, pain or discomfort, and anxiety or depression. It is a score from 0 to 1 (where 1 indicates full health). It maps directly to QALYs: a 0.1 increase in EQ-5D is equivalent to a 0.1 increase in QALYs for one year of life.
Externalities	When an individual's decisions affect people not involved in the activity, such as the benefits of one individual's improved health on family members. This can be positive or negative.
Fixed effects	A statistical technique that can control for unobserved individual characteristics that do not change over time, such as genetic predisposition or certain health conditions.
Incidence rate ratio	The number of new cases of a disease divided by the number of persons at risk for the disease.
Interaction effects	Occur when one variable's effect depends on another variable's value. For example, the impact of culture on health and wellbeing may depend on the sociodemographic status of the individual engaging with culture.
Longitudinal study	Studies in which the subjects are followed with continuous or repeated monitoring over time.
Observable variables	Variables which are included in the data and can be controlled for in the analysis.
Observational studies	Studies that use data from a sample of the population, where the researcher does not

Term	Definition
	control the behaviour over the course of the study, compared to a controlled trial, where individuals are allocated to the treatment or control groups.
Odds ratio	A measure of association between exposure and outcome: a low odds ratio when an individual engages with culture means reduced risk of an outcome (e.g. depression).
Ordinary least squares (OLS)	The standard and simplest regression method used in economics. Can be used on its own or combined with other methods (e.g. propensity score matching) to improve identification of causality.
Person-years	A unit calculated by multiplying the number of people in a study by the time each person is involved in the relevant activity (e.g. how long they are in a study, or how many years they have dementia). For example, if there are 1000 participants who are involved in the study across the 10-year period, this amounts to 10,000 person years. The unit captures both how many people have dementia and for how long they have it.
Propensity score matching	A statistical technique in which 'treated' individuals (those engaging) are matched with 'untreated' individuals with similar characteristics. This helps identify causality.
Quality-adjusted life year (QALY)	A measure of disease burden capturing both the quality and quantity of life lived: one QALY is equal to one year of perfect health.
Randomised control trial (RCT)	A research technique where individuals in the study are randomly assigned to 'treatment' (engage with the specific type of culture and heritage being studied) and 'control' (do not engage with the specific type of culture and heritage being studied). This is the most robust technique to identify causality.

Term	Definition
Regression analysis	A statistical technique used to understand the relationship between variables (health and cultural engagement).
Statistically significant	When a relationship between two or more variables is likely due to some factor of interest rather than chance.
Systematic review	A synthesis of evidence on a set of research questions using a clear and reproducible method of collecting evidence.
Threshold effects	When something needs to reach a certain level for an effect to occur. For example, the impact of culture and heritage does not occur unless a certain level of engagement is achieved.
Time-to-event analysis	A statistical technique used to investigate the length of time until a specific event occurs.
Unobservable variables	Variables that are not observed in the data and cannot be controlled for in standard regression analysis
Wellbeing-adjusted life year (WELLBY)	A measure of subjective wellbeing that captures how people think and feel about their lives: increases in WELLBYs correspond to an increase in life satisfaction.

Annex A – Literature Review

A.1 Scope

- **Beneficiaries:** there are no age exclusions; evidence relating to any age group is within the scope of our search. We include literature focused on the general population, literature focused on specific groups, and literature relating to populations experiencing particular health conditions.
- **Geography:** OECD countries.
- **Research methods:** quantitative studies (or mixed-method studies that include quantitative methods) that use methods that can establish causation. We exclude evidence that is solely descriptive (e.g. correlation analysis) or qualitative (e.g. interviews).
- **Dates:** we examine studies from 2000 to December 2023 (the time in which the literature searches were conducted). This means that this work does include studies published before the year 2000 or after January 2024.

A.2 Search terms

We developed a list of search terms by building on and adapting the terms used in Fancourt D and Finn S (2019) Cultural Contexts of Health: The role of the arts in improving health and wellbeing in the WHO European Region.

Our literature review search terms include:

- Terms specific to the Department for Culture, Media and Sport (DCMS) assets and services classification and terms associated with activities taking place in cultural and heritage settings
- Terms that capture our aim of developing a numerical estimation of the impact
- A focus on health and wellbeing terms associated with health outcomes, health-related patient behaviours or experiences impacting health

Our approach includes three categories of search blocks, which are included in Table 18 and Table 19 below.

- Search blocks within culture and heritage terms
- Search blocks within research methods terms
- Search blocks within health and wellbeing terms

These search blocks use standard search notations from Johns Hopkins University of Medicine, such as an asterisk to truncate the search and quotation marks to indicate searching for an exact phrase.

Table 18 Search blocks within culture and heritage terms

Search block	Search term used	Terms excluded
General Culture and Heritage	“culture” OR “arts” OR “cultural engagement”	NOT “workplace culture” NOT “safety culture” NOT “cultural values” NOT “heritage language” NOT “research culture” NOT “culture of health” NOT “culture of happiness” NOT “quality culture” NOT “organisation culture” NOT “organizational culture” NOT “hospital culture” NOT “martial arts”
Collections and Archives	“artwork” OR “archives" “museum collections” OR “exhibitions” OR “heritage railways” OR “historic ships”	NOT “carotid plaques” NOT “amyloid plaques” NOT “atherosclerotic plaques”
Creative and Artistic Works	“film-making” OR “video games” OR "sculpture” OR “performing arts” OR "theatre production" OR "drama" OR "opera" OR "movie" OR "film" OR "festival" OR "concert" OR "orchestra" OR "cultural events" OR "community arts" OR "cultural festivals" OR "cultural fairs" OR "music" OR "paintings" OR "crafts"	NOT “cognitive performance” NOT “physical performance” NOT “movie reviews” NOT “music therapy” NOT “medical music” NOT “music interventions”
Creative and Cultural Knowledge	"singing" OR "dancing" OR "drawing" OR "painting"	
Cultural Venues and Production Facilities	“culture and entertainment buildings” OR “entertainment buildings” OR “places of worship” OR "libraries" OR "museums" OR "museum" OR "galleries" OR "performance	NOT “operating theatre” NOT “hospital theatre” NOT “medical libraries”

Search block	Search term used	Terms excluded
	venues" OR "theatre" OR "cinema" OR "concert hall" OR "museum venue"	
Digital Assets	“digital archives” OR “digital artworks” OR “digital artwork” OR “computer animations” OR “digital collections”	NOT “gaming disorder” NOT “social media” NOT “active video games”
Historic Built Environment	“historic buildings” OR "heritage site" OR “historic structures” OR “monuments” OR “listed buildings” OR "palace" OR "castle" OR "abbey" OR “agricultural buildings” OR “commemorative structures”	
Historic Landscapes	“archaeology” OR “archaeological sites” OR “scheduled monuments” OR “battlefields” OR “canals” OR “gardens” OR “parks” OR "ruins" OR "shipwrecks" OR “conservation area” OR “natural heritage” OR “natural landscape” OR “community gardens”	NOT “root canals”
Intangible Heritage	"traditions" OR "folklore" OR "rituals" OR "customs" OR "storytelling"	

Source: Frontier Economics.

Table 19 Search blocks within research methods

Search block	Search terms used	Terms excluded
Data	“longitudinal data” OR “longitudinal study” OR “panel study” OR “cross-sectional” OR “survey”	
Methods and research type	causal* OR empiric* OR statistic* OR quantitative* OR	

Search block	Search terms used	Terms excluded
	"meta-analysis" OR "systematic review" OR "randomised control trial" OR "RCT" OR "propensity score matching" OR "fixed effects" OR "fixed-effects" OR "instrumental variables" OR "regression" OR "econometrics" OR "natural experiment" OR "quasi-experimental" OR "mixed methods" OR "experimental evaluation"	

Source: Frontier Economics.

Search blocks within health and wellbeing terms have been grouped into four sub-groups:

1. General health and wellbeing terms (Table 20)
2. Health services and clinical terms (Table 21)
3. Social determinants of health or life experiences (Table 22)
4. Physical and mental health conditions (Table 23)

Table 20 Health and wellbeing terms – general health and wellbeing terms

Search block	Search term
Children and young people's health	"children's health" OR "child's health" OR "young people's health" OR "early years health" OR "infant mortality"
Dental health	"dentist" OR "dental" OR "dental health" OR "oral health"
Mental health	"mental health" OR "health" OR "mental illness" OR "mental disorder" OR "psychological wellbeing"
Mortality	"life expectancy" OR "mortality" OR "premature mortality" OR "excess mortality" OR "quality of life" OR "long-term health" OR "co-morbidities"
Physical health	"physical health" OR "health" OR "physical illness" OR "physical disorder" OR "physical wellbeing"
Prevention	"health prevention" OR "health risk" OR "delayed onset" OR "healthy ageing"
Population health	"population health" OR "public health" OR "local health"

Search block	Search term
Wellbeing	"wellbeing" OR "wellbeing" OR "welfare" OR "life satisfaction" OR "hedonic" OR "eudemonic" OR "happiness" OR "emotion" OR "inspiration"
Workplace health	"workplace health" OR "long-term absence" OR "occupational health"

Source: Frontier Economics.

Table 21 Health and wellbeing terms – health services and clinical terms

Search block	Search term
Treatment adherence, health-related behaviour	"adherence" OR "treatment adherence" OR "vaccine"
Health services	"primary care" OR "general practice" OR "secondary care" OR "community care" OR "accident and emergency" OR "patient access" OR "appointment attendance"
Mechanical ventilation or intensive care	"mechanical ventilation" OR "intensive care mechanical ventilation" OR "intensive care"
Surgery, invasive procedures, and rehabilitation	"surgery" OR "procedure" OR "treatment" OR "hospital" OR "clinical" OR "recovery" OR "medical" OR "operative" OR "invasive" OR "rehabilitation"

Source: Frontier Economics.

Table 22 Health and wellbeing terms – wider determinants of health and experiences impacting health

Search block	Search term
Bereavement	"bereaved" OR "bereavement" OR "end of life" OR "palliative" OR "hospice" OR "death" OR "dying" OR "grieving"
Carer	"carers" OR "caring" OR "caregiving" OR "family" OR "dependents"
Health behaviours	"health behaviours" OR "diet" OR "nutrition" OR "obesity" OR "overweight" OR "underweight" OR "malnourished" OR "exercise" OR "physical activity" OR "smoking" OR "tobacco" OR "alcohol" OR "drugs" OR "substance use"

Search block	Search term
Health and social inequalities and inequities	"health inequalities" OR "health disparities" OR "low income" OR "inequality" OR "inequalities" OR "inequities" OR "inequity" OR "wider determinants of health" OR "social factors"
Social capital	"social capital" OR "social networks" OR "reciprocity" OR "social trust" OR "community development" OR "community identification" OR "social cohesion" OR "civic engagement"

Source: Frontier Economics.

Table 23 Health and wellbeing terms – physical and mental health conditions

Search block	Search term
Acquired brain injury or neurological	"neurological" OR "hemiplegia" OR "stroke" OR "coma" OR "blast injury" OR "brain injury" OR "paralysis" OR "disorders of consciousness" OR "epilepsy" OR "neurodegenerative" OR "motor neuron disease" OR "MND" OR "amyotrophic lateral sclerosis" OR "ALS" OR migraines OR "Parkinson's" OR "Huntington's" OR "stroke" OR "cerebral palsy"
Autism	"autism" OR "autistic" OR "Asperger's"
Cancer	"cancer" OR "oncology" OR "tumour" OR "neoplasm" OR "biopsy"
Chronic pain	"chronic pain" OR "nerve pain" OR "fibromyalgia"
CVD	"cardiovascular disease" OR "coronary heart disease" OR "heart disease" OR "heart attack" OR "heart failure" OR "hypertension"
Dementia	"dementia" OR "Alzheimer's OR "cognition" OR "cognitive" OR "memory"
Diabetes	"diabetes" OR "blood glucose"
Disability	"physical disability" OR "mental disability" OR "learning disability" OR "cognitive impairment" OR "intellectual impairment" OR "sensory impairment" OR "special needs" OR "special education" OR "dyslexia" OR "dyspraxia"
Developmental disorders	"developmental disorders" OR "attention deficit hyperactivity disorder" OR "ADHD" OR "Tourette's"
Genetic disorder	"genetic disorders" OR "Downs syndrome" OR "cystic fibrosis" OR "sickle cell"
Immune system	"immune system" OR "immunity" OR "immunodeficiency" OR "inflammation" OR "inflammatory"
Infectious diseases	"infectious diseases" OR "communicable diseases" OR "TB"

Search block	Search term
Lung health	"lung health" OR "breathing" OR "respiratory" OR "asthma" OR "chronic obstructive pulmonary disease" OR "dyspnoea"
Mental health	"stress" OR "self-esteem" OR "sleep" OR "insomnia" OR "depression" OR "anxiety" OR "suicide" OR "OCD" OR "obsessive-compulsive disorder" OR "psychotic" OR "bipolar" OR "schizophrenia" OR "addiction" OR "bulimia" OR "anorexia" OR "phobia" OR "personality disorder"
Mother and infant health	"pregnancy" OR "pregnant" OR "perinatal" OR "prenatal" OR "postnatal" OR "postpartum" OR "mothers" OR "parents" OR "infant" OR "parent-infant" OR "premature" OR "neonatal" OR "labour" OR "caesarean" OR "vaginal delivery" OR "abortion" OR "miscarriage" OR "fertility"
Musculoskeletal health	"musculoskeletal" OR "musculoskeletal health" OR "back pain" OR "arthritis" OR "osteoarthritis" OR "fractures" OR "sprains" OR "frailty" OR "falls" OR "falling" OR "balance" OR "injury"
Sexual health	"sexual health" OR "reproductive health" OR "STD" OR "STI" OR "HPV" OR "HIV" OR "AIDS"
Speech and language	"speech" OR "language" OR "stuttering" OR "stammering" OR "aphasia"
Trauma	"trauma" OR "abuse" OR "refugee" OR "torture" OR "violence" OR "post-traumatic stress disorder" OR "PTSD"

Source: Frontier Economics.

A.3 Key organisations

We conducted a grey literature search that involved identifying literature from following organisations' websites:

- National Centre for Creative Health
- What Works Centre for Wellbeing
- National Academy for Social Prescribing
- Culture Health and Wellbeing Alliance
- Arts Council England
- Arts Council of Wales
- Creative Scotland
- British Academy
- The King's Fund

- The Baring Foundation
- The Heritage Fund
- The Heritage Alliance
- United Nations Educational, Scientific and Cultural Organisation (UNESCO)
- Historic England
- World Health Organisation (WHO)
- British Council
- All-Party Parliamentary Group on Arts, Health and Wellbeing
- The Social Prescribing Youth Network

A.4 Detailed findings

Table 24, Table 25, Table 26, Table 27, Table 28, Table 29 and Table 30 below report our detailed findings for each DCMS asset and service category. The papers listed below are those that we identified as 'key' papers in the literature review. That is, they include an assessment of culture and heritage relevant to DCMS and use sufficiently high-quality methods (at least level 3 or high level 2 on the Maryland Scientific Methods Scale [SMS]).

Due to a lack of available evidence, we have highlighted in grey any papers that were used directly in the models. We do not include any information on collections and archives, built historic environments, or intangible heritage.

Technical terms have been included as part of our Glossary.

General Culture and Heritage

General culture refers to cultural engagement that is broad and overlaps multiple DCMS categories. For example, we include studies that use the English Longitudinal Study of Ageing (ELSA) definition of cultural engagement, which involves engagement with an art gallery, museum, exhibition, theatre, concert, opera, or cinema.

Table 24 General culture and heritage – Literature Review Summary

Cultural and heritage asset or service	Beneficiaries	Health and wellbeing outcomes	Impact of asset on health and wellbeing outcomes	Variation of evidence by beneficiary type or wider factors	Evidence quality (RAG rated)	Reference
Active arts participation (e.g. singing), and cultural engagement (e.g. museums and theatre)	Adults aged 16 years and over	Mental distress, mental functioning and life satisfaction	Active arts participation has a significant positive effect (reduces propensity) on mental distress, mental functioning and improves life satisfaction	Larger magnitude of effect for higher levels of engagement.	Cross-sectional design	Wang S, Wan Mak, H., Fancourt, D. Arts, mental distress, mental health functioning & life satisfaction: fixed-effects analyses of a nationally-representative panel study.

General cultural engagement	Adults aged 18 years and over	All-cause mortality	Engagement has a significant effect on crude-mortality, cardiovascular disease mortality and other-cause mortality	Not applicable	Cross-sectional design	Jensen A, Pirouzifard M, Lindström M. Arts and culture engagement and mortality: A population-based prospective cohort study.
General cultural engagement – attendance at a museum or art exhibition, concert, theatre, film, church, chapel, or sports event	Adults	Perceived health, anxiety, depression and satisfaction with life	Engagement has a significant effect on good health, good life satisfaction, a low anxiety score and a low depression score	Differences between genders: men who engaged specifically in receptive, rather than creative, cultural activities reported better health-related outcomes. A dose-response effect was indicated.	Cross-sectional design	Cuypers K, et al. 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.

General cultural engagement – a visit to the theatre, cinema or art exhibition	Adults	Health functioning	Cultural engagement was associated with improvements in social functioning and physical functioning when engaged several times a year	Not applicable	Cross-sectional design	Elsden, E., Bu, F., Fancourt, D. et al. Frequency of leisure activity engagement and health functioning over a 4-year period: a population-based study amongst middle-aged adults.
General cultural engagement as defined by ELSA	Older adults	Experienced, evaluative and eudaimonic wellbeing	Short-term engagement was not associated with wellbeing improvements; repeated engagement was associated with enhanced eudaimonic wellbeing	Not applicable	Cross-sectional design	Tymoszuk U, Perkins R, Spiro N, Williamon A, Fancourt D. Longitudinal Associations Between Short-Term, Repeated, and Sustained Arts Engagement and wellbeing Outcomes in Older Adults.
General cultural engagement as defined by ELSA	Older adults	Pain	Cultural engagement has a significant reduction in risk of developing chronic pain	Relationship is independent of confounders	Cross-sectional design	Fancourt D, Steptoe A. Physical and Psychosocial Factors in the Prevention of Chronic Pain in Older Age.

General cultural engagement as defined by ELSA	Older adults	Frailty	Cultural engagement has a significant effect on frailty incidence and progression	Results vary by levels of engagement with cultural events	Cross-sectional design	Rogers NT, Fancourt D. Cultural Engagement Is a Risk-Reducing Factor for Frailty Incidence and Progression.
General cultural engagement as defined by ELSA	Older adults	Disability	Cultural engagement results in a significant reduction in the risk of developing a disability	Association is most clearly seen in individuals aged 50 to 65 years. Frequent cultural engagement is important.	Longitudinal analysis (including fixed effects)	Fancourt D, Steptoe A. Comparison of physical and social risk-reducing factors for the development of disability in older adults: a population-based cohort study.

General cultural engagement as defined by ELSA	Older adults	Loneliness	Cross-sectional evidence show that cultural engagement results in a significant reduction in loneliness Longitudinal analysis did not show a clear impact of cultural engagement on loneliness	Results vary by level of engagement with cultural events and the type of cultural engagement	Cross-sectional design	Tymoszuk U, Perkins R, Fancourt D, Williamon A. Cross-sectional and longitudinal associations between receptive arts engagement and loneliness among older adults
General cultural engagement as defined by ELSA	Older adults	Depression	Cultural engagement results in significant reduction in depression risk	Dose-response relationship: more regular attendance further reduces the risk	Cross-sectional design	Fancourt, D, Tymoszuk, U. Cultural engagement and incident depression in older adults: evidence from the English Longitudinal Study of Ageing.

Source: Frontier Economics.

Creative and Artistic Works and Creative and Cultural Knowledge

We combined the creative and artistic works and creative and cultural knowledge categories as these often overlap in the literature. For this combined category we grouped our findings into three subgroups.

- Active general participation
- Cultural events or community based cultural programmes
- Music participation

Table 25 Creative and Artistic Works and Creative and Cultural Knowledge – Active general participation – Literature Review Summary

Cultural and heritage asset or service	Beneficiaries	Health and wellbeing outcomes	Impact of asset on health and wellbeing outcomes	Variation of evidence by beneficiary type or wider factors	Evidence quality (RAG rated)	Reference
Extracurricular art activities	Children to young adults	Externalising behaviour (including ADHD)	Engaging in extracurricular arts activities in 5th grade (Year 6 in England and Wales) are associated with decreased externalising behaviours reported by parents in 8th grade (Year 9 in England and Wales).	School-based activities were less impactful.	Cross-sectional design	Fluharty M, Bone J, Bu F, Sonke J, Fancourt D, Paul E. Associations between extracurricular arts activities, school-based arts engagement, and subsequent externalising behaviours: Findings from the Early Childhood Longitudinal Study.

Extracurricular music, painting, or reading activities	Children	Self-reported self-esteem	Children who participated in arts activities most days were significantly more likely to have higher levels of self-esteem than those who participated less often	Results varied between levels of parental engagement in these activities	Propensity score matching	Mak HW, Fancourt D. Arts engagement and self-esteem in children: results from a propensity score matching analysis.
Engagement in artistic, musical, or theatrical organisations	Young adults aged 18 to 28 years	Flourishing, emotional, psychological, and social wellbeing	Increases in arts engagement were associated with increases in flourishing There is limited evidence for the impact on emotional wellbeing	Residential area was a moderator (arts engagement was only associated with increased flourishing in metropolitan areas)	Fixed effects	Bone JK, Bu F, Sonke JK, Fancourt D. Longitudinal Associations Between Arts Engagement and Flourishing in Young Adults: A Fixed Effects Analysis of the Panel Study of Income Dynamics.

