



A review of economic evaluation methodologies for the assessment of arts and creativity interventions for improving health and wellbeing in older adults

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Executive Summary



Executive Summary

Economic evaluation contributes to evidence-based public health decision-making by identifying, measuring, valuing and comparing programmes and policies to optimise population health. Over the course of the past 30 years, considerable effort has been expended developing a range of methods for assessing the cost-effectiveness and budgetary impact of health technologies. Detailed technical guidance as well as an infrastructure that includes reference costs for healthcare and preference weights for health have been developed to support evaluation of pharmaceutical and medical device technologies.

The application of these techniques to public health interventions is not, however, straightforward. Issues include the existence of benefits that extend beyond health, costs and benefits that arise in multiple sectors in addition to health and the often-prolonged gap between the investment of resources and stream of benefits. Other issues include challenges in the demonstration of a causal link between a public health intervention and benefits accrued in the future given the various factors that can change in the interim. As well as the challenges in identifying, measuring and incorporating spill-over effects into evaluations.

A key challenge, however, is the focus of these approaches on efficiency – the maximization of health gain from a given resource. Equity which is often a key objective of public health interventions is not readily included within them and often treated as an afterthought by them if considered at all. Collectively these challenges call into question the usefulness of standard ‘cost-effectiveness’ and ‘budgetary impact’ analyses for public health interventions. This has seen analysts and policy makers turn to other forms of evaluation to inform decision making and demonstrate value for money, including in the area of arts and creativity interventions.

Research suggests that arts and creativity interventions have the potential to improve a broad range of outcomes for older people including wellbeing, quality of life and improved cognitive function (Fancourt and Finn, 2019; McQuade and O’Sullivan, 2021), as well as increased motivation, attention, appetite, communication and social engagement (Bosco et al., 2019). Such ‘intermediate’ outcomes may not immediately manifest in financial savings in terms of reduced use of healthcare services but can contribute to ‘health ageing’ that results in older adults remaining in good health and living independently for longer, benefiting not only the individual but wider society.

Such interventions have the potential to generate benefits beyond those consuming the service, for example, of other family members. This can spill over into the shared experiences by family members over the longer term and reduce inequalities in benefit and capacity to benefit from art and creativity interventions. For such interventions, traditional cost-effectiveness approaches may not only miss important aspects of benefit or savings but struggle to move beyond consideration of causal relationships to ascribe, measure or value costs and benefits.

Nevertheless, arts and creativity interventions can provide community based, non-clinical activity that improves and promotes health and well-being in older adults through the amelioration or prevention of a range of mental and physical conditions. This approach is consistent with goals outlined in ROI’s Healthy Ireland framework (DOH, 2013) and

Sláintecare (Houses of the Oireachtas, Dublin 2017). Both of which have a strong focus on population health that supports the individual whilst reducing inequalities and shifting care away from the hospital sector toward primary and social care services offered in the community.

Similarly, NI's Making life better strategic framework (DOH NI, 2013) focuses on investing in a broad range of social, economic and environmental factors which seek to create the condition for individuals and communities to take control of their own lives, achieve their full health and wellbeing potential and reduce inequalities in health. Both documents have at their core a responsibility to ensure that public money is spent in the public interest for the public good; and that all patients should be able to access cost-effective services. Adaptation and further development of current evaluation frameworks to adequately address the challenges inherent in appraising public health interventions is crucial if resources are to be allocated both equitably and efficiently.

In our review of studies, we have found evidence across a range of evaluation modalities that assesses the relative value for money of arts and creativity interventions. These studies are important not only in shedding light on the potential value for money of arts and creativity interventions but importantly help demonstrate the issues associated with the current methodological state of the art in this area. The established economic evaluation framework is robust and prescriptive, but captures costs and benefits from a narrow perspective, potentially undervaluing the contribution of such interventions across multiple sectors and stakeholders. Emerging methods capture a much broader picture of 'value', but a body of work is required to develop this framework further.