Participation in performing arts, visual arts, and writing	Young adults aged 18 to 28 years	Mental health	Once-a-week to almost-every-day participation is associated with an increased positive effect on mental health	Effect magnitude differs by frequency of participation (higher frequency results in more significant impact)	Fixed effects controlling for unobserved characteristics	Block EP, Wong MD, Kataoka SH, Zimmerman FJ. A symphony within: Frequent participation in performing arts predicts higher positive mental health in young adults.
Active engagement (e.g. singing and painting) and passive engagement (e.g. theatre and museum visits)	Individuals aged 14 years and over	General health, presence of specific symptoms, low mood, and general life satisfaction	Insignificant effect on the measured outcomes	Not applicable	Difference-in-difference with propensity score matching	Węziak-Białowolska D. Attendance of cultural events and involvement with the arts-impact evaluation on health and wellbeing from a Swiss household panel survey.
Art engagement or arts intervention	Healthy adults aged 18 years and over	Cognition, QoL, and wellbeing	Arts engagement has a significant positive effect on all health outcomes	Effect determined by factors such as exposure to cultural activities and group effect	Paper reviews (including RCTs and observational studies)	Fioranelli M, Roccia MG, Garo ML. The role of arts engagement in reducing cognitive decline and improving QoL in healthy older people: a systematic review.

Video games	Adults aged 18 years and over	Affective wellbeing and general life satisfaction	No significant evidence of a causal connection between the impacts of video games on wellbeing	Not applicable	Longitudinal analysis	Vuorre M, Johannes N, Magnusson K, Przybylski AK. Time spent playing video games is unlikely to impact wellbeing.
Art based activities delivered by a museum	Older adults	Wellbeing, general health, and frailty	Benefits were reported for QoL Mixed effects were observed for frailty No significant effect was found for wellbeing	Not applicable	RCT – Randomisation not successful between the two groups (i.e. allocation of individuals to the treatment and control groups was not random due to factors outside of the study)	Hayashi Y, Matskiv J, Galery K, Beauchet O. Productive arts engagement at the Tokyo Fuji Art Museum and its health effects on the older Japanese population: results of a randomized controlled trial.
Guided art tours and art-making activities in a museum	Individuals with dementia and their carers	Emotional state, wellbeing, and QoL	Intervention group showed significant improvements in self-assessed QoL Effect size deemed to be 'medium'	Not applicable	RCT	Schall A, Tesky VA, Adams AK, Pantel J. Art museum-based intervention to promote emotional well-being and improve QoL in people with dementia: The ARTEMIS project.

Participatory arts-based activities delivered by a museum	Older adults	Wellbeing, QoL, and frailty	Significant improvements in frailty, wellbeing, and QoL scores from art activities	Not applicable	RCT	Beauchet O, Cooper-Brown LA, Hayashi Y, Deveault M, Ho AHY, Launay CP. Health benefits of 'Thursdays at the Montreal Museum of Fine Arts': Results of a randomized clinical trial.
Visual arts, dance or movement, or music	Older adults aged 60 years and over with mild cognitive impairments	Cognition	A mixture of papers which showed significant and insignificant effects; however, visual arts were always found to have significant effects	Not applicable	Systematic review of RCTs	Fong, Z.H, Tan, S.H, Mahendran, R. Kua, E.H, Chee, T.T. Arts-based interventions to improve cognition in older persons with mild cognitive impairment: A systematic review of randomized controlled trials.

Performing arts, creative arts, visual arts, or recreational activities	Older people living in care homes	General health, wellbeing, and QoL	A minority of studies found a statistically significant impact on dementia, depression, and QoL	Not applicable	Systematic review with mixed-quality studies	Curtis A, Gibson L, O'Brien M, Roe B. Systematic review of the impact of arts for health activities on health, wellbeing and QoL of older people living in care homes.
Attending education, arts, or music classes	Older adults	Wellbeing	Education, arts, or music classes were associated with decreased 'negative effect' (i.e. fewer negative emotions or experiences), a significant positive impact on life satisfaction, an insignificant impact on wellbeing measures and 'positive effect' (i.e. no impact on positive emotions or experiences)	Not applicable	Longitudinal study without fixed effects	Fancourt D, Steptoe A. Community group membership and multidimensional subjective wellbeing in older age.

Active engagement (e.g. singing or painting) and passive engagement (e.g. theatre or museum visits)	Older adults	Cognition	Insignificant effect of active arts engagement Moderate passive arts engagement is associated with an increase in memory score	Differences in passive versus active culture and heritage No evidence that more frequent arts engagement was more beneficial for cognition	Propensity score matching	Bone J, Fancourt D, Sonke J, Bu F. Participatory and receptive arts engagement in older adults: Associations with cognition over a seven-year period
Theatre and visual arts intervention	Older adults	Cognitive and affective functioning: word recall, listening span, and problem-solving	Theatre participants improved significantly in two of the three cognitive variables: recall and problem-solving Participants also improved significantly in psychological wellbeing	The theatre group scored significantly higher than the visual arts group.	RCT	Noice H, Noice T, Staines G. A short-term intervention to enhance cognitive and affective functioning in older adults.

Source: Frontier Economics.

Table 26 Creative and Artistic Works and Creative and Cultural Knowledge – Cultural events or community based cultural programmes – Literature Review Summary

Cultural and heritage asset or service	Beneficiaries	Health and wellbeing outcomes	Impact of asset on health and wellbeing outcomes	Variation of evidence by beneficiary type or wider factors	Evidence quality (RAG rated)	Reference
Attendance at cultural events or places	Adults	Life satisfaction and self-assessed health	Significant effect on chances of good health and positive life satisfaction	Varies by the type of cultural event and activity.	Cross-sectional design	Scottish Government Social Research. Healthy Attendance? The Impact of Cultural Engagement and Sports Participation on Health and Satisfaction with Life in Scotland

Community arts programme	Adults	Wellbeing	Arts programme participation was associated with: higher 'positive effect' (i.e. more positive experiences) and increases in life satisfaction. In sensitivity analyses, these associations were maintained four years later		Propensity score matching	Bone JK, Fancourt D, Fluharty ME, Paul E, Sonke JK, Bu F. Associations between participation in community arts groups and aspects of wellbeing in older adults in the United States: a propensity score matching analysis.
Attendance at cultural events	Adults	All-cause mortality	Significant effect on crude, all-cause mortality: the mortality rate of participants with the lowest attendance level was 60% higher than those with the highest attendance level	Results vary by the frequency of participation in cultural events: a larger impact is associated with more frequent participation	Cross-sectional design	Bygren LO, Jansåker F, Sundquist K, Johansson SE. Association between attending cultural events and all-cause mortality: a longitudinal study with three measurements (1982-2017).

Attendance at cultural events	Adults	Coronary heart disease (CHD)	Significant reduction in CHD risk: a high level of cultural exposure reduces the risk by 34% compared to lowest levels of exposure	the level of cultural exposure is important	Longitudinal design	Johansson SE, Jansåker F, Sundquist K, Bygren LO. A longitudinal study of the association between attending cultural events and coronary heart disease.
Participation in local community arts groups	Older adults	Mental health	Significant positive effect on the 'positive affect score', life satisfaction, purpose in life, and mastery	Dose-response: larger impact for weekly participation compared to monthly	Propensity score matching	Bone JK, Fancourt D, Fluharty ME, Paul E, Sonke JK, Bu F. Associations between participation in community arts groups and aspects of wellbeing in older adults in the United States: a propensity score matching analysis.

Community-based cultural programmes	Older adults, aged 64 years and over	Physical and mental health	Significant effect on measures such as self-rated health, doctor visits, over-the-counter medications, and falls Magnitudes are not easily interpreted at this stage	Not applicable	RCT	Cohen GD et al. The Impact of Professionally Conducted Cultural Programs on the Physical Health, Mental Health, and Social Functioning of Older Adults.

Source: Frontier Economics.

Table 27 Creative and Artistic Works and Creative and Cultural Knowledge – Music participation – Literature Review Summary

Cultural and heritage asset and service	Beneficiaries	Health and wellbeing outcomes	Impact of asset on health and wellbeing outcomes	Variation of evidence by beneficiary type or wider factors	Evidence quality (RAG rated)	Reference
Listening to music	Children and young adults aged 13 to 25 years	Substance abuse	Positive relationship between music and substance abuse.	Varied by music format and genre	Systematic review that includes a wide range of analysis types (including RCTs)	Wright, C, Ball T., Kambour K., Machado, L., Defrancesco, T, Hamilton, C., Janette, H., Dauk, J. Music and substance use: A meta-analytic review.

Music and singing	Younger adults, adults, and older adults	General wellbeing, anxiety, and depression	No significant effect on anxiety Significant effect on depression	Reduced anxiety in specific groups including young adults, pregnant women, and prisoners Improvements in wellbeing and QoL for adults in palliative care with a range of chronic conditions	Systematic review (particularly high-quality evidence for older adults)	Daykin N, et al. What works for wellbeing? A systematic review of wellbeing outcomes for music and singing in adults.
Playing music	Adults	Mental health outcomes: incidence of mental health disorders	Insignificant effect of music on mental health disorders	Independent of musical achievement	Uses data on biological twins to control for genetic and shared environments	Wesseldijk, L.W., Ullén, F. & Mosing, M.A. The effects of playing music on mental health outcomes.
Active and passive music participation	Adults aged 40 years and over	Psychophysical and social variables	Active music participation has beneficial effects on both cognitive and psychosocial functioning (the magnitude varies across studies)	Difference between participation and listening; listening to music only impacts cognitive functioning	Systematic review. Only includes RCTs.	Viola E, et al. The role of music in promoting health and wellbeing: a systematic review and meta-analysis.

Group singing	Adults with long-term health conditions associated with persistent pain	Pain measures (intensity, interference, and depression)	Most studies find that singing reduces pain measures, but there is more support for a reduction in pain interference and depression than intensity (the magnitude varies across studies)	Results vary across studies (studies had different demographic groups)	Systematic review of various mixed-quality study types	Irons JY, Sheffield D, Ballington F, Stewart DE. A systematic review on the effects of group singing on persistent pain in people with long-term health conditions.
Choirs	Bereaved adults	Anxiety, depression, wellbeing, and self-esteem	Choir groups had more stable symptoms of depression and levels of wellbeing, plus gradual improvements in sense of self-efficacy and self-esteem over the 24 weeks in comparison to control group	Not applicable	Experimental design but the groups were not randomised to control for differences groups (observed and unobserved)	Fancourt D, Finn S, Warran K, Wiseman T. Group singing in bereavement: effects on mental health, self-efficacy, self-esteem and wellbeing.

Community group singing	Older adults	Mental health-related QoL, depression, and anxiety	Significant positive effect on mental health-related QoL	Not applicable	RCT but with a small sample size and a restricted geographical area	Coulton S et al. Effectiveness and cost-effectiveness of community singing on mental health-related QoL of older people: Randomised controlled trial. British Journal of Psychiatry

Source: Frontier Economics.

Cultural Venues and Production Facilities

Table 28 Creative and Cultural Knowledge – Literature Review Summary

Cultural and heritage asset or service	Beneficiaries	Health and wellbeing outcomes	Impact of asset on health and wellbeing outcomes	Variation of evidence by beneficiary type or wider factors	Evidence quality (RAG rated)	Reference

Engagement with cultural venues	Older adults	Mental health	Significant reduction in the risk of depression	Statistically significant at alternative thresholds of engagement	Propensity score matching, fixed effects and logistic regressions	Fancourt D, Steptoe A. Cultural engagement and mental health: Does socio-economic status explain the association?
General cultural engagement	Older adults	Dementia	Significant reduction in the risk of developing dementia	Not applicable	Cross-sectional design	Fancourt D, Steptoe A, Cadar D, Community engagement and dementia risk: time-to-event analyses from a national cohort study
Visits to art galleries, exhibitions, or museums	Older adults	Dementia	Significant reduction in dementia incidence from attending museums every few months or more	Lower levels of engagement did not have a statistically significant effect	Cross-sectional comparison	Fancourt D, Steptoe A, Cadar D. Cultural engagement and cognitive reserve: museum attendance and dementia incidence over a 10-year period.

Source: Frontier Economics.

Digital Assets

Table 29 Digital assets – Literature Review Summary

Cultural and heritage asset or service	Beneficiaries	Health and wellbeing outcomes	Impact of asset on health and wellbeing outcomes	Variation of evidence by beneficiary type or wider factors	Evidence quality (RAG rated)	Reference
Online museum resource (e.g. telling the human stories behind the art)	Young adults aged 16 to 24 years	Mental health	Significant decline in individuals with a deterioration of mental health negative effect over the intervention, but not sustained beyond intervention No significant improvement in mental health or psychological distress	Not applicable	RCT Small sample size as this is a proof-of-concept study	Syed Sheriff RJ et al., A co-produced online cultural experience compared to a typical museum website for mental health in people aged 16-24: A proof-of-principle randomised controlled trial.

Source: Frontier Economics.

Historic Landscapes

A high proportion of the identified evidence is based in the US and focuses on parks. Generally, the evidence shows a correlation between historic landscapes and services and health and wellbeing, rather than a causal link.

Table 30 Historic landscapes – Literature Review Summary

Cultural and heritage asset or service	Beneficiaries	Health and wellbeing outcomes	Impact of asset on health and wellbeing outcomes	Variation of evidence by beneficiary type or wider factors	Evidence quality (RAG rated)	Reference
Park space	Children aged 9 to 10 years	BMI change between childhood and age 18	Park spaces within 500 metres of children's homes had significant inverse associations with their BMI at age 18 Park spaces within 10 kilometres of children's homes had significant inverse associations with their BMI at age 18	Impact was larger for boys than girls	Initial baseline BMI controlled for in the model	Wolch J, et al. Childhood obesity and proximity to urban parks and recreational resources: a longitudinal cohort study.
Visits to canals and rivers	Adults aged 16 years and over	Mental wellbeing	Significant positive associations between visits to canals and rivers and mental wellbeing	Impact decreases slightly with increasing age	Cross-sectional comparison Sample was self-selected	Bergou N, et al. The mental health benefits of visiting canals and rivers: An ecological momentary assessment study.

Source: Frontier Economics.

Annex B – Monetisation

B.1 Inputs to monetisation

Table 31 sets out the inputs used across multiple case studies. The inputs are split into individual quality-of-life impacts, health and social care costs, productivity impacts, and engagement inputs.

Table 31 Inputs used across multiple case studies

Inputs	Source
Individual quality-of-life impacts	
QALYs for the healthy population	University of York (1999). UK Population Norms for EQ-5D
QALYs for those with depression and dementia	Public Health England (2020). The health and social care costs of a selection of health conditions and multi-morbidities
Health and social care costs	
NHS costs of depression and dementia	Public Health England (2020). The health and social care costs of a selection of health conditions and multi-morbidities
Social care costs of dementia	Care Policy and Evaluation Centre (2019) Projections of older people with dementia and costs of dementia care in the United Kingdom, 2019-2040
Productivity impacts	
Average hourly pay, weekly pay, and paid hours worked	Annual Survey of Hours and Earnings, Office for National Statistics
Calculation of net pay	Money Saving Expert
Engagement inputs	
England and Wales population data	England and Wales census
Scotland population data	Scotland Census
Northern Ireland population data	Northern Ireland census

Inputs	Source
Individual quality-of-life impacts	
Taking Part Survey	Taking Part survey; detailed information available at Taking Part survey dashboard;
Taking Part longitudinal survey	DCMS (2016). Taking Part: Findings from the longitudinal survey waves 1 to 3

Source: Frontier Economics.

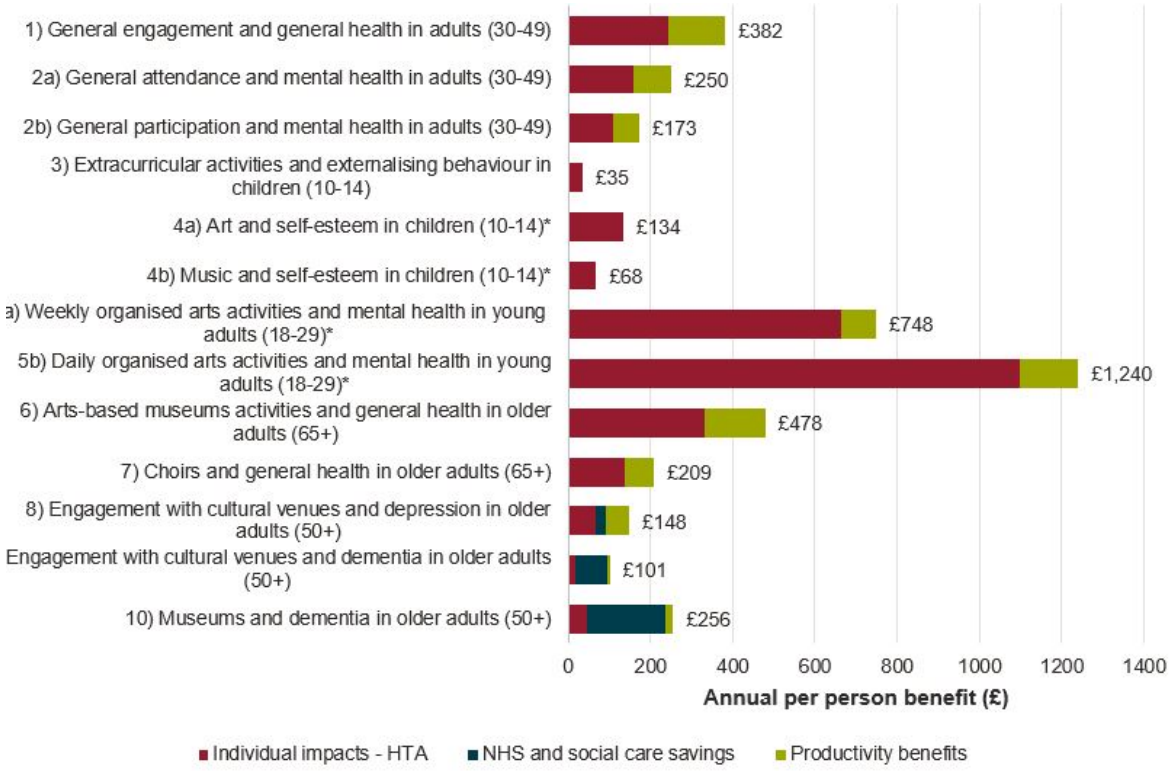
B.2 Overall results – Health technology assessment (HTA) value

The main body of this report presents the results of our modelling using the Green Book QALY value (£70k). As explained in section 4.1, we also used an alternative QALY valuation (£20k), the lower end of the range used in the National Institute for Health and Care Excellence (NICE) Health technology assessments (HTA value). While the Green Book value is more appropriate when considering welfare value (the primary focus of this work), we present HTA values so our work can be interpreted and used across the wider healthcare sector.

The benefits estimated in the four models which use Wellbeing-adjusted life year (WELLBY) do not change between the Green Book and the HTA QALY values. This is because WELLBY is a separate value to the QALY, and we do not adjust WELLBY to reflect changes in the QALY. Therefore, the benefits for these models appear higher in this valuation relative to other models, compared benefits in the Green Book valuation.

Figure 8 presents the per-person benefits, while Figure 9 presents society-wide benefits. Table 32 presents a breakdown of the figures.

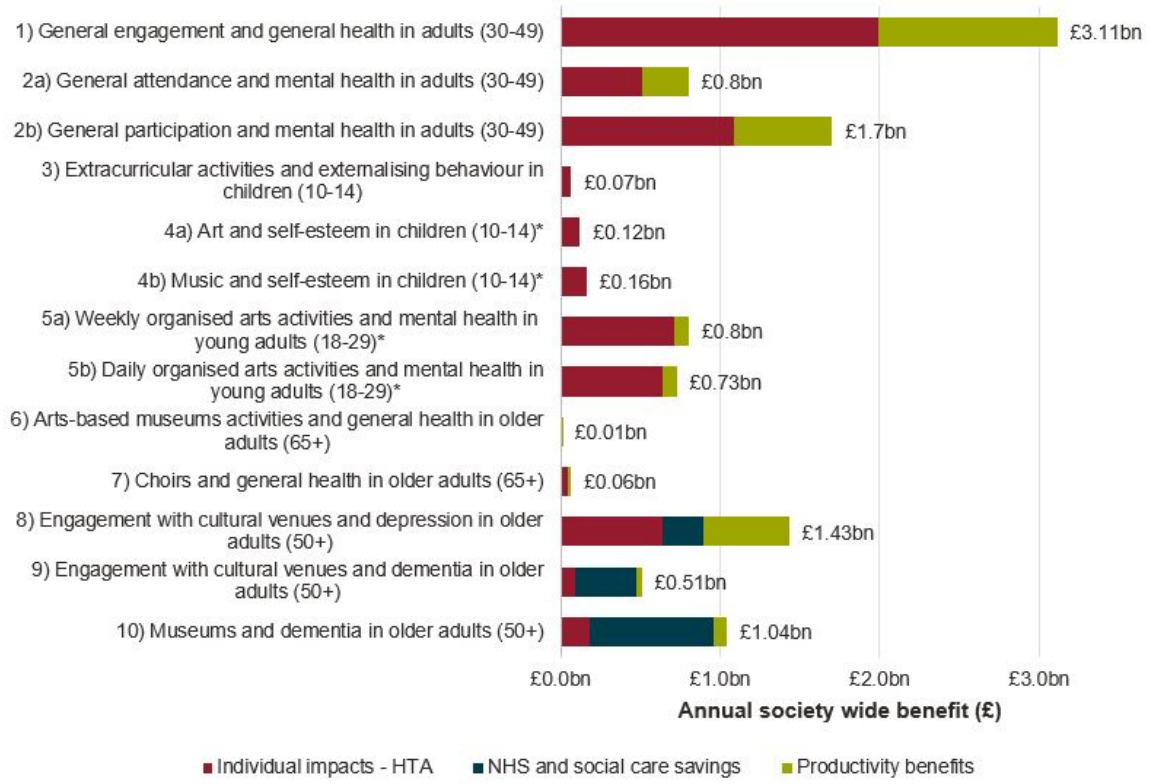
Figure 8 Annual per-person benefits across models (HTA value)



Source: *Frontier Economics.*

Note: **Models 4a, 4b, 5a, and 5b use WELLBYs rather than QALYs and so are not directly comparable to other models.*

Figure 9 Annual society-wide benefits across models (HTA value)



Source: *Frontier Economics.*

Note: **Models 4a, 4b, 5a, 5b use WELLBYs rather than QALYs and so are not directly comparable to other models.*

Table 32 Annual per-person and society-wide benefits across models (HTA value)

			Per-person benefits				Society-wide benefits			
#	Model name	Engagement	Individual impacts	NHS and social care savings	Productivity impacts	Total	Individual impacts	NHS and social care savings	Productivity impacts	Total
1	General engagement and general health in adults (30-49)	8,103,000	£244	Not modelled	£138	£382	£1.98bn	Not modelled	£1.12bn	£3.1bn
2a	General attendance and mental health in adults (30-49)	3,201,000	£160	Not modelled	£91	£250	£0.51bn	Not modelled	£0.29bn	£0.8bn
2b	General participation and mental health in adults (30-49)	9,855,000	£110	Not modelled	£63	£173	£1.09bn	Not modelled	£0.62bn	£1.7bn
3	Extra-curricular activities and externalising behaviour in children (10-14)	1,911,000	£35	Not modelled	Not modelled	£35	£0.07bn	Not modelled	Not modelled	£0.07bn

			Per-person benefits				Society-wide benefits			
#	Model name	Engagement	Individual impacts	NHS and social care savings	Productivity impacts	Total	Individual impacts	NHS and social care savings	Productivity impacts	Total
4a	Art and self-esteem in children (10-14)*	911,000	£134	Not modelled	Not modelled	£134	£0.12bn	Not modelled	Not modelled	£0.12bn
4b	Music and self-esteem in children (10-14)*	2,380,000	£68	Not modelled	Not modelled	£68	£0.16bn	Not modelled	Not modelled	£0.16bn
5a	Weekly organised arts activities and mental health in young adults (18-29)*	1,074,000	£663	Not modelled	£86	£748	£0.71bn	Not modelled	£0.09bn	£0.8bn
5b	Daily organised arts activities and mental health in young adults (18-29)*	586,000	£1,098	Not modelled	£142	£1,240	£0.64bn	Not modelled	£0.08bn	£0.73bn
6	Arts-based museums activities and general health in older adults (over 65)	14,000	£333	Not modelled	£146	£478	£0.005bn	Not modelled	£0.02bn	£0.007bn

			Per-person benefits				Society-wide benefits			
#	Model name	Engagement	Individual impacts	NHS and social care savings	Productivity impacts	Total	Individual impacts	NHS and social care savings	Productivity impacts	Total
7	Choirs and general health in older adults (over 65)	307,000	£138	Not modelled	£71	£209	£0.04bn	Not modelled	£0.02bn	£0.06bn
8	Engagement with cultural venues and depression in older adults (over 50)	9,646,000	£66	£26	£56	£148	£0.64bn	£0.26bn	£0.54bn	£1.43bn
9	Engagement with cultural venues and dementia in older adults (over 50)	5,018,000	£19	£75	£7	£101	£0.09bn	£0.38bn	£0.04bn	£0.51bn
10	Museums and dementia in older adults (over 50)	4,077,000	£46	£189	£21	£256	£0.19bn	£0.77bn	£0.09bn	£1.04bn

Source: *Frontier Economics.*

Note: **Models 4a, 4b, 5a and 5b use WELLBYs rather than QALYs and so are not directly comparable to other models.*

B.3 Approach to calculating productivity benefits

We calculate the productivity benefits using the Department of Health and Social Care (DHSC) guidance, developed for NICE.[12] These benefits include paid and unpaid productivity impacts and are based on QALY improvements estimated in the 'Individual impact' component of our modelling. We do not calculate productivity benefits for children.**Error! Reference source not found.** Figure 10 provides an example of how the calculations work in practice.

Paid productivity

Paid productivity is valued as the additional wages generated by improved QoL (and increased ability to work). Productivity levels are calculated using DHSC productivity functions as a function of an individual's age and EQ-5D score. In our calculations, 'age' is the average age reported in the specific study we used for that model, except for Models 2a and 2b and 5a and 5b, where we used the mid-point of the age range modelled (40 years old in 2a and 2b and 24 years old in 5a and 5b) since the study average is not suitable.

The exact approach used varies across the type of model:

- For Models 8, 9, and 10 (models which estimate reduced risk of disease), we calculate the productivity level using the EQ-5D score of an individual with the condition (depression or dementia) using a formula included in the NICE guidance. We compare this to the expected productivity level of an individual of the same age without the condition. This is also calculated using the data reported in NICE guidance.
- For all other models where we calculate productivity benefits (models which estimate adults' increased QoL without reference to a specific condition), we calculate counterfactual paid productivity as the productivity level using the EQ-5D score of a healthy individual in that age group based on QALYs in Table 31. To calculate factual productivity, we add the improvement in EQ-5D, which is calculated as part of the individual impacts based on evidence from the literature.

The change in productivity is calculated as the difference in productivity between the counterfactual and factual productivity levels. Productivity levels are combined with working hours and average wages based on the Annual Survey of Hours and Earnings (ASHE) data for the age group modelled (e.g. ages 30 to 49) to monetise the paid productivity impacts.

[12] This guidance has since been removed from the NICE website.

Unpaid productivity

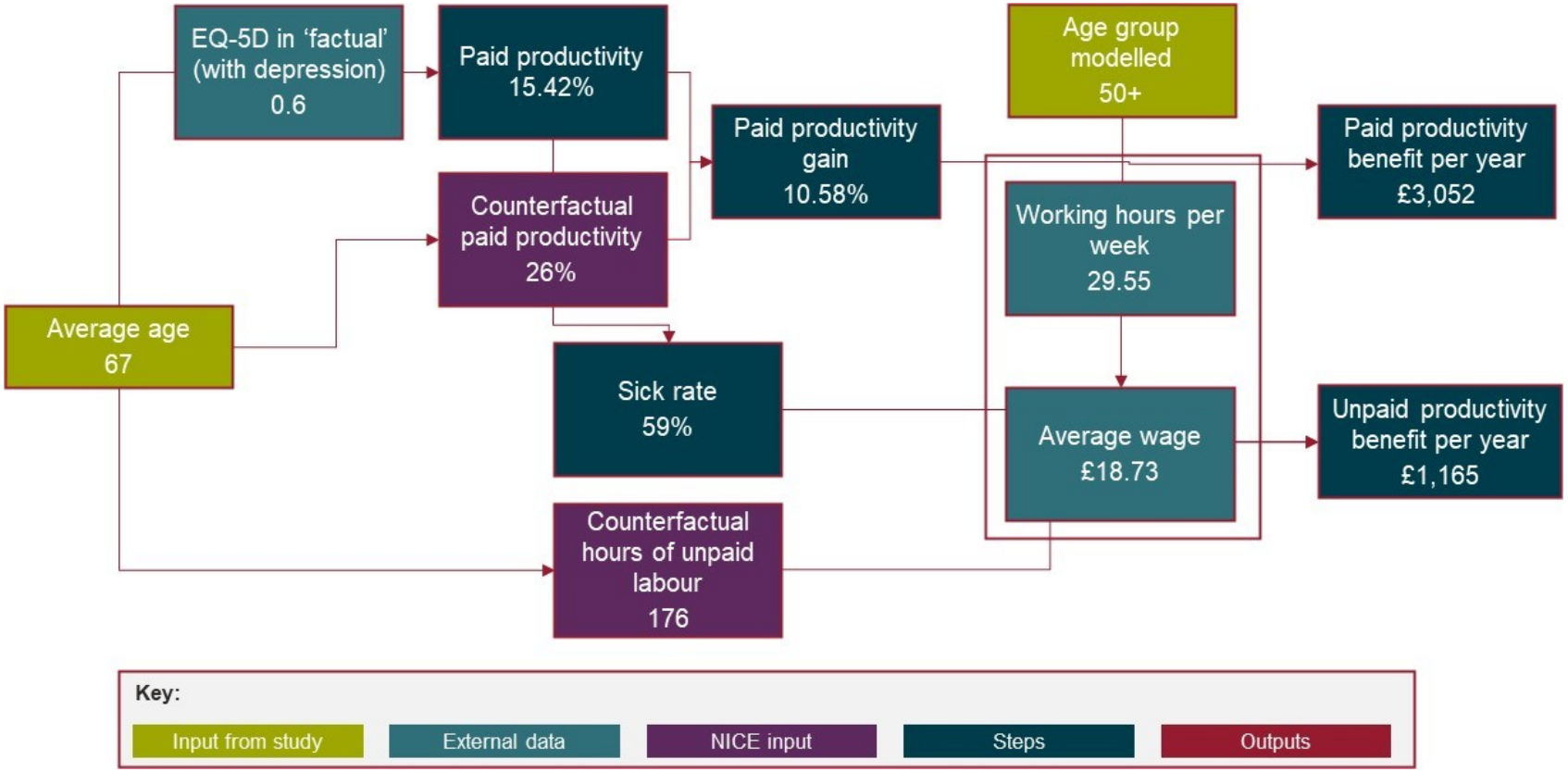
An individual's unpaid productivity relates to the time they spend on activities such as volunteering and labour in the home.

We define the 'sick rate' as the reduction in productive hours due to illness. This can be calculated as the level of paid productivity divided by the counterfactual level of paid productivity, as estimated using the steps above. For example, the sick rate would be 100% when factual and counterfactual productivity are equal. A sick rate of 60% implies that an individual is able to work 60% of the amount that an individual of the same age without the condition is able to. The sick rate is used to downscale hours of unpaid labour. Similar to paid productivity, the unpaid productivity monetary value combines the estimated number of unpaid hours with the average net wage from ASHE data. The methodology assumes that unpaid productivity increases at the same rate as paid productivity and is valued at the average net wage of people in work.

Total productivity

Total productivity impacts are the sum of paid and unpaid productivity benefits. Per-individual productivity impacts are combined with engagement levels to estimate society-wide impacts.

Figure 10 Example of productivity calculations – Model 8



Source: Frontier Economics.

B.4 Detailed model methodology

For each model, we provide a description of the main evidence source used, a summary of the wider evidence (where relevant), a detailed summary of the methodology, and the results.

The detailed model methodologies below refer to a number of health measures and surveys (such as the 36-Item Short Form Health Survey Instrument [SF-36] and the Strengths and Difficulties Questionnaire [SDQ]). Table 33 defines each measure and can be used as reference for each model. In addition, in our assessment of model robustness, we refer to 'levels' as explained in Section 3.2.

Table 33 Health measures and questionnaires

Term	Definition
QALY	Used to measure the value of interventions by considering both the quantity and QoL gained, where one QALY represents one year of perfect health, and 0 corresponds to death or a health state equivalent to death. Directly mapped from QALYs.
WELLBY	A measure of subjective wellbeing that captures how people think and feel about their lives. Increases in WELLBYs correspond to an increase in life satisfaction.
EQ-5D	Used to measure QoL across five 'dimensions': mobility, self-care, usual activities, pain or discomfort, and anxiety or depression. It is a score from 0 to 1 (where 1 indicates full health). It maps directly to QALYs: a 0.1 increase in EQ-5D is equivalent to a 0.1 increase in QALYs for one year of life.
CHU-9D	An equivalent to EQ-5D for children.
36-Item Short Form Health Survey (SF-36)	A standard health questionnaire made up of eight health 'domains': physical functioning, social functioning, physical role, pain, general health, vitality, emotional role, and mental health. It captures general health-related QoL.
Strengths and Difficulties	A behavioural questionnaire for individuals aged 2 to 17 years, consisting of five scales: emotional symptoms, conduct problems,

Term	Definition
Questionnaire (SDQ)	hyperactivity or inattention, peer relationship problems, and pro-social behaviour. Used to assess children's mental health
General Health Questionnaire (GHQ-12)	A standard health questionnaire comprising 12 questions assessing the severity of psychiatric problems over the previous few weeks. A screening instrument for common mental disorders and a general measure of psychiatric wellbeing.
Short Form 12 (SF-12)	Developed from the SF-36, covering the same eight health domains with fewer questions.
Short Warwick Edinburgh Mental Wellbeing Scale (SWEMWBS)	A measure of mental wellbeing. It comprises seven statements related to mental health, including 'I've been feeling optimistic about the future' and 'I've been feeling useful'.
Rosenberg self-esteem scale (adapted for the Millennium Cohort Study)	Uses five out of the ten questions from the Rosenberg self-esteem scale to measure self-esteem. Includes statements as such as 'On the whole, I am satisfied with myself' and 'I feel that I have a number of good qualities'.
The 'Flourishing to Languishing' scale (also known as the Mental Health Continuum Short Form)	'Flourishing' refers to the presence of good mental health. Questions cover three domains of subjective wellbeing (emotional, psychological, and social) and include the statements 'I lead a purposeful and meaningful life' and 'My social relationships are supportive and rewarding'.

Source: Frontier Economics.

Model 1 – General engagement and general health in adults

Summary of model and results

Age group studied: Adults aged 30 to 49 years.

Health benefit studied General health as measured by the SF-36.

Type of engagement: General engagement, defined as activities such as visiting museums, galleries, heritage sites, theatres, cinemas and concerts.

Frequency of engagement: Every few months or more.

Main source of evidence: Elsden, Bu and Fancourt et al. (2022). Frequency of leisure activity engagement and health functioning over a 4-year period: a population-based study amongst middle-aged adults.

Results: We estimate a value of **£992 per person per year** and **£8 billion of wider societal benefits per year**.

Robustness: This model uses reasonably robust evidence with no significant additional assumptions, although the literature evidence does not control for unobservable variables. The figures are likely to be underestimated due to assumptions made surrounding sustained engagement.

Literature informing this model

This model uses evidence from Elsden, Bu and Fancourt et al. (2022), which studies the relationship between general cultural engagement (as defined in the summary box) at age 42 and mental and physical health functioning as measured by SF-36 at age 46 (four years after the engagement). Findings suggest that cultural engagement every few months or more is positively associated with two domains of the SF-36: physical and social functioning. Engagement at lower frequencies was not associated with improved health.

Elsden, Bu and Fancourt's method ranks Level 2 on our robustness scale (see Table 7 for robustness scale). It uses a standard cross-sectional regression approach but controls for key demographic, socioeconomic and health status factors,[13] including demographic variables

[13] A full list of controls is: gender, ethnicity partnership status, whether participants were living alone, and whether participants had children, occupational status, education level, employment status, housing tenure, limiting longstanding mental or physical illness, self-reported health and baseline mental health problems.

such as gender, ethnicity and partnership status; socioeconomic characteristics such as occupational status and education level; and health status factors such as self-reported health and longstanding mental or physical illness. Given that the method is cross-sectional, Elsden, Bu and Fancourt are unable to control for an individual's unobserved characteristics, such as genetics or general enjoyment level from the arts. These unobserved characteristics potentially correlate to health status and cultural engagement, creating bias in the estimates.

Methodology

Figure 11 provides an overview of our approach to estimating individual benefits and engagement levels.

Step 1 – Estimating the health and wellbeing benefits per individual

To calculate the quality-of-life impact per person, we use Elsden, Bu and Fancourt's estimated impact on general health (as measured by SF-36 score) from cultural engagement 'every few months'. They estimate that physical functioning increases by 2.33 points and social functioning by 3.23 points.

We convert the estimated impact on general health from cultural engagement to an estimated quality-of-life change using Ara and Brazier's (2008) estimated relationship between SF-36 and EQ-5D. They estimate that a 1-point increase on the physical functioning scale is equal to a 0.0037 increase in EQ-5D and that a 1-point increase on the social functioning scale is equal to a 0.00111 increase in EQ-5D. We convert the physical and social functioning scales and sum to find a total increase of 0.012 in EQ-5D.

QoL is measured in terms of QALYs, where the QALY value equals the EQ-5D value (a 0.1-point increase in EQ-5D corresponds to a 0.1-point increase in QALY). The monetary value is calculated by multiplying the QALY by its £ value. We report estimates from the Green Book valuation (£70k per QALY) and the HTA valuation (£20k per QALY).

We calculate productivity impacts using the methodology outlined in Annex B.3. We do not calculate health and social care impacts because our model does not relate to the diseases avoided. However, we expect that health and social benefits to exist as individuals with improved general health and wellbeing will likely use NHS and social care services less (see Section 4.1.1).

Step 2 – Estimating the number of individuals' health and wellbeing benefits

We combine data on the number of adults aged 30 to 49 years (17.5 million) in the population with the Taking Part Survey percentage of adults aged 25 to 54 years who frequently engage

in culture (46%). The result estimates the number of adults who generally engage with culture and heritage every few months or more in a given year.

We downscale these figures, so our estimate of engagement includes only those engaging in a sustained way (across multiple years). Based on the methodology in B.5, we estimate that 75% of engagers are sustained. The downscale is applied because Elsden, Bu and Fancourt's results do not differentiate between health benefits that result from:

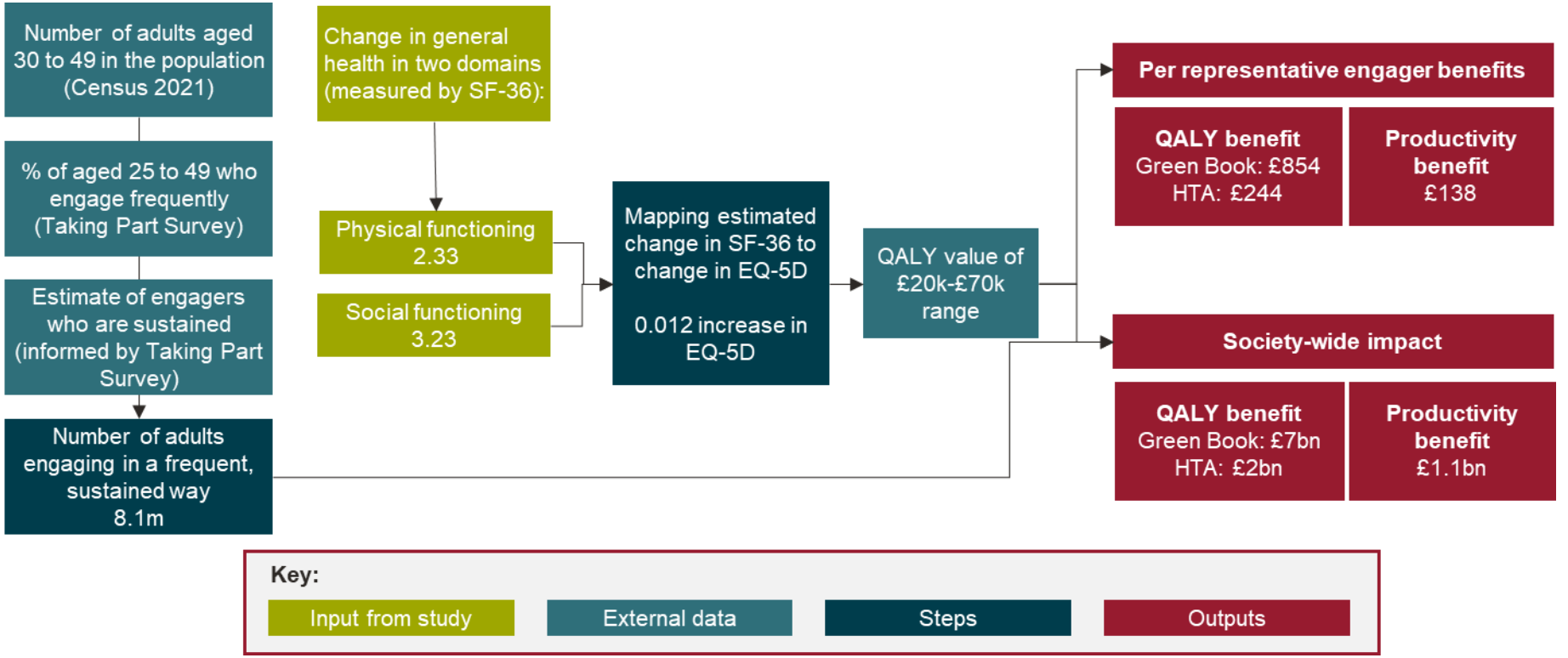
- cultural engagement at the baseline (at age 42) only
- cultural engagement in the fourth year (at age 46) only
- continuous cultural engagement across four years or more

We take a conservative approach by assuming that only those who engage in a sustained or continued way across multiple years gain health benefits. This assumption means we assume that individuals who engage with culture and heritage only for one year do not obtain health benefits.

Step 3 – Estimating the total health and wellbeing benefits to society

Our society-wide benefits are calculated by multiplying per-person benefits (Step 1) by the number of engagers (Step 2).

Figure 11 Model 1 – Methodology



Source: *Frontier Economics.*
Note: *See Table 33 for the definitions of SF-36 and EQ-5D.*

Results, sensitivity analysis and possible extensions

Table 34 presents the annual estimated benefits. We estimate that 8.1 million adults aged 30 to 49 years generally engage with culture and heritage every few months or more over a sustained period. Using the Green Book valuation, we estimate a benefit of **£992 per person per year** from general cultural engagement and a **society-wide benefit of £8 billion** per year. These benefits come predominantly from impacts on individuals' QoL.

These society-wide and per-person benefits are large compared to our other models. This is because the health outcome of this model includes a wide array of benefits across different aspects of health. There is also a large population that generally engages with culture (the focus is on adults who frequently engage in one of a wide variety of cultural assets).

Table 34 Model 1 – Annual estimated benefits

	Annual per-person impact	Annual society-wide impact
Individual impacts – Green Book	£854	£6.9bn
Individual impacts – HTA	£244	£2.0bn
NHS and social care savings	Not applicable	Not applicable
Productivity benefits	£138	£1.1bn
Total benefits – Green Book	**£992**	**£8.0bn**
Total benefits – HTA	**£382**	**£3.1bn**

Source: *Frontier Economics.*

Note: *Individual impacts are reported using a Green Book QALY valuation (£70,000) and a HTA QALY valuation (£20,000). The totals are calculated by summing the relevant individual impacts (Green Book or HTA) with the NHS and social care savings and productivity benefits. NHS and social care savings are only calculated for models where a specific condition is avoided.*

Models 2a and 2b – General attendance (2a) and General participation and mental health in adults (2b)

This model combines two sub-models which use the same approach and rely on evidence from the same study. However, each sub-model estimates the impact of a different type of cultural engagement (2a, attendance and 2b, participation).