The existence of distinct funders, with distinct objectives and approaches to assessing alternative uses of scarce resources is to be expected. While it has advanced the science of evidenced-based decision-making, it has also contributed to confusion when, for example, the evaluation approach with which a decision maker is familiar, fails to adequately capture important elements of cost or benefit or struggles to accommodate the challenges of demonstrating causality. In these circumstances the disconnect between what evaluations find and what stakeholders "know" to be the case has seen researchers improvise techniques and make what might be seen as ad hoc assumptions to bridge evidence gaps.

It is within this context that arts and creativity interventions targeted at older people must compete with other interventions for access to scarce resources, within which we have considered the evidence base and provided guidance for those seeking to add to that evidence base. In our review of the literature, including grey literature, we identify and consider six studies that could be considered to offer evidence in respect of the relative value for money of interventions of this type. The interventions differ in respect of the methods adopted, two using established economic evaluation methods and four using a Social Return on Investment (SROI) approach. On balance we consider them to offer support for the assertion that arts and creativity can offer value for money and further the objectives of such programmes as Healthy Ireland, Sláintecare and Making Life Better.

2 Introduction



Introduction

The number and proportion of older adults in the population has increased in virtually every country in the world over past decades, because of increased life expectancy and decreased fertility (United Nations Department of Economic Social Affairs Population Division, 2015). The populations of Ireland and Northern Ireland (NI) are ageing, and this trend will accelerate over coming decades (Sheehan and O'Sullivan, 2020). This demographic shift requires new models of support to maintain health and wellbeing across the life span.

The World Health Organisation (WHO) has recommended sustainable and equitable investment for health and wellbeing across all ages (WHO. Health Evidence Network Synthesis Report 51 Investment for Health and Wellbeing, 2017). Hence, at a time of financial constraint for health and social care services, this asset needs to be unlocked to ensure that there is commissioning of cost-effective public sector services, in co-production with voluntary and private sector resources.

Arts interventions have the potential to improve a broad range of outcomes for older people including wellbeing, quality of life and improved cognitive function (Fancourt and Finn, 2019; McQuade and O'Sullivan, 2021). Arts interventions have been shown to improve social cohesion and reduce social inequalities and inequities; encourage health promoting behaviour; prevent ill health (including enhancing well-being and mental health, reducing cognitive decline, frailty and premature mortality); support people with stroke, degenerative neurological disorders and dementias and support end of life care. Furthermore, benefits beyond the individual were identified, such as supporting the well-being of formal and informal carers, enhancing our understanding of health and improving clinical skills.

To date, no published review has critically appraised and synthesised the evidence relating to the economic impact of arts and creativity interventions on health and well-being in older adults. The Institute of Public Health (IPH) has commissioned this report to address this gap and review the current evidence base; and provide an assessment of the range of economic evaluation methodologies and to provide recommendations on the most suited type of economic evaluation methodology to assess such interventions (and other public health interventions). These recommendations will help inform the basis of planned IPH guidance and toolkit to assist providers, commissioners and policy makers to undertake robust and appropriate assessment of a diverse range of interventions aimed at improving health and wellbeing in older adults.

The choice of methodology for assessing the cost-effectiveness of healthcare interventions involving drugs, devices or medical interventions is well established (Edwards and McIntosh, 2019). Methods for the evaluation of screening and immunisation public health programmes are also well developed. However, economic evaluation of other, broader, public health interventions is scarce and methods uncertain (Weatherly, 2009). A number of reasons have been suggested as to why this is the case.

Public health interventions generate a broad range of costs and benefits which straddle multiple sectors requiring an intersectoral approach. They are often directed at populations or communities rather than individuals making it difficult to undertake randomised controlled trials (RCTs). Given their complex, broad and intersectoral nature,

standard approaches to measuring health gain may be inadequate (e.g. the quality adjusted life years, QALYs) and finally, standard economic evaluation methods focus on efficiency (i.e. maximising health gain) rather than on equity (the distribution of health gains) which is often an objective of many public health interventions.