Summary of model and results

Age group studied: Adults aged 30 to 49.

Health benefit studied: Mental distress as measured by the General Health Questionnaire (GHQ-12).

Type of engagement: A broad definition of:

(a) Cultural attendance[14] including films, exhibitions, events connected with books and music performances

(b) Cultural arts participation[15] including activities involving music, film, drawing and books

Frequency of engagement:

(a) Attendance benefits are from engagement once a week or more

(b) Participation benefits are from engagement more than once a week

Main source of evidence: Wang et al. (2020) Arts, mental distress, mental health functioning & life satisfaction: fixed-effects analyses of a nationally representative panel study.

Results:

(a) Attendance: We estimate a value of £649 per person per year and £2.1 billion of wider society benefits per year.

(b) Participation: We estimate a value of £448 per person per year and £4.4 billion of wider society benefits per year.

Robustness: This model relies on Level 3 evidence and does not require additional assumptions, so its robustness is high.

14 Cultural attendance including attending a film at a cinema or other venue, an exhibition or collection of art, photography, sculpture or a craft exhibition, an event which included video or electronic art, an event connected with books or writing, street arts or a public art display or installation, a carnival or cultural specific festival, a circus, a play or drama, pantomime or musical, an opera or operetta, a classical music performance, a rock, pop or jazz performance, a ballet, a contemporary dance performance, or an African people's dance or South Asian and Chinese dance.

15 Arts participation including dance, singing to an audience or rehearsing for a performance (not karaoke), playing a musical instrument, writing music, rehearsing or performing in a play or drama, opera or operetta or musical

Literature informing this model

This model uses evidence from Wang et al. (2020). The study uses a broad definition of arts participation and cultural engagement (see summary box) as defined by the longitudinal survey, 'Understanding Society', the data source relied upon for their findings. The findings suggest that those who participated in arts activities more than once a week and those who attended cultural events once a week or more had significantly lower levels of mental distress. Additionally, they found that participation is associated with improved mental functioning (as measured by the SF-12 Mental Component Summary [MCS] score), and participating more than once a week or attending at least once a year is associated with higher life satisfaction (measured on a 10-point scale). Lower levels of engagement were not associated with impacts on mental distress, mental functioning or life satisfaction.

The analytical techniques employed by Wang et al. mean this evidence scores a Level 3 on our robustness scale. First, a fixed-effects approach is used to study engagement impact on mental distress (measured by GHQ-12) over a 3-year period, allowing them to control for unobserved individual characteristics. Second, a statistical technique is used to identify the relevant variables, which must be controlled for since they correlate with both health and culture engagements.[16] One limitation of their fixed-effects technique is that they have only two waves of data, which means that lagged analysis, which controls for past characteristics such as health in earlier years, is impossible.

Methodology

Figure 12 provides an overview of our approach to estimating individual benefits and engagement levels.

theatre, taking part in a carnival or street arts event, learning or practising circus skills, painting, drawing, printmaking or sculpting, photography, film or video making as an artistic activity, using a computer to create original artworks or animation, taking part in textile crafts, wood crafts or any other crafts such as embroidery, knitting, reading for pleasure (not newspapers, magazines or comics), writing any stories, plays or poetry, or being a member of a book club where people meet up to discuss and share books.

16 A full list of controls: age, marital status, presence of children in the household, employment status, number of people in the household, logged household income, data collection, self-report sports activity ranking, smoking behaviour, drinking frequency in the last year, portions of fruits or vegetables eaten per day, family support and friend support

Step 1 – Estimating the health and wellbeing benefits per individual

To calculate the quality-of-life impact per person, we use Wang et al.'s estimated impact on mental distress (as measured by GHQ-12 score) from cultural attendance and participation. The study finds that attending cultural events once a week or more is associated with a 0.42 decrease in mental distress, w participating in cultural events more than once per week is associated with a 0.29 fall in mental distress.

We convert the estimated impact on mental health from cultural engagement to an estimated quality-of-life change using Lindkvist and Feldman (2016). Lindkvist and Feldman estimate that a 1-point decrease in GHQ-12 is associated with a 0.019 increase in EQ-5D, assuming self-reported health remains constant. We would expect self-reported health to either remain constant or improve due to cultural engagement, so our calculations may underestimate the total benefit. Combining Wang's estimate with this conversion factor estimates a 0.008 increase in EQ-5D for attendance and 0.005 for participation.

QoL is measured in terms of QALYs, where the QALY value equals the EQ-5D value (a 0.1-point increase in EQ-5D corresponds to a 0.1-point increase in QALY). The monetary value is calculated by multiplying the QALY by its £ valuation. We report estimates for the Green Book (£70k per QALY) valuation and the HTA (£20k per QALY) valuation.

We calculate productivity impacts using the methodology outlined in annex B.3. We do not calculate health and social care impacts because the model does not relate to disease avoidance. However, we expect health and social benefits to exist since individuals with improved general health and wellbeing will likely use NHS and social care services less (see Section 4.1.1).

Step 2 – Estimating the number of individuals accruing health and wellbeing benefits

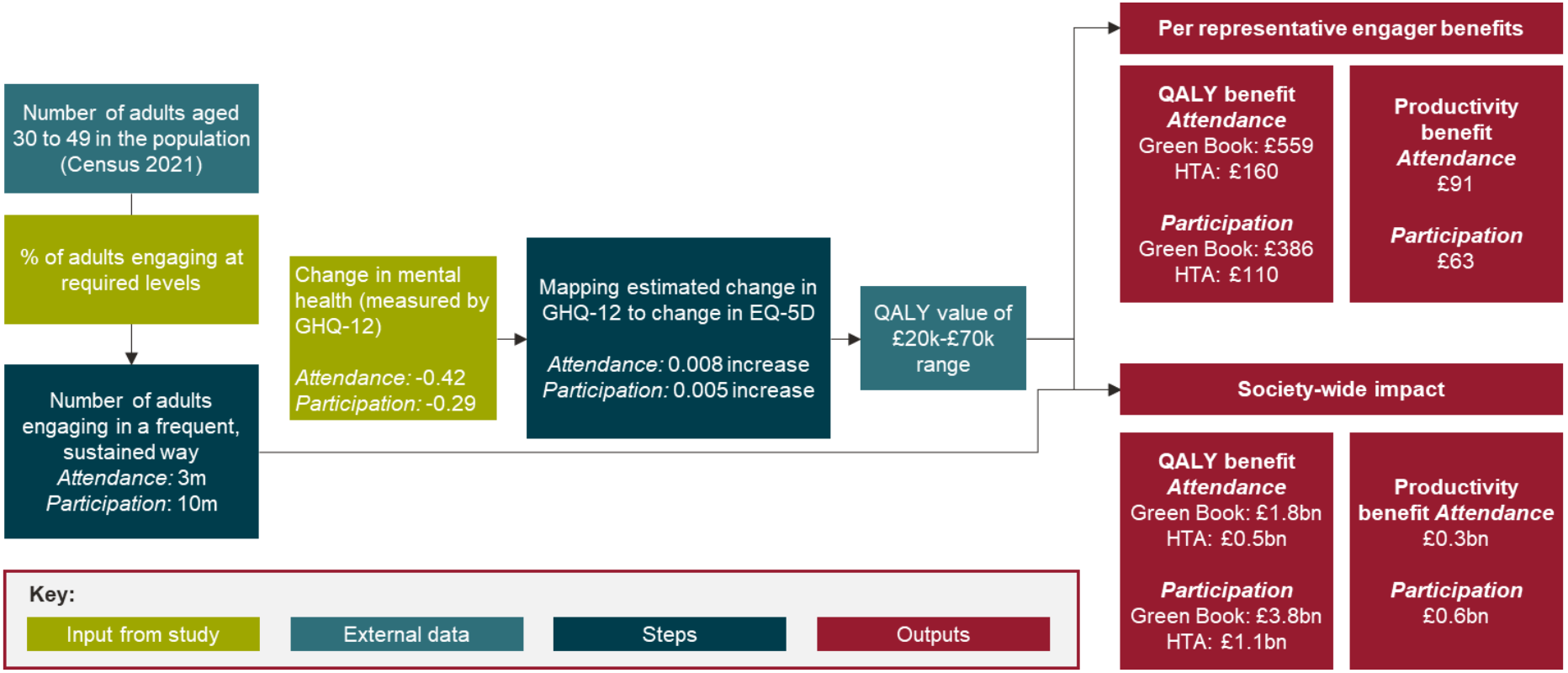
We combine data on the number of adults aged 30 to 49 in the population (17.5 million) with data from Wang et al. on the proportion of their sample that engages at the required level (56% participate more than once a week and 18% attend at least once a week). This estimates the number of adults aged 30 to 49 who attend cultural events at least once a week or participate in the arts more than once a week.

For this model (and other models based on evidence using fixed-effects methods), we do not downscale the estimate to account for sustained engagers. Fixed-effects techniques control for time-consistent unobserved factors regarding individuals. One of these unobserved factors is an individual's level of engagement at the start of the survey.

Step 3 – Estimating the total health and wellbeing benefits to society

Our society-wide benefits are calculated by multiplying the per-person benefits (Step 1) by the number of engagers (Step 2).

Figure 12 Model 2 – Methodology



Source: *Frontier Economics.*
Note: *See Table 33 for the definitions of GHQ-12 and EQ-5D.*

Results, sensitivity analysis and possible extensions

Table 35 presents the estimated benefits of the attendance sub-model (2a). We estimate that 3.2 million adults aged 30 to 49 attend cultural events once a week or more. Using the Green Book valuation, we estimate a benefit of £649 per person attending cultural events per year and a society-wide benefit of £2.1 billion per year. These benefits come predominantly from impacts on individuals' QoL.

Table 36 presents the estimated benefits of the participation sub-model (2b). We estimate that 9.8 million adults aged 30 to 49 participate in the arts more than once a week. Using the Green Book valuation, we estimate a benefit of £448 per person participating in arts or cultural events per year and a society-wide benefit of £5.5 billion per year. These benefits come predominantly from impacts on individuals' QoL.

The benefits per person are lower for participation than attendance. However, society-wide impacts for participation are much larger because a larger proportion of those aged 30 to 49 are engaged at the required frequency to see the benefits we estimate.

The benefits in these sub-models are at the higher end of the benefits across our model. Per-person benefits are expected to be large because they relate to a high frequency of engagement. Since culture is broadly defined, a large number of people can be expected to see the benefits.

Table 35 Model 2a (Attendance) – Annual estimated benefits

	Annual per-person impact	Annual society-wide impact
Individual impacts – Green Book	£559	£1.8bn
Individual impacts – HTA	£160	£0.5bn
NHS and social care savings	Not applicable	Not applicable
Productivity benefits	£91	£0.3bn
Total benefits – Green Book	**£649**	£2.1bn
Total benefits – HTA	**£250**	£0.8bn

Source: *Frontier Economics.*

Note: *Individual impacts are reported using a Green Book QALY valuation (£70,000) and a HTA QALY valuation (£20,000). The totals are calculated by summing the relevant individual impacts (Green Book or HTA) with the NHS and social care savings and productivity benefits. NHS and social care savings are only calculated for models where a specific condition is avoided*

Table 36 Model 2b (Participation) – Annual estimated benefits

	Annual per-person impact	Annual society-wide impact
Individual impacts – Green Book	£386	£4.7bn
Individual impacts – HTA	£110	£1.3bn
NHS and social care savings	Not applicable	Not applicable
Productivity benefits	£63	£0.8bn
Total benefits – Green Book	**£448**	**£5.5bn**
Total benefits – HTA	**£173**	**£2.1bn**

Source: *Frontier Economics.*

Note: *Individual impacts are reported using a Green Book QALY valuation (£70,000) and a HTA QALY valuation (£20,000). The totals are calculated by summing the relevant individual impacts (Green Book or HTA) with the NHS and social care savings and productivity benefits. NHS and social care savings are only calculated for models where a specific condition is avoided.*

Model 3 – Extracurricular activities and externalising behaviour in children

Summary of model and results

Age group studied: Children aged 10 to 14 years.

Health benefit studied: Externalising behaviour such as defiance, tantrums, and lack of emotional and self-control, as measured by the conduct and hyperactivity or inattention subscales of the Strengths and Difficulties Questionnaire (SDQ) (See Table 33 for more details).

Type of engagement: Dance lessons, music lessons, art lessons, or organised performing arts programmes.

Frequency of engagement: Binary indicator: 'Yes' or 'no' for participation in the year.

Main source of evidence: Fluharty et al. (2023) Associations between extracurricular arts activities, school-based arts engagement, and subsequent externalising behaviours: Findings from the Early Childhood Longitudinal Study.

Results: We estimate a value of **£122 per person** per year and **£232 million of wider-society benefits** per year.

Robustness: The results are based on data from the USA and apply to a specific age group (engagement is measured at age 10 to 11 years and impact at age 13 to 14), so we make the simplifying assumption that these benefits carry over to all children aged 10 to 14 years in the UK. The evidence does not control for unobserved characteristics and uses a binary indicator for participation; in reality, we expect impacts to vary with participation levels.

Literature informing this model

This model uses evidence from Fluharty et al. (2023). This paper estimates the impact of extracurricular activities in 5th grade (Year 6 in England and Wales, aged 10 to 11 years) on externalising behaviour (such as defiance, tantrums and a lack of emotional control and self-control) in 8th grade (Year 9 in England and Wales, aged 13 to 14 years), as measured by the Strengths and Difficulties Questionnaire. It differs from other studies in that it looks at the number of extracurricular activities (dance lessons, music lessons, art classes or lessons, or organised performing art programmes) rather than the frequency of activity. The study suggests that participating in more extracurricular activities in 5th grade (Year 6 in England and Wales) is associated with decreased individual-level externalising behaviour in 8th grade (Year 6 in England and Wales).

Because of the model's cross-sectional design, the evidence ranks Level 2 on our robustness scale since it is unable to control for unobserved individual characteristics which might affect

both health status and cultural engagement (such as genetics or general enjoyment level from the art). The OLS model controls for several sociodemographic variables.[17]

Methodology

Figure 13 provides an overview of our approach to estimating individual benefits and engagement levels.

Step 1 – Estimating the health and wellbeing benefits per individual

To calculate the quality-of-life impact of a person, we use Fluharty's estimated impact on externalising behaviour from cultural extracurricular activities. For each type of cultural extracurricular activity (dance lessons, music lessons, art classes or lessons, or organised performing art programmes) in which a child participates in a given year, Fluharty estimates a 0.22 decrease in the SDQ conduct and hyperactivity subscales.

We convert the estimated impact on externalising behaviour to an estimated quality-of-life change using Boyer et al. (2016). This model uses CHU-9D to measure the QoL since it is a children-appropriate alternative to EQ-5D (see Table 33 for more information). Boyer et al. estimate that a 1-point increase in the SDQ hyperactivity subscale leads to a 0.001 decrease in CHU-9D, and a 1-point increase in the SDQ conduct subscale leads to a 0.009 decrease in CHU-9D. We combine the average of these two figures with the decrease in SDQ to estimate the impact on CHU-9D.

Unlike in other models, we need to take an additional step to convert this to a benefit per person. The figure calculated represents the quality-of-life improvement from one additional extracurricular activity. Using data from Fluharty's study, we combine estimates on the average number of activities per child (0.75) with the percentage of children engaged in activities (52.5%) to estimate the average number of activities for each engaging child (1.58). We combine this with the CHU-9D impact per activity to calculate the benefit for a child participating in the average number of extracurricular activities.

QoL is measured in QALYs, where the QALY value equals the EQ-5D value (a 0.1-point increase in EQ-5D corresponds to a 0.1-point increase in QALY). The monetary value is

[17] A full list of controls is: gender, first-language, ethnicity, parental education, home location (city, suburb or small town), family structure, household income, family use of food stamps and student eligibility for reduced or free school meals.

calculated by multiplying the QALY by its £ valuation. We report estimates for the Green Book (£70k per QALY) valuation and the HTA (£20k per QALY) valuation.

We do not calculate health and social care impacts since the model does not relate to avoided disease. We also do not calculate productivity impacts for children, although we acknowledge that there are likely to be benefits for both children's education and parents' productivity.

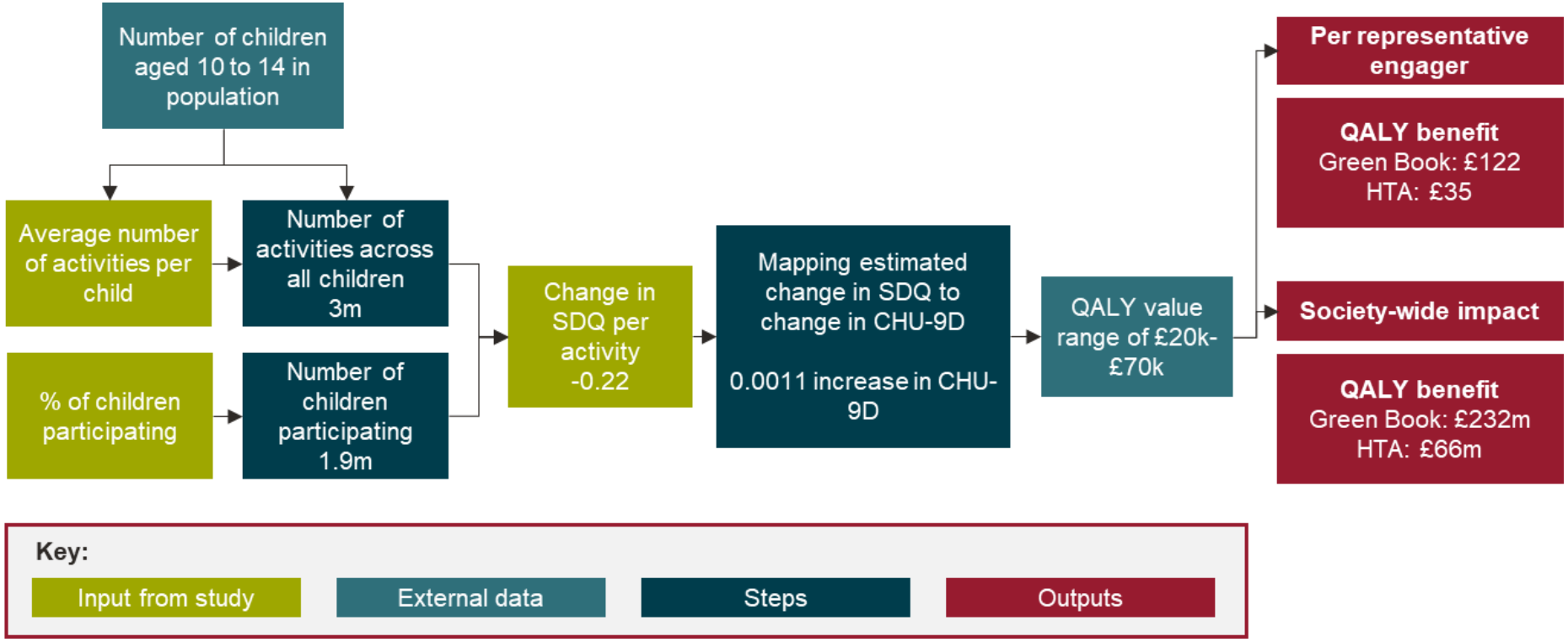
Step 2 – Estimating the number of individuals accruing health and wellbeing benefits

We combine evidence from Fluharty's study on the proportion of children with a positive number of extracurricular cultural activities (47.5%) with the number of children aged 10 to 14 years in the UK (2 million). This provides an estimate of the number of children aged 10 to 14 years who engage in at least one extracurricular cultural activity in a given year. These figures are based on engagement levels in the US rather than the UK.

Step 3 – Estimating the total health and wellbeing benefits to society

Our society-wide benefits are calculated by multiplying per-person benefits (Step 1) by the number of engagers (Step 2).

Figure 13 Model 3 – Methodology



Source: *Frontier Economics.*

Note: *See Table 33 for the definition of SDQ and CHU-9D.*

Results, sensitivity analysis and possible extensions

Table 37 presents the annual estimated benefits. We estimate that 1.9 million children aged 10 to 14 years participate in 3 million cultural extracurricular activities annually. Using the Green Book valuation, we estimate a per-person benefit of £122 per year from extracurricular activities and a society-wide benefit of £232 million per year. These benefits are from impacts on individuals' QoL and do not include NHS and social care savings or productivity benefits.

The benefits of this model at a per-person level are some of the lowest estimated across all models. To an extent, this is driven by the fact that we do not estimate productivity benefits for children. It may also be because, unlike other models, it includes individuals (children) who participate in these extracurricular activities infrequently (and frequently). At a society-wide level, these benefits are on the lower end since the size of the relevant population is relatively small.

Table 37 Model 3 – Annual estimated benefits

	Annual per-person impact	Annual society-wide impact
Individual impacts – Green Book	£122	£232 million
Individual impacts – HTA	£35	£66 million
NHS and social care savings	Not applicable	Not applicable
Productivity benefits	Not applicable	Not applicable
Total benefits – Green Book	**£122**	**£232 million**
Total benefits – HTA	**£35**	**£66 million**

Source: *Frontier Economics*

Note: *Individual impacts are reported using a Green Book QALY valuation (£70,000) and a HTA QALY valuation (£20,000). The totals are calculated by summing the relevant individual impacts (Green Book or HTA) with the NHS and social care savings and productivity benefits. NHS and social care savings are only calculated for models where a specific condition is avoided.*

Models 4a and 4b – Art (4a) and Music (4b) and self-esteem in children

This model combines two sub-models, which use the same approach and rely on evidence from the same study but estimate the impact of two different types of cultural engagement.

Summary of model and results

Age group studied: Children aged 10 to 14 years.

Health benefit studied: Self-esteem, as measured by an adaptation of the Rosenberg self-esteem scale used in the Millennium Cohort Study.

Type of engagement:

(a) Art (drawing, painting or making things)

(b) Music (listening to or playing music)

Frequency of engagement: Most days.

Main source of evidence: Mak HW, Fancourt D. (2019) Arts engagement and self-esteem in children: results from a propensity score matching analysis.

Results:

(a) Art: We estimate a value of **£134 per person** per year and **£122 million of wider society benefits** per year.

(b) Music: We estimate a value of **£68 per person** per year and **£162 million of wider-society benefits** per year.

Robustness: This model uses high-quality (Level 3) evidence. We use a mapping based on WELLBYs rather than QALYs (because of data availability) and make a conservative assumption about the link between self-esteem and WELLBYs. We also approximate the effect sizes by calculating a standard deviation to determine the total effect size.

Literature informing this model

This model uses evidence from Mak and Fancourt (2019). Mak and Fancourt investigate the impact of participating in art (drawing, painting or making things) and music (listening to and playing music) activities 'most days' on self-esteem. They found that engaging with either activity most days had a significant effect on self-esteem. Furthermore, they found that the effect of engagement on self-esteem was stronger when children engaged in these activities with their parents. Children's artistic or musical abilities did not impact the effect size in their model.

Mak and Fancourt use propensity score matching (see Glossary), in which children who engage most days are paired with children who engage less often.[18] Matching was based on variables including family socioeconomic characteristics, parents' self-rated closeness of relationship with children, and mother and father's mental health. They were unable to match individuals based on unobservable variables, such as genetics or general enjoyment level. This evidence scores Level 3 on our robustness scale.

Methodology

Figure 14 provides an overview of our approach to estimating individual benefits and engagement levels.

Step 1 – Estimating the health and wellbeing benefits per individual

To calculate the quality-of-life impact for an individual, we use Mak and Fancourt's (2019) estimated music and art impact on self-esteem. They calculate two impacts: one comparing 'most days' to 'never or less than once a month' and another comparing 'most days' to 'engagement at any other lower level'. We use the 'most days' to 'never or less than once a month' comparison because it is consistent with the method used for other studies, which typically compare engagement at a certain level to no engagement rather than comparing engagements at different levels. In the results section, we present a sensitivity which compares engagement 'most days' to 'engagement at any other level'.

Mak and Fancourt report standardised effect sizes, where the total effect size is divided by the standard deviation to create a more meaningful statistic for comparison. Since our analysis requires non-standardised measures, we use data from the Millennium Cohort Study to calculate an approximate standard deviation. We calculate that listening to or playing music most days is associated with a 0.18 increase in the adapted Rosenberg self-esteem scale (see Table 33), and making art on most days is associated with a 0.35 increase.

We measure the impact using an adapted Rosenberg self-esteem scale for which there is no direct mapping to EQ-5D. To deal with this issue, we convert the Rosenberg self-esteem scale to the short-form Warwick Edinburgh Mental Wellbeing Scale (SWEMWBS), a commonly used wellbeing scale. Evidence from Scior et al. (2023) and Moksnes and Reidunsdatter (2019)

[18] A full list of variables matched on: children's gender and ethnicity; parental marital status, educational level, and employment status; parents' self-rated closeness of relationship with child, mothers' and fathers' mental health, parental perception regarding the school offering a good range of extracurricular activities as an important factor in choosing a secondary school.

suggests that there is a reasonably strong relationship between the Rosenberg self-esteem scale and the SWEMWBS, with an estimated correlation of between 0.48 and 0.66. Based on this evidence, we calculate the change in the SWEMWBS by assuming that the percentage increase is equal to 60% of the percentage increase in the Rosenberg self-esteem scale. Therefore, we multiply the increase in the Rosenberg self-esteem scale reported above (0.18 and 0.35) by 60% to estimate a 0.11 increase in SWEMWBS for 'music' and a 0.21 increase for 'art'.

We monetise the SWEMWBS estimates using WELLBYs, with a monetary value assigned to specific SWEMWBS scores (e.g. a score of 23 to 24 is valued at £22,944). Using these values, we estimate that a 1-point increase in the SWEMWBS is worth £640,[19] which we multiply by our estimated increase in SWEMWBS to calculate the value of the increase. This estimates the value of the average quality-of-life increase due to increased self-esteem from music and art. Given the uncertainty around our estimate, we provide two sensitivities using different valuations of a 1-point change in the SWEMWBS.

We do not calculate health and social care impacts since the model does not relate to disease avoidance. We do not calculate productivity impacts for children, although we acknowledge that there will likely be benefits to children's education and parents' productivity.

Step 2 – Estimating the number of individuals accruing health and wellbeing benefits

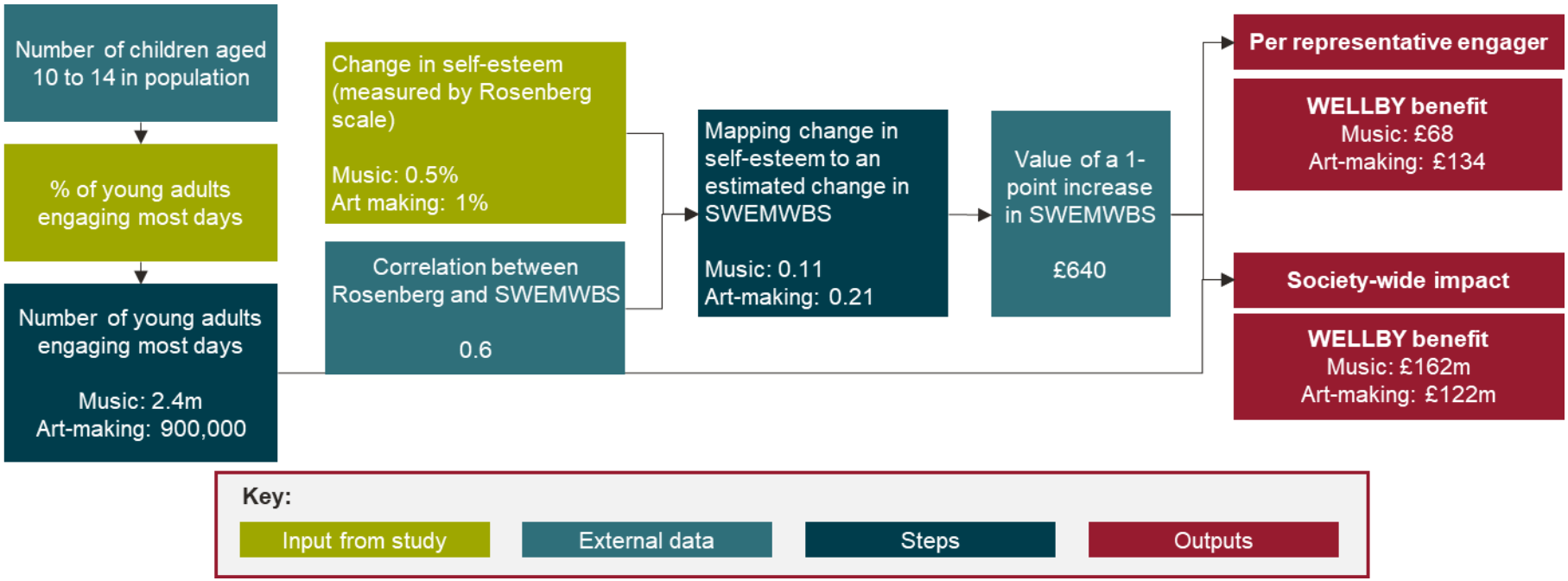
We combine data on the number of children aged 10 to 14 (12.4 million) in the population with the percentage of Mak and Fancourt's sample who engage with art and music, respectively, most days (19% and 7%), according to the Millennium Cohort Study. This estimates the number of children aged 10 to 14 who engage with art and music on most days.

Step 3 – Estimating the total health and wellbeing benefits to society

Our society-wide benefits are calculated by multiplying per-person benefits (Step 1) by the number of engagers (Step 2).

[19] According to the Warwick Medical School, the average SWEMWBS value in the UK is 23.5. So, we consider the value of an increase in one point based on going from 23 to 24 on the SWEMWBS.

Figure 14 Model 4 – Methodology



Source: *Frontier Economics.*

Note: *See Table 33 for more details on the Rosenberg self-esteem scale and SWEMWBS.*

Results, sensitivity analysis and possible extensions

Table 38 presents the estimated benefits for sub-model 4a: Art and self-esteem in children. We estimate that 900,000 children aged 10 to 14 years draw, paint, or make things most days. Using the Green Book valuation, we estimate a benefit of £134 per person per year and a society-wide benefit of £122 million per year.

Table 39 presents the annual estimated benefits for sub-model 4b: Music and self-esteem in children. We estimate that 2.4 million children aged 10 to 14 years listen to or play music most days. Using the Green Book valuation, we estimate a benefit of £68 per person per year and a society-wide benefit of £162 million per year.

The benefits are entirely due to individual quality-of-life impacts since we do not calculate NHS and social care savings or productivity benefits. The per-person benefit for art activities is higher than that for music activities because Mak and Fancourt estimate a larger impact on self-esteem from art. However, more children are involved in music activities, resulting in a larger society-wide impact than art.

The estimated benefits are some of the lowest estimated across all models. To an extent, this is driven by the fact we do not estimate productivity benefits for children. On a society-wide level, the benefits are on the lower end since the number of children is lower than the size of the population for other age groups.

Table 38 Model 4a (Art) – Annual estimated benefits

	Annual per-person impact	Annual society-wide impact
Individual impacts (WELLBYs)	£134	£122 million
NHS and social care savings	Not applicable	Not applicable
Productivity benefits	Not applicable	Not applicable
Total benefits	**£134**	**£122 million**

Source: *Frontier Economics.*

Note: *Individual impacts are reported using WELLBYs and so we do not include two scenarios. The totals are calculated by summing individual impacts with the NHS and social care savings and productivity benefits. NHS and social care savings are only calculated for models where a specific condition is avoided. Productivity benefits are not calculated for children.*

Table 39 Model 4b (Music) – Annual estimated benefits

	Annual per-person impact	Annual society-wide impact
Individual impacts (WELLBYs)	£68	£162 million
NHS and social care savings	Not applicable	Not applicable
Productivity benefits	Not applicable	Not applicable
Total benefits	**£68**	**£162 million**

Source: *Frontier Economics.*

Note: *Individual impacts are reported using WELLBYs and so we do not include two scenarios. The totals are calculated by summing individual impacts with the NHS and social care savings and productivity benefits. NHS and social care savings are only calculated for models where a specific condition is avoided. Productivity benefits are not calculated for children.*

Sensitivities: Valuation of SWEMWBS

Our baseline model calculates the value of a 1-point increase in SWEMWBS by assuming that each individual starts with a score of 23 (the average SWEMWBS in the UK is 23.5). We calculate the value of a 1-point increase point based on going from 23 to 24 on the SWEMWBS, with an estimate of £640 per SWEMWBS point.

The valuation of the SWEMWBS scale is such that the value of a 1-point change in the score is not constant: when an individual has a low score, an additional point is valued more highly than when they have a high score. As a result, we have considered two alternative scenarios for the valuation of a 1-point increase on the SWEMWBS:

- Low scenario: We assume that the impact of gaining one point on the SWEMWBS scale is linear from 20 to 35 points on the scale. This produces an estimate of £829 per SWEMWBS.
- High scenario: We assume that the impact of gaining one point on the SWEMWBS scale is linear from 16 to 35 points on the scale. This produces an estimate of £515 per SWEMWBS.

Table 40 and Table 41 present the estimates under all three scenarios. In both the sensitivity-check scenarios, there is no significant impact on estimated benefits.

Table 40 Model 4a (Art) – Differing valuation of SWEMWBS

	Annual per-person impact	Annual society-wide impact
Impacts (baseline scenario)	£134	£122 million
Impacts (low scenario)	£108	£98 million
Impacts (high scenario)	£174	£158 million

Source: *Frontier Economics.*

Note: *'Impacts' refers to the individual QoL effects (in WELLBYs). NHS and social care savings and productivity benefits are not estimated in this model.*

Table 41 Model 4b (Music) – Differing valuation of SWEMWBS

	Annual per-person impact	Annual society-wide impact
Impacts (baseline scenario)	£68	£162 million
Impacts (low scenario)	£55	£130 million
Impacts (high scenario)	£88	£210 million

Source: *Frontier Economics.*

Note: *'Impacts' refers to the individual QoL effects (in WELLBYs). NHS and social care savings and productivity benefits are not estimated in this model.*

Sensitivities: Alternative engagement levels

Our main results use Mak and Fancourt's estimated impact of engaging 'most days' compared to 'never or less than once a month'. Table 42 and Table 43 present the estimated impact of engaging 'most days' compared to any other (lower) level of engagement. The benefits in this scenario are under half the size of the benefits estimated in our main model, suggesting dosage effects from engagement. Engaging at a rate less often than 'most days' but more often than 'less than once a month' has benefits, so when 'most days' is compared to these engagement levels, the additional benefit is smaller.

Table 42 Model 4a (Art) – Alternative engagement levels

	Annual per-person impact	Annual society-wide impact
Individual impacts (WELLBYs)	£58	£53 million
NHS and social care savings	Not applicable	Not applicable
Productivity benefits	Not applicable	Not applicable
Total benefits	**£58**	**£53 million**

Source: *Frontier Economics.*

Note: *Individual impacts are reported using WELLBYs and so we do not include two scenarios. The totals are calculated by summing individual impacts with the NHS and social care savings and productivity benefits. NHS and social care savings are only calculated for models where a specific condition is avoided. Productivity benefits are not calculated for children.*

Table 43 Model 4b (Music) – Alternative engagement levels

	Annual per-person impact	Annual society-wide impact
Individual impacts (WELLBYs)	£30	£72 million
NHS and social care savings	Not applicable	Not applicable
Productivity benefits	Not applicable	Not applicable
Total benefits	**£30**	**£72 million**

Source: *Frontier Economics.*

Note: *Individual impacts are reported using WELLBYs and so we do not include two scenarios. The totals are calculated by summing individual impacts with the NHS and social care savings and productivity benefits. NHS and social care savings are only calculated for models where a specific condition is avoided. Productivity benefits are not calculated for children.*

Models 5a and 5b – Weekly (5a) and Daily (5b) Organised arts activities and mental health in young adults

This model combines two sub-models which use the same approach and rely on evidence from the same study. However, each sub-model estimates the impact a different cultural engagement frequencies (5a, weekly and 5d, daily).

Summary of model and results

Age group studied: Young adults aged 18 to 30.

Health benefit studied: Flourishing, as measured by the Flourishing-Languishing scale (known as the Mental Health Continuum Short Form [MHC-SF]). The scale covers three domains of subjective wellbeing: emotional, psychological, and social.

Type of engagement: Organised activities related to art, music, or the theatre (such as being part of a band, a group trip to a play, or any kind of art tuition). Includes both participatory and attendance activities.

Frequency of engagement:

(a) Weekly: Once a week or several times a week.

(b) Daily: Almost every day or daily

Main source of evidence: Bone et al. (2023) Longitudinal Associations Between Arts Engagement and Flourishing in Young Adults: A Fixed Effects Analysis of the Panel Study of Income Dynamics.

Results:

(a) Weekly: We estimate a value of £748 per person per year and £804 million of wider-society benefits per year.

(b) Daily: We estimate a value of £1,240 per person per year and £726 million of wider-society benefits per year.

Robustness: This model uses high-quality (Level 3) evidence. We use a mapping based on WELLBYs rather than QALYs (because of data availability) and make a conservative assumption about the link between self-esteem and WELLBYs. In addition, the study is based in the US, so we make the simplifying assumption that engagement rates and benefits are the same in the UK.

Literature informing this model

This model uses evidence from Bone et al. (2023) to investigate the impact of regular engagement with organised arts activities on young adults' 'flourishing'(having high levels of emotional, psychological and social wellbeing). They found that weekly and daily engagement had a significant effect on flourishing (weekly engagement showed slightly larger effects). Lower engagement frequencies were not found to have a significant effect. They found that geographical location was one factor that influenced the effect size. For example, organised arts activities affect young adults' flourishing in metropolitan areas but not in non-metropolitan areas.

This paper performs strongly on our robustness scale because of the statistical techniques it employs. In addition to using a fixed-effects model, which can control for time-invariant factors,[20] it uses a statistical technique known as Arellano-Bond, to assess the directionality of the relationship between engagement and health. This technique assesses whether better health leads to more engagement or more engagement leads to better health. It conducts several sensitivities to test the findings.

Methodology

Figure 15 provides an overview of our approach to estimating individual benefits and engagement levels.

Step 1 – Estimating the health and wellbeing benefits per individual

To calculate the quality-of-life impact for a person, we use Bone's estimated impact on flourishing from organised art activities. They estimate a 0.76-point impact on the flourishing scale (out of a total of 18 points) for weekly engagement and a 1.26-point impact for daily engagement.

There is no direct mapping of the Flourishing-Languishing (MHC-SF) scale to EQ-5D, so we monetise the impact using SWEMWBS and WELLBYs (see above). Several sources suggest that there is a good relationship between the MHC-SF scale and both the SWEMWBS and its longer form, with correlations between the two scales estimated between 0.65 and 0.77. Based on this, we calculate the change in the SWEMWBS by assuming that the percentage increase is equal to 70% of the percentage increase in flourishing. Therefore, we multiply the increase in the flourishing scale reported above (0.76 and 1.26) by 70% to calculate an increase of 1 point on the SWEMWBS from weekly engagement and an increase of 1.7 points for daily engagement. This is monetised using the approach set out in above.

To calculate productivity impacts, we map the monetised change to a QALY by dividing by £70,000 (our baseline value of a QALY) and then apply the methodology outlined in Annex B.3. We do not calculate health and social care impacts because the model does not relate to disease avoidance. However, we expect health and social benefits to exist since individuals

20 A full list of controls: age, marital status, level of education, employment status, total family income, participants' rating of their general health, and whether a health professional has ever told participants that they have an emotional, nervous or psychiatric problem.

with improved general health and wellbeing will likely use NHS and social care services less (see Section 4.1.1).

Step 2 – Estimating the number of individuals accruing health and wellbeing benefits

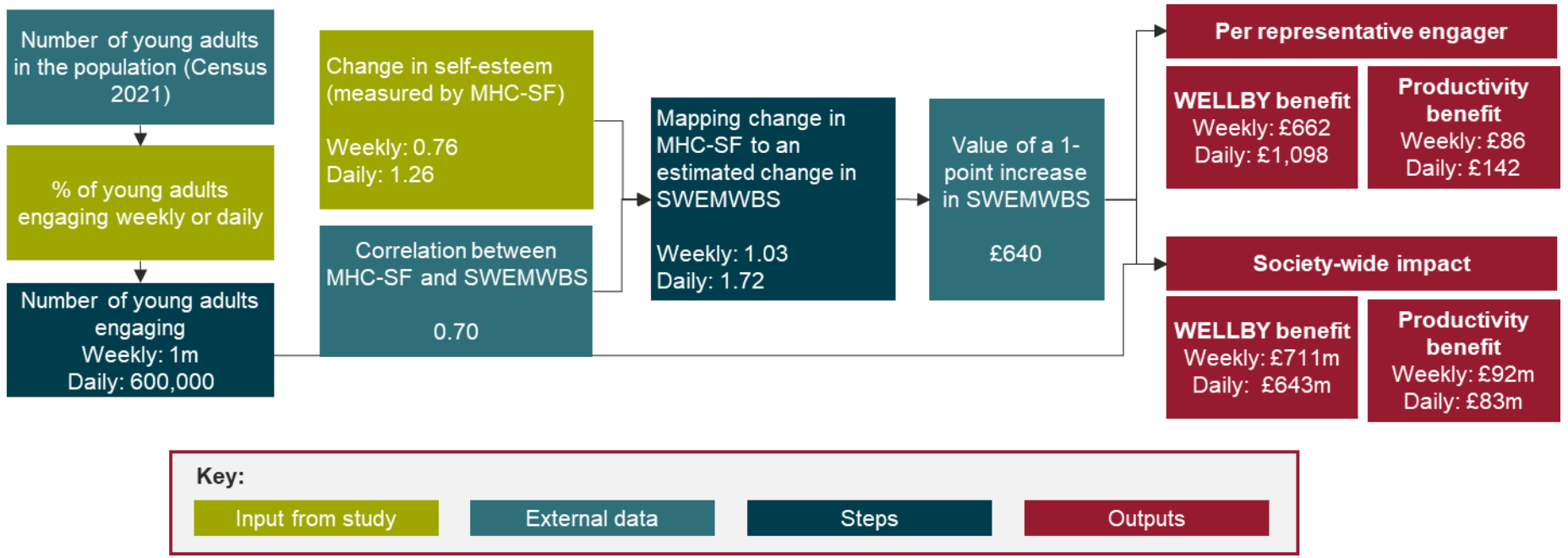
We estimate the number of young adults who engage with organised art activities weekly and daily. We combine data on the number of young adults (aged 18 to 29) in the population (9.8 million) with the percentage of Bone's sample who engage with organised art activities at the required frequency (11% weekly and 6% daily).[21] We do not downscale this figure for sustained engagement as it relies on evidence from a fixed effects study (see above for more detail). These figures should be caveated as they are based on engagement levels in the US rather than the UK.

Step 3 – Estimating the total health and wellbeing benefits to society

Our society-wide benefits are calculated by multiplying per-person benefits (Step 1) by the number of engagers (Step 2).

[21] 3,333 participants aged 18 to 28 years from the Transition into Adulthood Supplement of the Panel Study of Income Dynamics, a nationally representative sample in the US. We use this data in absence of better evidence on organised cultural activities for young adults in the UK and expect that engagement is similar across the two countries.

Figure 15 Model 5 – Methodology



Source: *Frontier Economics.*
Note: *See Table 33 for details on MHC-SF and SWEMWBS.*

Results, sensitivity analysis and possible extensions

Table 44 presents the annual estimated benefits for sub-model 5a (weekly). We estimate that 1 million young adults aged 18 to 29 engage with organised arts activities at least once a week. Using the Green Book valuation, we estimate that this results in a benefit of £748 per person per year and a society-wide benefit of £800 million per year. These benefits come predominantly from impacts on individuals' QoL.