At the outset it should be noted that the use of economic evaluation to support evidence-based decision-making in public health is an emerging science. Established techniques used to assess the value-for-money of clinical interventions have struggled to capture the breadth of costs and benefits associated with public health interventions. Similarly, techniques that have emerged, in part to address the shortfalls of established techniques, have faced significant criticism related to their methodological rigour.

In this report we will provide an overview of the types of economic evaluation that have been applied in this area; provide a commentary on the strengths and weaknesses of each approach; indicate which resource-allocation questions can be answered by each approach; and give guidance regarding which approach should be applied in different settings. To reiterate though, it should be borne in mind that methods continue to evolve in this area and debates around their use continue.



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Overview of Economic Evaluation Methodologies



Overview of Economic Evaluation Methodologies

What is economic evaluation?

Economic evaluation asks whether a particular healthcare intervention is worth producing, by weighing up its costs and benefits, relative to the benefits which could be produced by using scarce resources to produce other healthcare interventions (Drummond et al., 2015). For public health interventions this translates into how society uses scarce resources to meet our preventative healthcare needs, improve health, and reduce inequalities in health (Edwards and McIntosh, 2019).

Two closely linked concepts are 'scarcity' and 'opportunity cost'. If we invest resources in a community choir intervention to promote wellbeing among diverse older adults, this same resource cannot be invested in an alternative use, such as an arts intervention for people living with dementia. That is, every choice, action, or decision about the use of resources has an associated foregone opportunity, namely the value of those resources in their next best use (Edwards and McIntosh, 2019).

The examples presented in Table 1 illustrates this concept. The 'Silver Song Club' (Coulton et al., 2015) and the 'Dementia and Imagination' (Jones et al., 2020) programmes aim to improve the health and wellbeing of older adults. Both programmes differ in how they achieve this goal, the patient population they target, the type of economic evaluation framework employed and presentation of findings.

Funders and commissioners are frequently presented with this type of economic evidence to inform resource allocation decisions. However, the approach adopted may differ with respect to the rigour with which causality (the relationship between cause and effect/outcome) has been determined and the steps taken to minimise bias; the type of economic evaluation framework employed; the perspective from which costs and outcomes have been collected; and the instruments and methods used to assess outcomes. Furthermore, presentation of results may make it difficult to compare programmes if, as in the example below, one programme presents findings as a 'probability of being cost-effective at a specified 'cost/QALY' threshold' versus presentation of a 'return on investment' ratio.

Table 1: Comparison of two evaluations aimed at improving the health and wellbeing of older adults

	Silver Song Club programme	Dementia and Imagination programme
	Colton et al., 2015	Jones et al., 2020
Aim	To evaluate the effectiveness and cost-effectiveness of singing for a population of older adults	To explore the wider social value of arts activities in older adults with dementia
Type of evaluation	Cost-effectiveness analysis (CEA)	Social return on investment (SROI)
Counterfactual / control group	Costs and outcomes were compared for the group who participated in the programme and a group who did not	No comparator group - results relate to the group that received the programme only
Assessment of causality	A pilot pragmatic Randomised Controlled Trial (RCT)	Non-randomised mixed methods longitudinal cohort study
Costs	Costs were collected from a health and social care (H&SC) perspective; included the cost of the programme and H&SC costs	Costs of providing the programme were collected from the perspective of a range of stakeholders (the older person with dementia, their family, care home staff)
Outcomes	Health-related quality-of-life (HRQoL)	Health and non-health outcomes (such as increased confidence, improved mood, professional development of care staff)
Valuation of outcomes/ impact	HRQoL gains were estimated using a validated questionnaire (EQ-5D)	Estimates of health and non-health benefits were provided by stakeholders and valued using financial proxies
Conclusions	At a willingness-to-pay of £30,000 (the threshold used by NICE) the programme had a 64% probability of being the more cost-effective option	Between £3.20 and £6.62 of social value was generated for every £1 invested

For resources to be allocated efficiently and/or equitably it is important to understand, a) the quality of evidence presented, b) strengths and limitations of different frameworks, and c) how to re-engineer the data into a useful metric such that programmes can be meaningfully compared across a range of relevant criteria.