Table 45 presents the annual estimated benefits for sub-model 5b (daily). We estimate that 600,000 adults aged 18 to 29 engage with organised arts activities almost every day or daily. Using the Green Book valuation, we estimate that this results in a benefit of £1,240 per person per year and a society-wide benefit of £726 million per year. These benefits also come predominantly from impacts on individuals' QoL.

The more frequent engagement level (daily) has higher per-person benefits. Still, the larger proportion of young adults engaging at lower engagement levels means that the society-wide impact of weekly engagement is higher.

On a per-person level, the benefits in this model are high compared to other models because of the high engagement frequency. Engagement levels in this model are lower than in other models, producing society-wide estimates that are in the middle of the estimated range.

Table 44 Model 5a (Weekly) – Annual estimated benefits

	Annual per-person impact	Annual society-wide impact
Individual impacts (WELLBYs)	£662	£711 million
NHS and social care savings	Not applicable	Not applicable
Productivity benefits	£86	£92 million
Total benefits	**£748**	**£804 million**

Source: *Frontier Economics*

Note: *Individual impacts are reported using WELLBYs and so we do not include two scenarios. The totals are calculated by summing individual impacts with the NHS and social care savings and productivity benefits. NHS and social care savings are only calculated for models where a specific condition is avoided. Productivity benefits are not calculated for children*

Table 45 Model 5b (Daily) – Annual estimated benefits

	Annual per-person impact	Annual society-wide impact
Individual impacts (WELLBYs)	£1,098	£643 million
NHS and social care savings	Not applicable	Not applicable
Productivity benefits	£142	£83 million
Total benefits	**£1,240**	**£726 million**

Source: *Frontier Economics*

Note: *Individual impacts are reported using WELLBYs and so we do not include two scenarios. The totals are calculated by summing individual impacts with the NHS and social care savings and productivity benefits. NHS and social care savings are only calculated for models where a specific condition is avoided. Productivity benefits are not calculated for children*

Sensitivities

As set out in above, using an alternative valuation of the SWEMWBS does not have a large impact on estimated benefits. We do not present the sensitivity analysis again for this case study.

Model 6 – Arts-based museum activities and general health in older adults

Summary of model and results

Age group studied: Adults aged 65 and over.

Health benefit studied: General health, as measured by an adapted EQ-5D score.

Type of engagement: Museum-based art workshop where participants were involved in activities such as abstract painting, bookbinding, and stained-glass painting.

Frequency of engagement: Weekly for a 12-week period.

Main source of evidence: Beauchet et al. (2020). Participatory art-based activity, community-dwelling older adults and changes in health condition: Results from a pre–post intervention, single-arm, prospective and longitudinal study.

Results: We estimate a value of £1,310 per person per year and £19 million of wider-society benefits per year.

Robustness: The evidence used in this model is Level 2 on the robustness scale (no control group), and simplifying assumptions are needed to monetise the quality-of-life effects. The results are high compared to other models; given the intensity of the activity, this seems appropriate. We address the sensitivities in the results.

Literature informing this model

This model uses evidence from an intervention designed and analysed by Beauchet et al. (2020). Regular visitors to the Montreal Museum of Fine Arts aged 65 and older were given the opportunity to participate in weekly art-based workshops for 12 weeks (known as 'Thursdays at the Museum'), where they were involved in activities such as abstract painting, bookbinding, and stained-glass painting. Beauchet et al. found that EQ-5D scores improved with each follow-up (weeks 5, 9, and 12) compared to baseline. They also study the impact on wellbeing (as measured by the Warwick Edinburgh Mental Wellbeing Scale [WEMWBS]) and frailty, finding a significant effect by week 12.

Because there is no control group against which those attending the arts-based activities can be compared, the evidence scores Level 2 on our robustness scale. Beauchet et al. use a standard regression model (see the Glossary for more details) and controls for participants' characteristics but cannot control for unobserved individual characteristics (such as genetics

or general enjoyment level from the arts).[22] They also control for responses to some survey questions at baseline, such as scores of activity, daily living, and history of falls in the past 12 months.

Methodology

Figure 16 provides an overview of our approach to estimating individual benefits and engagement levels.

Step 1 – Estimating the health and wellbeing benefits per individual

To calculate the quality-of-life impact for a person, we use Beauchet et al.'s estimated impact on their adapted EQ-5D scale. As explained in Table 33, the EQ-5D scale ranges from 0 to 1, where 1 represents full health. The adapted scale used by Beauchet et al. is calculated by summing responses to the standard EQ-5D questions so that the final scale ranges from 5 to 25, where 5 represents the best possible health, and 25 represents the worst possible health. We convert the adapted scale to the standard scale using a simplified approach. We assume that 5 corresponds to 1 on the EQ-5D scale, 25 corresponds to 0.2 on the EQ-5D scale, and that the intermediate scores scale linearly. This equates to a 0.04 increase in QALYs for a 1-point decrease on Beauchet's adapted EQ-5D scale.

Beauchet et al. report the impact on the adapted EQ-5D score at different points in the study. There was a 0.5 increase at week 5, 1.94 at week 9 and 2.1 at week 12. We assume that the impact on the adapted EQ-5D score is linear during the course of the study (the score grows gradually from 0 to 0.5 over weeks 0 to 5, from 0.5 to 1.94 over weeks 5 to 9, and from 1.94 to 2.1 over weeks 9 to 12). Based on evidence on the length of benefits from cultural engagement (see discussion of Impact persistence above), we assume that participants see benefits over six months in total. In the absence of other evidence, we calculate benefits after the end of the study period (week 12) using an indicative assumption that each week the benefits decay by 10%. Due to the uncertainties in these assumptions, we also present the results of sensitivity analyses, which assume that benefits only last for the 12-week duration of the study.

QoL is measured in QALYs, where the QALY value equals the EQ-5D value (a 0.1-point increase in EQ-5D corresponds to a 0.1-point increase in QALY). The monetary value is

[22] A full list of controls: age, sex, home support, polypharmacy, scores of activities of daily living scale and instrument activity of daily living scale, mood, Practice of Physical activity, History of falls in the past 12 months, computer proficiency score

calculated by multiplying the QALY by its £ valuation. We report estimates for the Green Book (£70k per QALY) valuation and the HTA (£20k per QALY) valuation.

We calculate productivity impacts using the methodology outlined in Annex B.3. We do not calculate health and social care impacts because the model does not relate to disease avoidance. However, we expect health and social benefits to exist since individuals with improved general health and wellbeing will likely use NHS and social care services less (see Section 4.1.1).

Step 2 – Estimating the number of individuals accruing health and wellbeing benefits

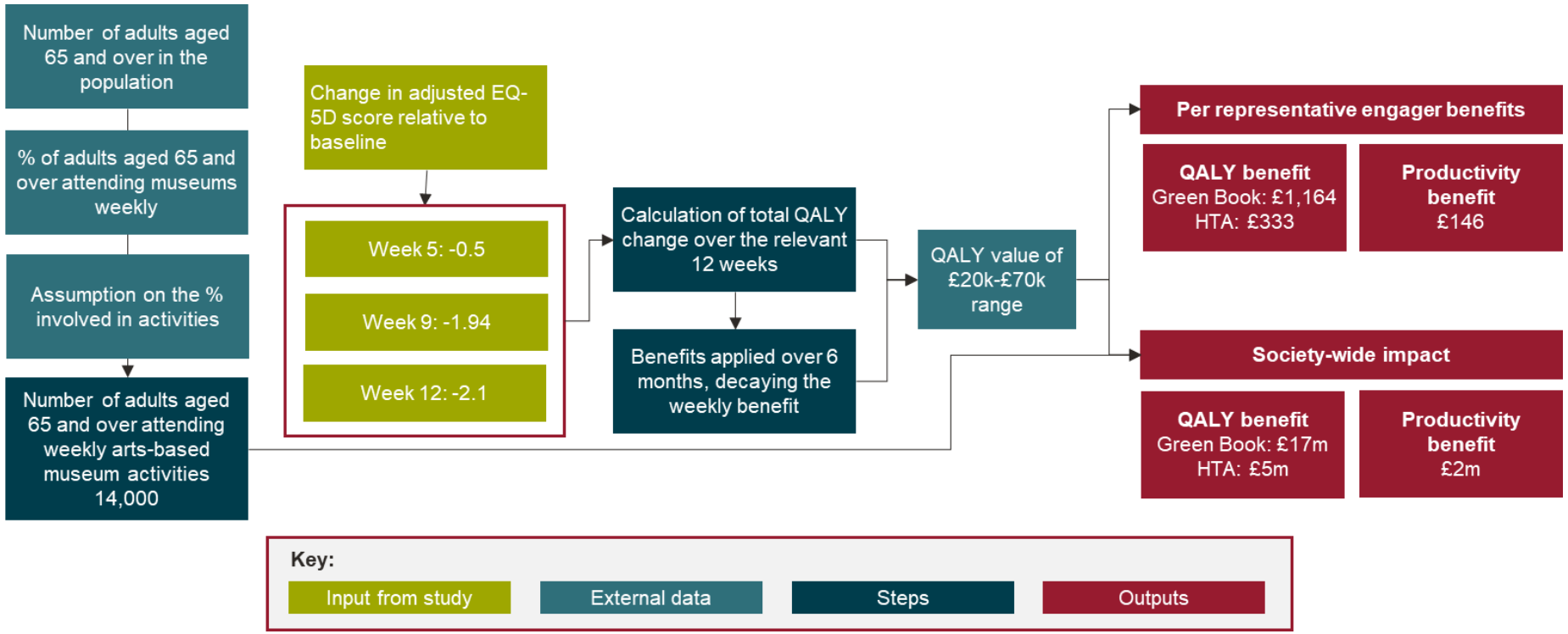
Data is not available to provide an accurate estimate of the number of adults aged 65 and over who participate in weekly arts-based museum activities. Instead, we present a 'what-if' scenario, answering the question, 'What would be the benefit to society if 25% of weekly museum attendees aged 65 and over participated in arts-based activities?'. We combine data on the number of adults aged 65 and over in the population (12.5 million) with the percentage of the population who attend museums weekly from the Taking Part survey (0.45%).[23] We multiply this by our baseline 'what-if' assumption (that 25% of this group attends arts-based activities). We present sensitivities to this assumption below.

Step 3 – Estimating the total health and wellbeing benefits to society

Our society-wide benefits are calculated by multiplying per-person benefits (Step 1) by the number of engagers (Step 2).

[23] The Taking Part data does not report engagement frequencies by age group. We assume that, of those who attend museums, age does not affect frequency of attendance.

Figure 16 Model 6 – Methodology



Source: *Frontier Economics.*
Note: *See Table 33 for an explanation of EQ-5D.*

Results, sensitivity analysis and possible extensions

Table 46 presents the annual estimated benefits for adults aged 65 years and over who participate in weekly arts-based museum events. In our baseline scenario, we calculate the impact of 14,000 adults aged 65 years and over participating in these activities. Using the Green Book valuation, we estimate a benefit of £1,310 per person from arts-based museum activities per year and a society-wide benefit of £19 billion per year. These benefits come predominantly from impacts on individuals' QoL.

The per-person figures are larger for this model than for all other models. We assume this is because the engagement is intense and frequent. However, it is likely that only a small group of individuals are engaged in this type of activity, so the society-wide impact is one of the lowest.

These benefits apply to adults aged 65 years and over who participate in a weekly arts-based event at museums for 12 weeks. If an individual participated for a longer period then we would reasonably expect the benefits to be higher, but evidence is not available to assess the size of these benefits.

Table 46 Model 6 – Annual estimated benefits

	Annual per-person impact	Annual society-wide impact
Individual impacts – Green Book	£1,164	£17 million
Individual impacts – HTA	£333	£5 million
NHS and social care savings	Not applicable	Not applicable
Productivity benefits	£146	£2 million
Total benefits – Green Book	**£1,310**	**£19 million**
Total benefits – HTA	**£478**	**£7 million**

Source: *Frontier Economics.*

Note: *Individual impacts are reported using a Green Book QALY valuation (£70,000) and a HTA QALY valuation (£20,000). The totals are calculated by summing the relevant individual impacts (Green Book or HTA) with the NHS and social care savings and productivity benefits. NHS and social care savings are only calculated for models where a specific condition is avoided.*

Sensitivity: Impact persistence

For this model, we present a sensitivity around the persistence of the impacts. The baseline model presented above assumes that the intervention's benefits last six months. We consider a scenario where the benefits occur only during the study's course, where an individual is still attending the activities. This sensitivity is not relevant for many of our models, since they typically look at engagement across the entire year, while this model looks at engagement over a shorter time scale with no evidence on whether impacts last.

Table 47 presents the estimated benefits for adults in this scenario. Using the Green Book valuation, we estimate a benefit of £695 per person per year from general cultural engagement and a society-wide benefit of £10 million per year. These benefits are around half of the size of the benefits under our baseline model.

Table 47 Model 6 – Annual estimated benefits: Conservative impact persistence

	Annual per-person impact	Annual society-wide impact
Individual impacts – Green Book	£656	£9 million
Individual impacts – HTA	£188	£3 million
NHS and social care savings	Not applicable	Not applicable
Productivity benefits	£39	£1 million
Total benefits – Green Book	**£695**	**£10 million**
Total benefits – HTA	**£227**	**£3 million**

Source: *Frontier Economics.*

Note: *Individual impacts are reported using a Green Book QALY valuation (£70,000) and a HTA QALY valuation (£20,000). The totals are calculated by summing the relevant individual impacts (Green Book or HTA) with the NHS and social care savings and productivity benefits. NHS and social care savings are only calculated for models where a specific condition is avoided.*

Sensitivity: 'What if' scenarios

In addition, we consider alternative engagement levels. For other models, calculating an evidence-based estimate of engagement was possible. However, data is not available to estimate the number of people attending arts-based activities robustly, so a 'what if' scenario is needed.

The society-wide impacts presented are based on the baseline scenario where we assume that 25% of weekly museum attendees aged 65 years and over participate in arts-based activities at the museum. To test the impact of this assumption, Table 48 shows the benefits under a low, medium (baseline), and high scenario (attendance) – where 10%, 25% and 50% of the relevant group participate in arts activities. The per-person impact is constant across all three scenarios and the benefits scale linearly with the increase in participants. Using the Green Book valuation, we estimate a benefit of £7 million per year in the low scenario, £19 million per year in the medium scenario, and £37 million per year in the high scenario.

Table 48 Model 6 – Annual estimated benefits: What if scenarios

		Annual society-wide impacts		
	Annual per-person impact	**Low**	**Medium**	**High**
Individual impacts – Green Book	£1,164	£7 million	£17 million	£33 million
Individual impacts – HTA	£333	£2 million	£5 million	£9 million
NHS and social care savings	Not applicable	Not applicable	Not applicable	Not applicable
Productivity benefits	£146	£1 million	£2 million	£4 million
Total benefits – Green Book	**£1,310**	**£7 million**	**£19 million**	**£37 million**
Total benefits – HTA	**£478**	**£3 million**	**£7 million**	**£14 million**

Source: *Frontier Economics*

Note: *Individual impacts are reported using a Green Book QALY valuation (£70,000) and a HTA QALY valuation (£20,000). The totals are calculated by summing the relevant individual impacts (Green Book or HTA) with the NHS and social care savings and productivity benefits. NHS and social care savings are only calculated for models where a specific condition is avoided*

Model 7 – Choirs and general health in older adults

Summary of model and results

Age group studied: Adults aged 65 years and over.

Health benefit studied: General health, as measured in EQ-5D.

Type of engagement: Participation in a choir.

Frequency of engagement: Weekly for a 3-month period.

Main source of evidence: Coulton S. et al. (2018) Effectiveness and cost-effectiveness of community singing on older people's mental health-related quality of life: Randomised controlled trial.

Results: We estimate a value of £553 per person per year and £170 million of wider-society benefits per year.

Robustness: The model uses a randomised control trial (Level 3) and includes conservative assumptions about the expected length of the effect. It is one of the most robust models we calculate.

Literature informing this model

This model uses evidence from Coulton et al. (2018). Coulton's study is a randomised control trial (RCT) of 184 participants, with the treatment group enrolled in a 14-week 90-minute choir programme while the control group continued their everyday activities. The study finds a significant effect on EQ-5D at month three (the end of the 14-week trial) and a slightly reduced, but still statistically significant, effect at the end of month six (three months after the end of the trial). Additionally, the study analyses a measure of anxiety and depression (the Hospital Anxiety and Depression Scale [HADS]) and a more general measure of mental and physical health (SF-12). They find no significant effect on physical health, but they find significant effects on all other measures at month three. They find no significant measures at month six.

Since the study relies on an RTC, it scores Level 5 on our robustness scale. The limitation of this study is its small sample size (184 participants).

Methodology

Figure 17 provides an overview of our approach to estimating individual benefits and engagement levels.

Step 1 – Estimating the health and wellbeing benefits per individual

To calculate the quality-of-life impact for a person, we combine Coulton's estimated impact of weekly choir attendance on EQ-5D at months three and six to calculate the full benefit over the 6-month period.

Coulton estimates a 0.02 increase in EQ-5D at month three and 0.015 at month six (both figures are compared to baseline EQ-5D). We take a conservative approach, assuming that benefits do not persist beyond six months (the end of the study). We assume that the impact on EQ-5D is linear, such that it increases gradually over the course of engagement (three months) and decreases from three to six months.

Since Coulton's estimates are reported in EQ-5D, they can be converted directly to QALYs without any mapping. QoL is measured in QALYs, where the QALY value equals the EQ-5D value (a 0.1-point increase in EQ-5D corresponds to a 0.1-point increase in QALY). The monetary value is calculated by multiplying the QALY by its £ valuation. We report estimates for the Green Book (£70k per QALY) valuation and the HTA (£20k per QALY) valuation.

We calculate productivity impacts using the methodology outlined in Annex B.3. We do not calculate health and social care impacts because the model does not relate to disease avoidance. However, we expect health and social benefits to exist since individuals with improved general health and wellbeing will likely use NHS and social care services less (see Section 4.1.1).

Step 2 – Estimating the number of individuals accruing health and wellbeing benefits

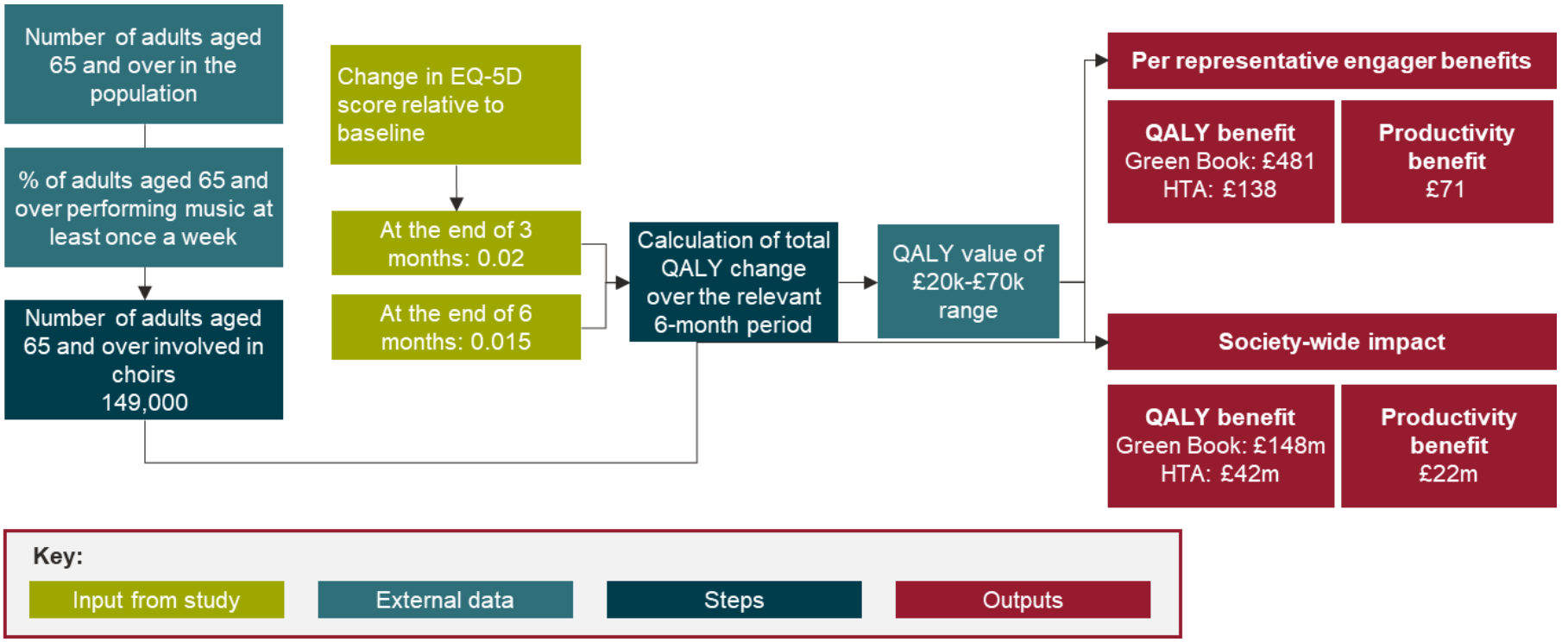
We estimate the number of adults aged 65 years and over who attend choirs weekly. We combine data on the number of adults aged 65 years and over in the population (12.4 million) with the percentage of the age group who 'sing to an audience or rehearse' weekly from the Taking Part data (1%).[24]

[24] The variable used is 'Music: sing to an audience or rehearse, not karaoke'. This could include engagement beyond choirs but in the absence of better available data we assume this entire group is involved in choirs. We combine the adults aged 65 to 75 and adults aged 75 and over categories.

Step 3 – Estimating the total health and wellbeing benefits to society

Our society-wide benefits are calculated by multiplying per-person benefits (Step 1) by the number of engagers (Step 2).