Economic evaluation frameworks exist on a continuum – some are relatively quick and easy to perform and may provide sufficient evidence for a range of decision modalities. Determining the nature and extent of the causal relationship is paramount, however, as the requirement for rigor in determining this relationship increases, so too does the cost of producing that evidence. The more robust the methods used to establish causality, the more expensive it is to generate such evidence as more complex experimental designs are necessary.

In general, where the 'opportunity cost' of a wrong decision is high from either a financial or humanistic perspective, the effort expended (in terms of time and resources) to ensure that the purported benefits of intervention can be realised should be greater. Where the purpose of the evaluation is not to inform high budget spend, but rather provide evidence on the impact and value of a programme and/or embed organisational goals and encourage stakeholder engagement, a more pragmatic design can be employed.

The next section of the report provides an overview of a range of established and emerging economic evaluations frameworks, outlines their strengths and limitations, giving a general indication of when each method is most appropriate including examples of their use within a public health context. We also provide commentary on the importance of the 'vehicle' for the economic evaluation, i.e., the underlying experimental design which demonstrates 'causality' and the implications this has for the choice of evaluation.

Types of economic evaluation

A range of approaches can be used to assess the 'cost-effectiveness' or 'value for money' of an intervention. Each method differs slightly with respect to the question it can answer and the setting in which it should be applied. One approach may be appropriate when assessing interventions which capture (mainly) health benefits funded from a single health and social care budget. An alternative approach may be required where the intervention is expected to generate significant 'non-health' benefits, when costs (and benefits) fall across multiple sectors (such as the education or the criminal justice system). The distinction between economic and social impact is particularly difficult to disentangle. An economic value can be attached to many examples of social impact, however, not all 'social impact' creates 'social value'.

The most widely used taxonomy to classify economic evaluation of healthcare distinguishes between 'full' and 'partial' evaluations. Full evaluations capture both costs and outcomes and are comparative in nature. Partial evaluations may capture only costs or outcomes or both but not employ a comparator.

Cost-minimisation (CMA), cost-effectiveness analysis (CEA), cost-utility analysis (CUA) and cost-benefit analysis (CBA) form the cornerstone of economic evaluation methods which evaluate programmes, services and policies which aim to improve health and wellbeing (Table 2). All four evaluative methods measure costs in monetary terms but differ in the measurement of outcomes. They are known as 'full' economic evaluations as they consider both costs and outcomes and are comparative (i.e., the programme is compared to a 'usual care' or 'next best' alternative). These methods are well established and standardised

guidance (in the form of the ‘reference case’, published by NICE in the UK and HIQA in Ireland) govern their design, implementation, analysis and reporting of the findings. Standardisation of methods, clear guidance on technical aspects of the evaluation and peer review of evaluations ensures robust determination of causality and minimisation of bias (the extent to which systematic error may be introduced into sampling or testing, whether in the study design, data collection or analysis and publication stage).

Table 2: Economic evaluation methods

Methods	Description
Cost-Minimisation Analysis (CMA)	Cost-minimisation analysis compares the costs of alternative interventions and can be used when the benefit of the programmes under consideration has been demonstrated as equivalent and therefore the decision is reduced to one of cost only.
Cost-Effectiveness Analysis (CEA)	Cost-effectiveness analysis can be used to compare alternative programmes or services which measure benefit using the same unit of outcome, e.g., ‘life years’ saved.
Cost-Utility Analysis (CUA)	Cost-utility analysis can be used to compare a diverse range of programmes or services which have different units of health outcome, but which can be expressed in a common unit.
Cost-Benefit Analysis (CBA)	Cost-benefit framework is a methodologically rigorous alternative to cost-utility analysis when it is important to establish causality and capture a broader set of societal benefits expressed in monetary terms.
Social Return on Investment (SROI)	SROI can be performed if an organisation wishes to demonstrate the economic, social and environmental value of their work. This approach is particularly useful when an evidence base on causality already exists.

The usefulness of an evaluation is dependent on the degree of certainty associated with the findings. No study is completely free from bias, but studies which have been designed in such a way as to minimise known biases and demonstrate the 'causal' relationship in a robust manner, are more likely to deliver the benefits suggested by the evaluation if the programme were to be introduced.

A range of methods are available to ensure robust estimation of causality and to minimise bias, with the choice of particular method depending on the underlying 'experimental design' of the study. The randomised controlled trial (RCT) is considered the 'gold standard' and economic evaluations are frequently performed alongside such studies. However, it is not always possible (or appropriate) to employ this design. More pragmatic designs include 'before and after' studies, 'natural experiments' and in the case where the data is administrative in nature, a range of statistical techniques (such as difference-in-difference techniques and propensity score matching) can be used.

However, the most important requirement in producing reliable cost-effectiveness or impact estimates is the inclusion of a credible counterfactual or 'control' group. A variety of 'partial' economic evaluations (such as cost-consequence analyses, cost analyses and cost descriptions), present the cost and/or outcomes for a single programme, service or policy. This can be an important intermediate step in informing a full evaluation, by identifying resource use categories, piloting data collection instruments, and determining the extent to which costs may vary (across a range of observable factors). In the absence of more rigorous evidence, it may be necessary for commissioners and funders to consider this type of information when allocating resources, however, they should be aware of the shortcomings of this type of evidence.

Within the last 20 years, a number of alternative approaches to measuring economic and social impact have gained prominence as funders of public health interventions and governments aim to stimulate accountability and require evidence of 'value for money' and estimates of 'social value' creation. Social return on investment (SROI) analysis has been used by organisations within the government and charity sectors to showcase the social value created through the introduction of programmes or services and to embed stakeholder engagement.

Table 3 provides an overview of a range of full economic evaluation methods (CMA, CEA, CUA and CBA) and social return on investment analyses (SROI) for a range of key metrics such as the perspective of the study, how costs are measured, and what benefits are captured. All five methods capture costs in monetary terms with the choice of outcome measure differing between approaches. In general, full evaluation methods (with the exception of cost-benefit analysis) adopt a narrower 'healthcare payer' perspective, whereas CBA and SROI use a broader 'societal' perspective and monetise outcomes. Full evaluations are usually undertaken alongside effectiveness studies and use standardised instruments to capture outcomes, whereas SROI analyses employ a more pragmatic approach to outcome valuation. The following section explains each method in more detail, providing an example from a public health context for each method.

Table 3: Comparison of economic evaluation methods

	Cost-Minimisation analysis (CMA)	Cost-Effectiveness analysis (CEA)	Cost-Utility Analysis (CUA)	Cost-Benefit Analysis (CBA)	Social Return on Investment (SROI)
Rationale	To aid efficient allocation of resources	To aid efficient allocation of resources	To aid efficient allocation of resources	To aid efficient and/or equitable allocation of resources	To determine the economic, social and environmental impact of an intervention
Resource allocation	Yes	Yes	Yes	Yes	Yes
Priority setting	Yes	Yes	Yes	Yes	Yes
Impact assessment	Yes	Yes	Yes	Yes	Yes
Cost-effectiveness	Yes	Yes	Yes	Yes	No
Hypothesis/theory of change	Yes	Yes	Yes	Yes	Yes
Perspective	Payer/societal	Payer/societal	Payer/societal	Societal	Stakeholder
Underlying experimental design	Experimental design from which causality can be inferred such as randomised controlled trial (RCT); pre-post design; natural experiment; statistical analysis of existing data e.g., regression techniques, propensity score matching				No underlying experimental design. SROI uses stakeholder engagement to estimate impact.