Figure 17 Model 7 – Methodology



Source: *Frontier Economics.*
Note: *See Table 33 for an explanation of EQ-5D.*

Results, sensitivity analysis and possible extensions

Table 49 presents the annual estimated benefits for adults aged 65 years and over who attend choirs for three months. We estimate that 307,000 adults aged 65 years and over attend a choir weekly. Using the Green Book valuation, we estimate a benefit of £553 per person per year and a society-wide benefit of £170 million per year. These benefits come predominantly from impacts on individuals' QoL.

The per-person benefits for this model are at the high end of benefits across all models. This is likely because the engagement frequency is at a high. However, the society-wide impact is among the lowest across all models because only a few people are expected to engage in this way (relative to other models).

These benefits apply to adults aged 65 years and over who participate in a choir for three months. If an individual participated in a choir for a longer period, we would reasonably expect the benefits to be higher, but there is no evidence to assess these benefits.

Table 49 Model 7 – Annual estimated benefits

	Annual per-person impact	Annual society-wide impact
Individual impacts – Green Book	£481	£148 million
Individual impacts – HTA	£137	£42 million
NHS and social care savings	Not applicable	Not applicable
Productivity benefits	£71	£22 million
Total benefits – Green Book	**£553**	**£170 million**
Total benefits – HTA	**£209**	**£64 million**

Source: *Frontier Economics*

Note: *Individual impacts are reported using a Green Book QALY valuation (£70,000) and a HTA QALY valuation (£20,000). The totals are calculated by summing the relevant individual impacts (Green Book or HTA) with the NHS and social care savings and productivity benefits. NHS and social care savings are only calculated for models where a specific condition is avoided.*

Model 8 – Engagement with cultural venues and depression in older adults

Summary of model and results

Age group studied: Adults aged 50 years and over.

Health benefit studied: Depression incidence.

Type of engagement: General engagement, defined as attending the theatre, a concert, the opera, the cinema, an art gallery, an exhibition, or a museum.

Frequency of engagement: Every few months or more often.

Main source of evidence: Fancourt D, Steptoe A. (2019) Cultural engagement and mental health: Does socio-economic status explain the association?

Results: We estimate a value of £314 per person per year and £3 billion of wider-society benefits per year.

Robustness: This model is fairly robust, using high-quality evidence with no significant additional assumptions. However, the conclusions are likely to be underestimated since we downscale society-wide benefits for sustained engagement.

Literature informing this model

This model uses evidence from Fancourt and Steptoe (2019) to estimate the economic value of reduced depression risk for adults who engage with culture frequently. Individuals with 'frequent engagement' are those who respond 'every few months', 'about once a month' or 'twice a month or more' to the broad question on cultural engagement in the English Longitudinal Study of Ageing (ELSA), covering the types of engagements defined in box above. They find that frequent engagement with culture significantly reduces an individual's risk of depression.

Additional analysis finds that this result is consistent across individuals with different wealth levels, qualification levels, and occupational status and that none of these factors impacted the size of the effect (e.g. someone with a high wealth level would not see larger or smaller benefits than those with a low wealth level). Moreover, as a sensitivity check, the model explores the effect of engagement at any level (compared to no engagement) and continues to find a significant impact of cultural engagement on depression risk.

This evidence ranks as Level 3 on our robustness scale since it uses a propensity score matching technique (see the Glossary for more information) to control for other factors which are related to health status and cultural engagement by matching each 'frequent engager' with an 'infrequent engager' based on their age, gender and socioeconomic status. In addition,

results are based on three separate statistical methods, including a fixed-effects technique which can control for unobservable, time-invariant differences between people. The results are consistent across all techniques.

Methodology

Figure 18 provides an overview of our approach to estimating individual benefits and engagement levels. For this model, we begin by calculating the society-wide benefits.

Step 1 – Estimating the total health and wellbeing benefits to society

To calculate the quality-of-life impact for a person, we use Fancourt and Steptoe's (2019) estimated reduction in risk of depression incidence due to general cultural engagement. They estimate that the depression risk for someone frequently engaging in culture is 76% of the risk for someone not engaging in culture frequently.

We calculate the number of adults with depression in the counterfactual (where none of them engaged with culture) using the 6% 12-month depression prevalence in the UK (see Table 31). We combine this with Fancourt and Steptoe's 'odds ratio' (76%) to calculate the number of people with depression at the current levels of engagement. Comparing these figures, we estimate that there are 127,000 fewer people with depression as a result of cultural engagement.

We combine this with the increase in QoL (as measured in QALYs) for an individual who avoids depression (0.25), according to Public Health England (2020). The increase in QALYs is multiplied by their monetary value. We report estimates for the Green Book (£70k per QALY) valuation and the HTA (£20k per QALY) valuation.

To calculate the NHS savings, we combine the number of fewer individuals with depression with the expected cost to the NHS per depression case each year. These figures are indicative and rely on average costs of care across all types of depression. Evidence suggests that social care costs from depression are expected to be marginal, so we do not calculate social care savings.

We calculate productivity impacts using the methodology outlined in Annex B.3.

Step 2 – Estimating the number of individuals accruing health and wellbeing benefits

We estimate the number of adults who engage generally with culture and heritage every few months or more. We combine data on the number of adults aged 50 years and over in the population (23.6 million) with the percentage of Fancourt and Steptoe's sample who frequently

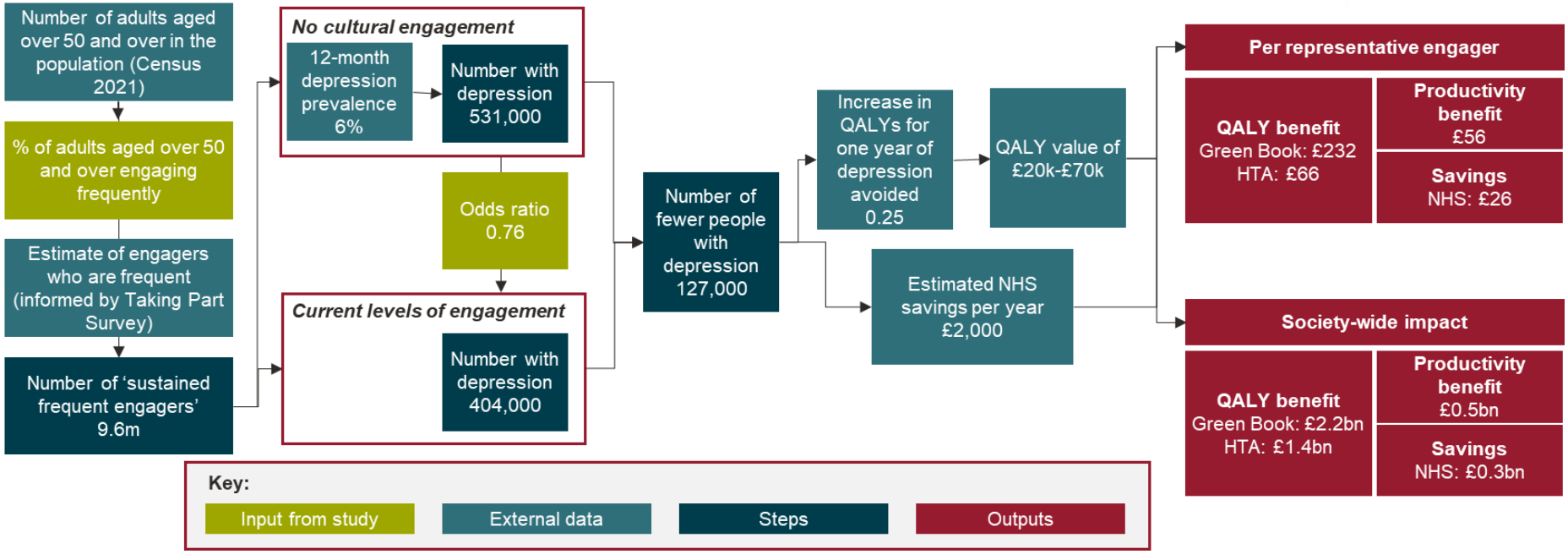
engage with culture (50%).[25] We downscale these figures so that our engagement estimate includes only those engaging in a sustained way across multiple years (75% of annual engagers; see below for more details).

Step 3 – Estimating the health and wellbeing benefits per individual

Our society-wide benefits are calculated by dividing society-wide benefits (Step 1) by the number of engagers (Step 2).

25 8,780 adults aged 50 and over from the English Longitudinal Study of Ageing. We assume this sample is representative of the wider population in the absence of better data to estimate engagement.

Figure 18 Model 8 – Methodology



Source: Frontier Economics.

Results, sensitivity analysis and possible extensions

Table 50 presents the annual estimated benefits. We estimate that 9.6 million adults aged 50 years and over engage generally with culture and heritage every few months or more over a sustained period. Using the Green Book valuation, we estimate a benefit of £314 per person from general cultural engagement per year and a society-wide benefit of £3 billion per year. These benefits come predominantly from impacts on individuals' QoL.

The per-person benefits estimated in this model fall in the middle of the range of the benefits estimated across all our models. The benefits relate to one specific area of health at a relatively low frequency of engagement. On the other hand, unlike other models, health and social care benefits are included. In contrast, the society-wide impact is on the higher end of the range. A large number of people engage at the required level to achieve benefits from reduced depression risk.

Table 50 Model 8 – Annual estimated benefits

	Annual per-person impact	Annual society-wide impact
Individual impacts – Green Book	£232	£2.2 billion
Individual impacts – HTA	£66	£639 million
NHS and social care savings	£26	£255 million
Productivity benefits	£56	£537 million
Total benefits – Green Book	**£314**	**£3.0 billion**
Total benefits – HTA	**£148**	**£1.4 billion**

Source: *Frontier Economics*

Note: *Individual impacts are reported using a Green Book QALY valuation (£70,000) and a HTA QALY valuation (£20,000). The totals are calculated by summing the relevant individual impacts (Green Book or HTA) with the NHS and social care savings and productivity benefits. NHS and social care savings are only calculated for models where a specific condition is avoided.*

Model 9 – Engagement with cultural venues and dementia in older adults

Summary of model and results

Age group studied: Adults aged 50 years and over.

Health benefit studied: Delayed dementia onset.

Type of engagement: General engagement, defined as attending the theatre, a concert, an opera, an art gallery, an exhibition, or a museum.

Frequency of engagement: Every few months or more often.

Main source of evidence: Fancourt D, Steptoe A, Cadar D, (2020) Community engagement and dementia risk: time-to-event analyses from a national cohort study

Results: We estimate a value of £148 per person per year and £742 million of wider-society benefits per year.

Robustness: The difficulties modelling dementia incidence and onset suggest that this model is slightly less robust than others we have estimated. We have used conservative assumptions (in particular, assuming that dementia is delayed rather than prevented) to counteract the risk of overestimating the benefits in light of these difficulties.

Literature informing this model

This model uses evidence from Fancourt et al. (2020), which looks at the impact of visiting cultural assets on the risk of developing dementia over a 12-year period, using time-to-event analysis. Individuals with 'frequent engagement' are those who respond either 'every few months', 'about once a month' or 'twice a month or more' to the broad question about cultural engagement in the English Longitudinal Study of Ageing (ELSA), covering the types of engagement defined in the box above. They find that cultural engagement has a significant impact on dementia risk. Factors such as age, gender, marital status, loneliness, wealth, educational attainment, and employment status did not have a statistically significant impact on the effect of cultural engagement (the impact was constant across these groups).

The evidence scores Level 3 on our robustness scale. A panel dataset is used, looking at individuals over a 12-year period, with three different time-to-event techniques employed. The

regression controls for demographic, health, and social variables that were selected using a statistical technique.[26] These variables include:

- demographics such as age, sex, wealth, and employment status
- health status such as depression and physical activity
- social factors such as marital status, social contact, and perceived loneliness

In addition, several sensitivity checks were conducted to confirm the robustness of the results (such as excluding individuals who develop dementia during the first two years of the study and controlling for other factors such as baseline cognition, BMI, and chronic illness).

Methodology

Figure 19 provides an overview of our approach to estimating individual benefits and engagement levels. We begin by calculating society-wide benefits.

Step 1 – Estimating the health and wellbeing benefits per individual

To calculate the quality-of-life impact for a person, we use Fancourt et al.'s estimate that dementia risk for an individual engaging with general culture every few months or more is 65% of the risk for an individual not engaging.

We combine our estimate of the number of adults aged 50 years and over who engage with culture and heritage every few months or more (detailed in Step 2) with the 12-year dementia prevalence in Fancourt et al.'s study (4.5%) to calculate the number of individuals at risk of developing dementia in the counterfactual. We use the odds ratio to calculate the number of individuals with dementia in the factual case and estimate that 77,000 people benefit from the delayed onset of dementia.

The number of individuals who benefitted from delayed onset dementia is combined with the average number of years (2.34) by which the dementia is delayed for these individuals (Calculated using detailed study output provided by the UCL Social Biobehavioural Research Group). We assume that individuals do not avoid dementia altogether but experience a delay in the onset. This is because the study only covers 12 years, and individuals may develop

[26] A full list of controls: age, sex, educational attainment, wealth, employment status, depression, eyesight, hearing, cardiovascular conditions, physical activity, marital status, living status, social contact, social network size, perceived loneliness, perceived positive social support, perceived negative social support.

dementia after the end of the study. While this will be underestimated if cultural engagement leads to dementia prevention, we cannot make this assumption based on a lack of evidence.

The total years of delayed dementia onset is combined with the increase in QoL (measured in QALYs) for an individual who avoids dementia for one year (0.31), according to Public Health England (2020). The increase in QALYs is multiplied by their monetary value. We report estimates for the Green Book (£70k per QALY) valuation and the HTA (£20k per QALY) valuation.

To calculate the NHS and social care savings, we assume that life expectancy is not affected by engagement. Therefore, each year of delayed dementia onset is equal to one fewer year for which an individual has dementia (the individual lives the same number of years, but the number of years they live with dementia is reduced). This simplifying assumption is informed by early evidence, from Fancourt et al. (2018) and Van Loenhoud et al. (2019), that cultural engagement builds cognitive reserve, which is associated with delayed dementia onset but an increased speed of decline once onset has begun, meaning that individuals benefitting from delayed dementia are unlikely to see an impact on life expectancy. According to the Alzheimer's Association, Overview of disease progression, his means that the assumed average length of life lived with dementia decreases from 8 years to 5.66 years. We combine the average decrease in years living with dementia with the number of individuals who benefit from the delayed onset of dementia. This gives us a decrease in the number of people-years of dementia (the total number of people with dementia multiplied by the total number of years they have dementia) which need to be treated by the NHS and social care. To calculate the savings per person, we combine this with the expected cost per person per year, according to Public Health England (2020) and Care Policy and Evaluation Centre (2019). These figures are indicative and rely on average care costs across all types of dementia.

We calculate productivity impacts using the methodology outlined in Annex B.3.

The figures calculated using the method outlined above relate to the benefits throughout the 12-year period studied by Fancourt et al. We make the simplifying assumption that benefits are linear over time (we divide the benefits by twelve to calculate annual benefits). In reality, the benefits more likely to occur towards the end of the study. If a cohort starts engaging in a given year, we would expect the benefits of engagement to accrue over time, so the impact on dementia onset may take a while to be felt. Therefore, the benefits may be an overestimate for the start of the 12-year study and an underestimate for the end of the period.

Step 2 – Estimating the number of individuals accruing health and wellbeing benefits

We estimate the number of adults aged 50 years and over who engage with general culture and heritage every few months or more. We combine data on the number of adults aged 50

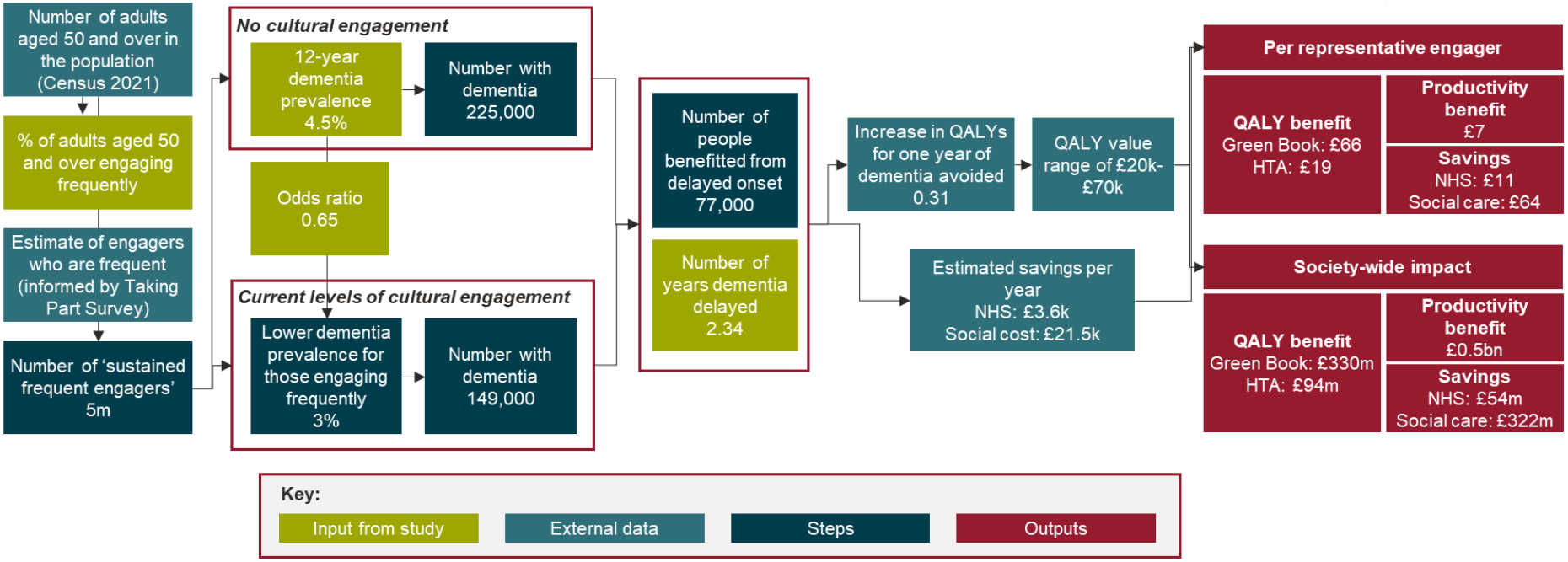
years and over in the population (25.6 million) with the percentage of Fancourt et al.'s sample who engage with culture every few months or more (26%).[27] We downscale this estimate so that our figure includes only those engaging in a sustained way across multiple years, as per our sustained engagement assumption (75% of annual engagers, see below for more details).

Step 3 – Estimating the total health and wellbeing benefits to society

Our per-person benefits are calculated by dividing society-wide benefits (Step 1) by the number of engagers (Step 2).

[27] 9,550 adults aged 50 and over from the English Longitudinal Study of Ageing. We assume this sample is representative of the wider population in the absence of better data to estimate engagement.

Figure 19 Model 9 – Methodology



Source: Frontier Economics.

Results, sensitivity analysis and possible extensions

Table 51 presents the annual estimated benefits. We estimate that 5 million adults aged 50 years and over engage with general culture and heritage every few months or more over a sustained period. Of these, we estimate that 225,000 will develop dementia, and 77,000 of those individuals will benefit from a delayed onset of dementia. Using the Green Book valuation, we estimate a benefit of £148 per person from general cultural engagement per year and a society-wide benefit of £741 million per year. NHS and social care savings (£75 per person per year and £358 million society-wide per year) make up about half of the total benefit.

The per-person figures are relatively low compared to our other models. This is likely because of the conservative assumptions we made about delayed dementia onset (rather than dementia avoidance) and the fact that the reduction in risk and the associated benefits occur over 12 years, so annual benefits will be low. The high engagement levels for the relevant group mean that the society-wide impact falls within the middle of the range of benefits.

Table 51 Model 9 – Annual estimated benefits

	Annual per-person impact	Annual society-wide impact
Individual impacts – Green Book	£66	£330 million
Individual impacts – HTA	£19	£92 million
NHS savings	£11	£54 million
Social care savings	£64	£322 million
Productivity benefits	£7	£36 million
Total benefits – Green Book	**£148**	**£741 million**
Total benefits – HTA	**£101**	**£506 million**

Source: *Frontier Economics*

Note: *Individual impacts are reported using a Green Book QALY valuation (£70,000) and a HTA QALY valuation (£20,000). The totals are calculated by summing the relevant individual impacts (Green Book or HTA) with the NHS and social care savings and productivity benefits. NHS and social care savings are only calculated for models where a specific condition is avoided.*

Model 10 – Museums and dementia in older adults

Summary of model and results

Age group studied: Adults aged 50 years and over.

Health benefit studied: Delayed dementia onset.

Type of engagement: Attendances at museums, art galleries, and exhibitions.

Frequency of engagement: Every few months or more often.

Main source of evidence: Fancourt D, Steptoe A, Cadar D. (2018) Cultural engagement and cognitive reserve: museum attendance and dementia incidence over a 10-year period.

Results: We estimate a value of £369 per person per year and £1.5 billion of wider-society benefits per year.

Robustness: The difficulties modelling dementia incidence and onset suggest that this model is slightly less robust than others we have estimated. We have used conservative assumptions (in particular, assuming that dementia is delayed rather than prevented) to counteract the risk of overestimating the benefits.

Literature informing this model

This model uses evidence from Fancourt et al. (2018). The paper studied a 10-year period, looking at the incidence of dementia per 1,000 person-years. The analysis suggests that attending museums, art galleries, and exhibitions every few months or more was associated with decreased dementia risk throughout the study. Lower levels of engagement are not found to have an effect on dementia risk.

Robustness for this evidence is ranked at a high Level 2. The paper uses panel data to conduct a regression analysis, which calculates the incidence rate ratio of dementia incidence, controlling for demographic, health-related and community engagement variables.[28] Similar to the previous models, they are unable to control for unobservable variables such as genetics

[28] A full list of controls: gender, age, marital status, educational attainment, employment, wealth and previous occupational classification, eyesight, hearing, depression and existing cardiovascular health conditions, and membership of social clubs, arts or music groups, charities, church groups, volunteer networks, political or union groups, neighbourhood groups, environmental groups or sports clubs.

or general enjoyment level from the arts. Several sensitivities are conducted, which help increase robustness.