Expertise required for evaluation	High level of expertise required; Multidisciplinary research team; usually clinical/academic				Moderate level of expertise required; usually performed in-house by organisations or commissioned.
Funding required for evaluation	Moderate cost, assuming the equivalence of outcomes has already been established.	The cost of undertaking an economic evaluation is related to the complexity of the underlying experimental design used to determine causality. RCTs are the most expensive design compared to, for example, statistical analysis of administrative data.			An SROI can be undertaken at relatively low cost
Mechanism	Compares costs and outcomes of programmes/services which have been demonstrated to be equivalent	Compares costs and outcomes of programmes/services measured in the same units	Compares costs and outcomes of programmes/services which can be measured using QALYs	Compares costs and outcomes of programmes/services with different outcomes	To assess if an intervention is worth the investment.
Example	Two (or more) smoking cessation programmes which have demonstrated equivalent effectiveness in reducing	Two (or more) smoking cessation programmes which have measured smoking status using the same outcome	A smoking cessation programme can be compared to a walk-to-work initiative where the outcome of both interventions is	A smoking cessation programme can be compared to a walk-to-work initiative where the outcome of both interventions	Smoking cessation policies which lead to improved work productivity and improved health outcomes. A Dutch study concluded that smoking

	smoking- can then be as- sessed on the basis of budgetary impact (i.e., cost) only.	measure (e.g., co- tinine veri- fied cessa- tion for 12 months or more) can be com- pared on the basis of costs and outcome.	measured in quali- ty-adjusted life-years (QALYs) gained.	are ex- pressed in monetary terms.	cessation could con- tribute to welfare with a return of €1.1-€2.2 for every €1 invested.
Costs (units)	Monetary value	Monetary value	Monetary value	Monetary value	Monetary value
Mea- sure-ment of costs	Identify, measure, value and compare costs based on guidance contained in the 'reference case'; for example, using PSSRU unit costs or Admitted Patient Price List; micro-costing exercises where costs are not available.				A pragmatic approach to costing is adopted using 'proxys' identified as being equivalent for activities identified.
Benefits (units)	Benefits must be demon- strated as equi- valent (or non-in- ferior)	Captures health and wellbeing outcomes	Captures health and wellbeing outcomes	Captures health and non-health impacts (from a societal perspec- tive)	Captures health and non-health impacts (us- ing a social, economic and envi- ronmental framework)
Mea- sure-ment of benefits	Using standardised and validated instruments and/or clinical scales.				Participant or carer reported benefits from a range of stakeholders;

Valuation of benefits	Benefits are measured in clinical units	Benefits are measured in natural units (such as life years saved, reduction in HbA1C levels; reduction in mmHg)	Benefits are measured in terms of health-related quality of life (HRQoL)	Non-monetary benefits are obtained by estimating the compensating variation measure of welfare (e.g., Willingness to pay; WTP)	Monetary equivalent of benefits are valued using 'financial proxies'.
Timeline of analysis	Prospective	Prospective	Prospective	Prospective	Retrospective or Prospective
Discounting of future value	Yes	Yes	Yes	Yes	Yes
Stakeholder engagement	Yes - through patient and public involvement; PPI				Yes - an explicit part of the SROI method
Theory of change/ hypothesis	Yes	Yes	Yes	Yes	Yes - an explicit part of the SROI method
Main output of analysis	Least costly option (requires formal demonstration of equivalence or non-inferiority)	Incremental Cost-Effectiveness Ratio (ICER) and/or cost-effectiveness acceptability curve (CEAC)	Incremental Cost-Effectiveness Ratio (ICER) and/or cost-effectiveness acceptability curve (CEAC)	Benefit-Cost Ratio (BCR); presentation on cost-benefit plane; hypothetical net benefit acceptability curve	Social Return on Investment ratio

Interpretation of evaluation findings	Least costly option is preferred (if equivalence of outcomes has been demonstrated)	Programmes/ services with an ICER below the agreed threshold are deemed a cost-effective use of resources	Programmes/ services with an ICER below the agreed threshold are deemed a cost-effective use of resources	Programmes/ services with a positive net-benefit or ratio of benefit to cost which exceeds 1 are deemed value for money	Programmes/ services with a positive net-benefit or SROI ratio of benefit to cost which exceeds 1 are deemed value for money
Treatment of uncertainty	One-way and probabilistic sensitivity analysis (based on statistical parameters)	One-way and probabilistic sensitivity analysis (based on statistical parameters)	One-way and probabilistic sensitivity analysis (based on statistical parameters)	One-way and probabilistic sensitivity analysis (based on statistical parameters)	One-way sensitivity analyses based on a range of assumptions relating to deadweight loss, attribution etc.

Cost-minimisation analysis (CMA)

“A cost-minimisation analysis can be used when the benefit of the programmes under consideration has been demonstrated as equivalent and therefore the decision is reduced to one of cost only.”

Cost-minimisation analysis (CMA) requires evidence of ‘equivalence’ or ‘non-inferiority’ of outcomes before a cost analysis is performed. If equivalence with respect to outcomes has been established, the choice of programme is reduced to that which is lowest cost. Hence of all the full evaluation methods, CMA is analytically less cumbersome and relatively quick to perform. One criticism of this approach is that although outcomes such as ‘deaths averted’ or ‘one unit reduction in Body Mass Index (BMI)’ may be equivalent for two programmes, other differences may exist e.g. participants may prefer some aspects of one intervention over the other.

Case study: CMA

This approach was used to compare the effectiveness of generic e-mails versus a remote knowledge broker to integrate mood management into a smoking cessation programme in team-based primary care (Minian et al., 2021). A randomised controlled trial (RCT) was the vehicle for the evaluation with participants randomly assigned to either a 'remote knowledge broker offering tailored support via phone and e-mail' or 'a generalised monthly e-mail focusing on tobacco and depression treatment'. No statistically significant differences were observed between groups (with regard to smoking abstinence and acceptance) and hence the evaluation was concerned only with which delivery methods was less costly. Costs collected included the costs of developing, maintaining, and running each programme, cost of personnel and training and costs of supplies and services. Cost analysis showed that the generalised e-mail strategy was the least costly option.

Strengths and weaknesses of CMA

Strengths: Rigorous assessment of causality and analytically less cumbersome than other established evaluation methods.

Weaknesses: CMA focuses on health and wellbeing – non-health outcomes are not included; robust evidence is required to support 'equivalence' or 'non-inferiority' of outcomes; and even if 'equivalence' is established, participants may have preferences regarding certain aspects of the intervention.

Cost-effectiveness analysis (CEA)

"A cost-effectiveness analysis can be used to compare programmes or services which measure benefit using the same unit of outcome, e.g., 'life years saved.'"

In a cost-effectiveness analysis (CEA), costs are measured in monetary terms and health outcomes are measured in 'natural units' (such as 'deaths averted' or 'change in blood pressure'). This method is most useful when a decision maker, operating within a given budget, is considering a limited number of options within a given field. In general, the outcome measure is a 'clinical' health output such as 'mmHG' (millimetres of mercury), 'heart attacks averted', 'reduction in BMI', which can be objectively measured using standardised instruments.

Case study: CEA

This approach was used to determine the cost-effectiveness of a clinical childhood obesity intervention (Sharifi et al., 2017). The vehicle for the economic evaluation was a cluster randomised trial with children identified through electronic health records by primary care providers. Data from the trial was used to construct a model which compared changes in obesity (measured as 'BMI unit reduced') for children who received the intervention compared with those that did not. The intervention was expected to avert 43,000 cases of obesity at a net cost of \$4,085 per case averted and \$774 per life-year with obesity averted. The authors concluded that this clinical intervention could identify and treat children with obesity whilst working in synergy with population-level prevention strategies to reduce obesity prevalence.