Methodology

Figure 20 provides an overview of our approach to estimating individual benefits and engagement levels. This model follows the same structure as Models 8 and 9.

Step 1 – Estimating the health and wellbeing benefits per individual

To calculate the quality-of-life impact and NHS and social care cost savings for a person, we use a similar methodology outlined above (Figure 19), but we apply Fancourt et al.'s estimated reduction in the risk of dementia ('odds ratio'). We calculate productivity impacts using the methodology outlined in Annex B.3.

The figures calculated relate to the benefits over the 10-year period studied by Fancourt et al. We make the simplifying assumption that benefits are linear over time (we divide the benefits by ten to calculate annual benefits).

Step 2 – Estimating the number of individuals accruing health and wellbeing benefits

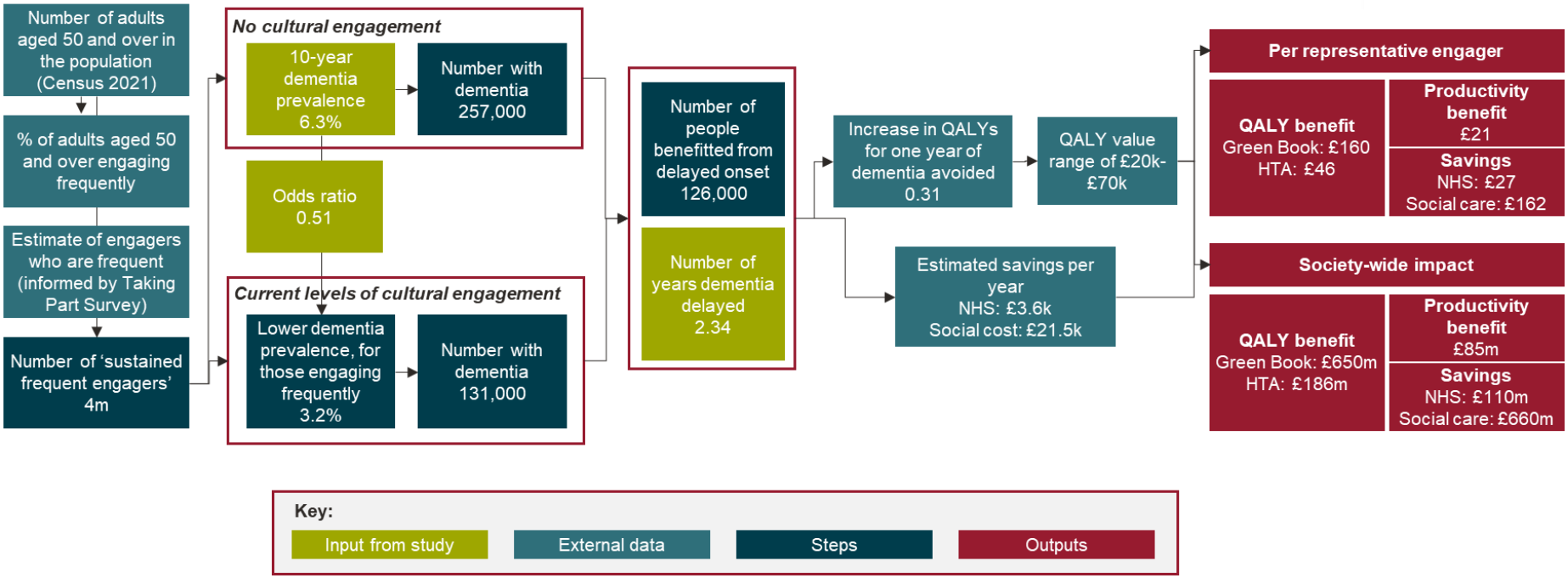
We estimate the number of adults aged 50 years and over who visit museums every few months or more. We combine data on the number of adults aged 50 years and over in the population (25.6 million) with data from the Taking Part survey on the percentage of adults aged 45 and over who visit museums at this frequency (14%).[29] We downscale this estimate so that our figure includes only individuals engaging in a sustained way across multiple years, as per our sustained engagement assumption (75% of annual engagers; see below for more details).

Step 3 – Estimating the total health and wellbeing benefits to society

Our society-wide benefits are calculated by multiplying per-person benefits (Step 1) with the number of engagers (Step 2).

[29] We use the number of adults aged 45 years and over (rather than the number of adults aged 50 years and over) based on data availability in the Taking Part survey. The Taking Part data does not report engagement frequencies by age group. We assume that, of those who attend museums, age does not affect frequency of attendance.

Figure 20 Model 10 – Methodology



Source: Frontier Economics.

Results, sensitivity analysis and possible extensions

Table 52 presents the annual estimated benefits. We estimate that 4 million adults aged 50 years and over visit museums every few months or more, over a sustained number of years. Of this group, 257,000 individuals develop dementia and 126,000 benefit from a delayed onset of dementia due to cultural engagement. Using the Green Book valuation, we estimate a benefit of £369 per person from museum attendance per year and a society-wide benefit of £1.5 billion per year. Around half of the benefits (£183 per-person per year and £800 million society-wide per year) come from NHS and social care benefits.

The benefits fall in the mid-range of our estimates. The per-person benefits are higher in this model than above because the literature evidence estimates a larger impact on the risk of developing dementia. This suggests that museum engagement has a larger effect on delaying dementia onset than general cultural engagement, although this comparison cannot be made directly.

Table 52 Model 10 – Annual estimated benefits

	Annual per-person impact	Annual society-wide impact
Individual impacts – Green Book	£160	£0.6bn
Individual impacts – HTA	£46	£0.2bn
NHS savings	£27	£0.1bn
Social care savings	£162	£0.7bn
Productivity benefits	£21	£0.1bn
Total benefits – Green Book	**£369**	**£1.5bn**
Total benefits – HTA	**£256**	**£1.0bn**

Source: *Frontier Economics.*

Note: *Individual impacts are reported using a Green Book QALY valuation (£70,000) and a HTA QALY valuation (£20,000). The totals are calculated by summing the relevant individual impacts (Green Book or HTA) with the NHS and social care savings and productivity benefits. NHS and social care savings are only calculated for models where a specific condition is avoided.*

B.5 Sustained engagement assumptions

Several of our models rely on an assumption for estimating the sustained levels of engagement. A change in the sustained engagement figures would not impact the estimated benefits per person but would lead to an up or downscaling of the society-wide estimates.

For the models using the sustained engagement assumption, Table 53 presents the society-wide impacts under three scenarios:

- a 'baseline' scenario, which assumes that 75% of annual engagers are sustained engagers (engage with the relevant type of culture at the required frequency over multiple years). This is based on data from the longitudinal Taking Part survey and is an approximation of the number of individuals who engage in all three years surveyed.
- a 'low' scenario, which assumes that 50% of annual engagers are sustained engagers.
- a 'high' scenario, which assumes that 100% of annual engagers are sustained engagers. This is equivalent to assuming that individuals do not need to engage in a sustained way to see benefits and that benefits results from annual engagement with culture.

These scenarios are indicative and reflect what could happen under different assumptions.

Table 53 Scenarios around sustained engagement

#	Model name	Per-person	Baseline scenario	Low scenario	High scenario
1	General engagement and general health in adults	£992	£8.08bn	£5.39bn	£10.77bn
8	Engagement with cultural venues and depression in older adults	£314	£3.03bn	£2.02bn	£4.04bn
9	Engagement with cultural venues and dementia in older adults	£148	£0.74bn	£0.49bn	£0.99bn
10	Museums and dementia in older adults	£369	£1.5bn	£1.0bn	£2.01bn

Source: Frontier Economics

Annex C – Clinical deep dive – Visual art therapy model

This section presents the method and results for our clinical deep dive – visual art therapy model.

Summary of model and results

Beneficiaries included: Estimates calculated for all adults diagnosed with a new cancer in a year, and specific estimates for all adults diagnosed with breast cancer.

Health outcome: QoL.

Type of engagement: Visual art therapy intervention delivered in a clinical setting. The intervention includes some non-art-making components, such as mindfulness and psychotherapy. The length of intervention varies across studies (between five and twelve weeks).

Main sources of evidence: Svensk et al. (2009), Jang et al. (2016), and Monti et al. (2013): RCTs studying the impact of Mindfulness-Based Art Therapy (MBAT) on patients with breast cancer. Monti et al. (2006): an RCT focusing on the impact of MBAT on females with cancers (not isolated to breast cancer).

Results:

- Per individual: £730 per year for individuals diagnosed with breast cancer undergoing visual art therapy and £450 per year for individuals diagnosed with all other cancers (using the HTA QALY) valuation.
- Society-wide: Assuming that 10% of newly diagnosed breast cancer patients or all other newly diagnosed cancer patients each year participate in visual art therapy, we expect a benefit of £4.5 million and £16.3 million for breast cancer and all other cancers per year, respectively (using the HTA QALY valuation).

Robustness: The literature focuses on the impact of visual art therapy on females diagnosed with breast cancer. As a result, we expect our estimates for breast cancer to be more robust than our estimates for all other cancers.

C.1 Literature informing this model

The clinical deep dive uses evidence from four separate studies, which are summarised in Table 54. All of the studies are RCTs that aim to assess the causal impact of visual art therapy on the QoL of individuals who have been diagnosed with breast cancer. However, the studies are based on small sample sizes and generally focus on individuals in a particular hospital or small geographic area.

Table 54 Literature informing the visual art therapy model

Study	Beneficiaries	Geography	Intervention	Health outcomes	Impact	Evidence quality assessment (RAG)
Monti et al. (2006), A randomized, controlled trial of mindfulness-based art therapy (MBAT) for women with cancer.	Females – range of cancers, stage 1 to 4	United States	Mindfulness-based art therapy: drawing, painting, book making, and meditation	Pain, QoL (SF-36)	Significant improvement in pain and QoL	RCT, small sample (n=111)
Monti et al. (2013), Psychosocial benefits of a novel mindfulness intervention versus standard support in distressed women with breast cancer.	Females, breast cancer, stage 1 to 4	United States	Mindfulness-based art therapy: drawing, painting, book making, and meditation	Pain, QoL (SF-36)	Significant improvement in pain and QoL Similar response to art therapy across different ethnic groups	RCT, small sample (n=191)
Svensk et al. (2009), Art therapy improves experienced quality	Females, breast cancer, undergoing radiotherapy	Sweden	Painting, drawing, collage, paper work, writing, and psychotherapy	Pain, QoL (WHO-QoL)	Significant improvement in QoL at six months after the	RCT, small sample (n=41)

Study	Beneficiaries	Geography	Intervention	Health outcomes	Impact	Evidence quality assessment (RAG)
of life among women undergoing treatment for breast cancer: a randomized controlled study.					intervention, but not at two months post-intervention	
Jang et al. (2016), Beneficial Effect of Mindfulness-Based Art Therapy in Patients with Breast Cancer-A Randomized Controlled Trial.	Females with breast cancer	South Korea	Mindful-based art therapy: drawing meditation, and yoga	Pain, QoL (EORTC QLQ-C30)	Significant improvement in QoL for group who received intervention versus control group	RCT, small sample (n=24)

Source: Frontier Economics.

C.2 Methodology

Figure 21 provides an overview of our approach to estimating individual impacts and the potential society-wide impacts.

Per-person calculations

Each study provides an estimated change in the QoL of cancer patients engaging in visual art therapy. The studies use different quality-of-life measures that are not directly monetisable. We convert the changes in QoL reported in the studies to a consistent quality-of-life measure (QALYs measured by EQ-5D). The quality-of-life measures mentioned below (SF-36, WHO-QoL, and EORTC QLQ-C30), are alternative quality-of-life measures used in the studies and defined in the Glossary.

- Monti et al. (2006) and Monti et al. (2013) measure quality-of-life changes using the SF-36 survey. We use Ara and Brazier (2008) to convert the SF-36 scores to EQ-5D
- Svensk et al. (2009) measure quality-of-life changes using the WHO-QoL. We use Wee et al. (2018) to convert changes in WHO-QoL scores to changes in EQ-5D
- Jang et al. (2016) measure quality-of-life changes using the EORTC QLQ-C30. We use Kim et al. (2012) to convert changes in the EORTC QLQ-C30 to EQ-5D

We calculate the impact of visual art therapy for individuals with breast cancer and all other cancers separately. We estimate the change in the QoL for individuals with breast cancer who engage in visual art therapy by taking an average of the quality-of-life change across the studies. We take our estimate for quality-of-life change for all cancers (excluding breast cancer) directly from Monti et al. (2006), as this is the only study that contains a wider set of cancers beyond breast cancer. We report the estimated QALY impact using Green Book and HTA QALY valuations.

We assume that visual art therapy impacts the QoL up to six months after the start of the intervention. This is a conservative assumption based on the literature. Evidence suggests that visual art therapy impacts the QoL for at least six months. However, the impact is not

measured at later intervals, so we have not included impacts post-six months in the modelling.[30]

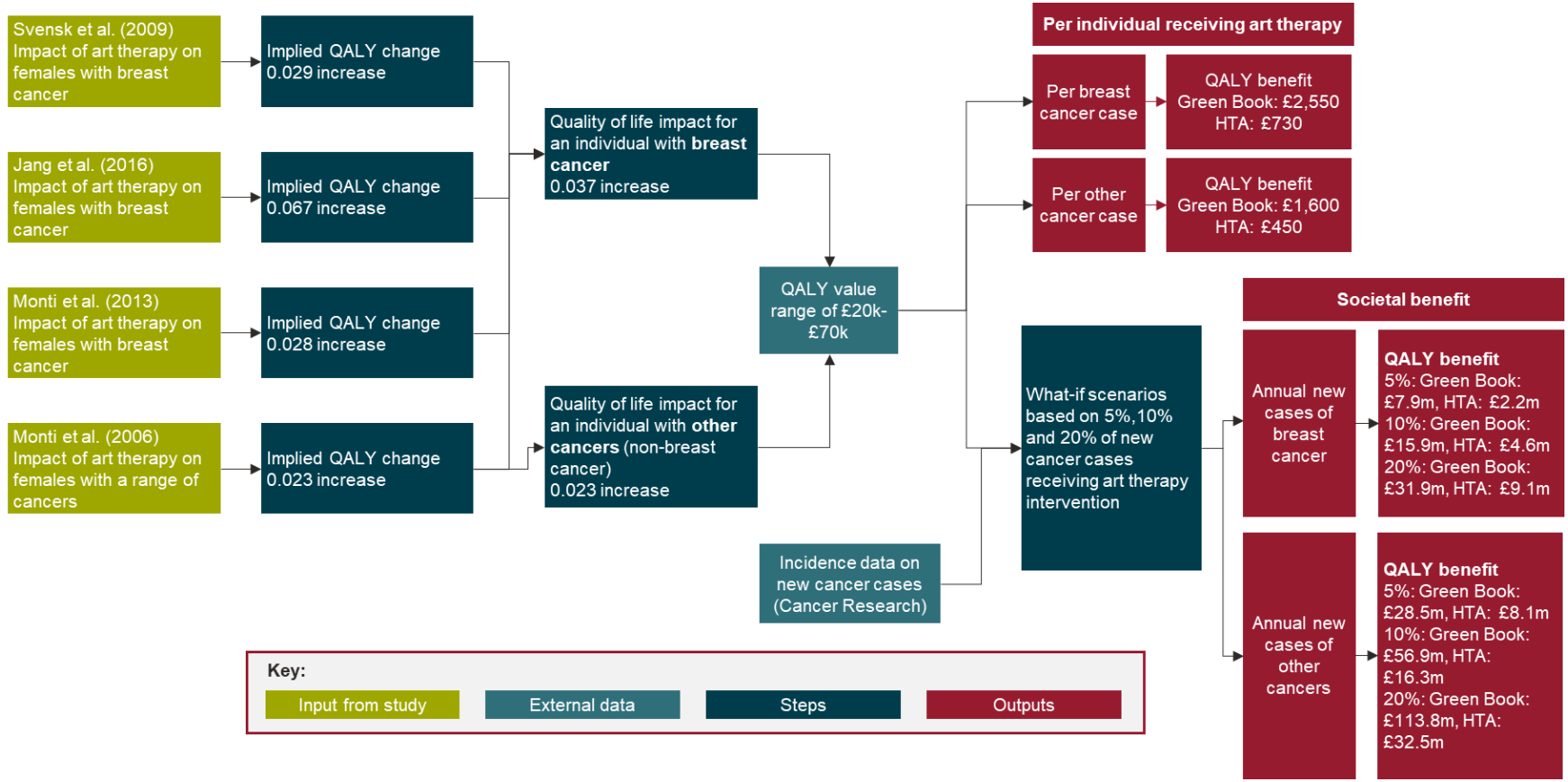
We have not included estimates for NHS and social care costs or savings or any wider societal estimates (such as changes to productivity). Changes to NHS and social care costs can only be calculated where there is a change in the stage of cancer diagnosis or the cancer diagnosis itself, which we do not expect from visual art therapy interventions. Additionally, we do not expect that the change in the QoL due to visual art therapy will be sufficient to result in increased productivity levels.

Society-wide impact

Our society-wide calculations are based on what-if scenarios. Unlike most of our other models, we do not have engagement data with which to estimate the society-wide impact. Instead, we use cancer incidence data (according to the Cancer Research UK projections) to estimate the number of individuals we expect to have a new cancer diagnosis in 2024 and apply what-if scenarios to understand the potential societal benefit if, for example, 10% of individuals with a new cancer diagnosis undergo visual art therapy.

[30] Svensk et al. (2009) find an impact on QoL at six months post-intervention, and Gellaritry et al. (2010) find an impact on quality of life at six months post-intervention. Both studies do not measure QoL at further intervals. Rosenberg (2002) finds an impact from expressive disclosure at six months on physical symptoms (including physical pain) and health care utilisation, but not in psychological variables.

Figure 21 Clinical deep dive – methodology



Source: Frontier Economics.

C.3 Results and what-if scenarios

Table 55 presents the estimated benefits for each individual undergoing visual art therapy and Table 56 presents the potential society-wide benefits if a given proportion of individuals diagnosed with cancer undergo visual art therapy.

For individuals with breast cancer, we estimate a benefit of £2,550 per individual per year using the Green Book QALY valuation, and a benefit of £730 per individual per year using the HTA QALY valuation. The society-wide potential benefits range from £2.28 million per year to £31.89 million per year. This depends on the valuation we use and the percentage of the relevant population that receives visual art therapy.

- £2.28 million if 5% of individuals with a new breast cancer diagnosis receive visual art therapy (using the HTA QALY valuation)
- £31.89 million if 20% of individuals with a new breast cancer diagnosis receive visual art therapy (using the Green Book QALY valuation)

For individuals with all other cancers (excluding breast cancer), we estimate a benefit of £1,600 per individual per year, using the Green Book QALY valuation, and a benefit of £450 per individual per year using the HTA QALY valuation. The society-wide potential benefits range from £8.13 million per year to £28.46 million per year. This depends on the valuation we use and the percentage of the relevant population that receives visual art therapy.

- £8.13 million if 5% of individuals with a new cancer diagnosis (excluding breast cancer) receive visual art therapy (using the HTA QALY valuation)
- £28.46 million if 20% of individuals with a new cancer diagnosis (excluding breast cancer) receive visual art therapy (using the Green Book QALY valuation)

A value for all cancers combined can be calculated by summing the results for breast cancer and all other cancers.

Table 55 Per individual undergoing visual art therapy – annual estimated values

	Per individual with breast cancer	Per individual with all other cancers
Individual impacts – Green Book	£2,550	£1,600
Individual impacts – HTA	£730	£450

Source: *Frontier Economics.*

Note: *These figures are annual figures in 2024£s. 'All other cancers' excludes breast cancer. Individual impacts are reported using a Green Book QALY valuation (£70,000) and a HTA QALY valuation (£20,000).*

Table 56 What-if scenarios – annual estimated values

	Breast cancer		All other cancers	
Individuals with new cancer diagnoses receiving visual art therapy	**Individuals receiving visual art therapy**	**Benefit**	**Individuals receiving visual art therapy**	**Benefit**
5%	3,100	Green Book: £7.97 million HTA: £2.28 million	17,900	Green Book: £28.46 million HTA: £8.13 million
10%	6,200	Green Book: £15.94 million HTA: £4.56 million	35,800	Green Book: £56.91 million HTA: £16.26 million
20%	12,400	Green Book: £31.89 million HTA: £9.11 million	71,500	Green Book: £113.82 million HTA: £32.52 million

Source: *Frontier Economics.*

Note: These figures are annual figures in 2024£s. 'All other cancers' exclude breast cancer. Individual impacts are reported using a Green Book QALY valuation (£70,000) and a HTA QALY valuation (£20,000).

C.4 Possible extensions

Our model focuses specifically on the monetary benefits of rolling out visual art therapy to cancer patients. This analysis could be extended to include:

- **an assessment of different types of art therapies.** There is a wide range of art therapies used as clinical interventions. Our modelling work focused on Mindfulness-based art therapy (MBAT). Additional work could seek to understand the impact of other art therapies, such as music therapy, drama therapy or dance therapy, on different health conditions.
- **an assessment of the associated costs of rolling out art therapy.** We can calculate an initial view of workforce costs using the study evidence. This involves making assumptions on the number of hours required by a workforce group. According to NHS Health Careers, art psychotherapists are band six on the Agenda for Change band and are renumerated according to the Agenda for Change pay rates. However, the research is more limited in terms of the additional inputs required to deliver art therapy at scale (e.g. administration, equipment, workforce training).
- **a wider set of beneficiaries and health outcomes.** For example, an analysis could be conducted on the potential impact of visual art therapy on cognition levels for individuals with dementia or on the impact of visual art therapy on social skills and social functioning of individuals with developmental disabilities. This could be used to understand the potential relative benefits of visual art therapy across different beneficiaries and health outcomes.

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