In this example, whether this intervention is 'value for money' depends on what society (or a government/ healthcare system) is willing to pay for each case of obesity averted. Is the 'payer' willing to invest \$4,085 to avoid a case of childhood obesity? This will depend on a variety of factors, including the expected downstream costs associated with childhood obesity, the projected budgetary impact and current policy priorities.

Cost-effectiveness is assessed relative to a 'ceiling ratio', which is the maximum amount a 'payer' is willing to pay for the benefit gained from the intervention. Below this set threshold, interventions are considered 'value for money' or 'cost effective'. For example, if the maximum amount that a funder is willing to pay to avert a case of childhood obesity is \$5,000, the aforementioned intervention would be considered value for money. 'Affordability' would depend on the budgetary impact of implementing the programme which would differ depending on whether the eligible population comprised of 5,000 or 50,000 children.

Finally, for decision making purposes, only interventions which have used the same outcome measure can be compared. Hence, it is possible to compare the relative cost-effectiveness of a pharmacist-led obesity intervention with a tax on sugar sweetened beverages if the outcome of both interventions is measured in terms of reduced BMI. However, it would not be possible to compare either of these interventions to one which gets children walking if the outcome used is 'increased minutes of physical activity per week'.

Strengths and weaknesses of CEA

Strengths: Rigorous assessment of causality and clinically meaningful outcomes (sensitive and specific for the patient population under consideration) are used to assess cost effectiveness.

Weaknesses: A focus on health outcomes and payer perspective (although a societal perspective can be explored using sensitivity analysis); the output from cost-effectiveness analyses can be difficult to interpret for non-specialists as results are presented as a 'probability of being cost-effective' relative to a ceiling threshold; data on cost-effectiveness must be supplemented with data on affordability; and no national 'ceiling thresholds' exist for outcomes such as 'BMI reduction' or 'cases of diabetes averted' etc.

Cost-utility analysis (CUA)

“Cost-utility analysis can be used to compare a diverse range of programmes or services which have different units of outcome, but which can be expressed in a common unit.”

As mentioned, a drawback of CEA is that comparison of alternatives is limited to interventions with the same outcome measure (e.g., ‘cost per case of obesity averted’). Cost-utility analysis (a sub-category of cost-effectiveness analysis) circumvents this by using a composite outcome measure which combines both quantity and quality of life (known as the quality-adjusted life-year; QALY) allowing a diverse range of interventions to be compared (more information on the QALY is presented in box 1 below).

The QALY is the leading metric when evaluating healthcare interventions. QALYs allow for the standardised measurement of health outcomes, thus allowing for comparisons across different disease and population subtypes (Pettitt et al., 2016). In both the UK and Ireland, CUA is the preferred method specified by both HIQA and NICE in the ‘reference case’ when undertaking health technology assessment (HTA). This ‘reference case’ provides technical guidance when performing economic evaluations in healthcare. Only minor differences are evident in the technical specification used in Ireland (by HIQA) and the UK (by NICE). Detail on the reference cases for Ireland and the UK are presented in the Appendix 1 (Table A1). Guidance is presented with respect to the choice of comparator, the perspective from which costs and outcomes should be collected, the tools which should be used to both collect costs and value them (using standardised unit cost, Diagnosis Related Group (DRG) costs or micro-costing techniques), the discount rate which should be used, how health benefits should be measured, and results presented. Adherence to the reference case improves the quality and comparability of evaluations across a broad range of programmes and diseases.

The output from a CUA is interpreted in the same way as a CEA. This process is somewhat simplified as a ‘ceiling threshold’ against which CUA should be assessed is standardised with a cost/QALY below €45,000/QALY being cost-effective in Ireland and between £20,000-£30,000/QALY in the UK. Higher thresholds have however been applied to end-of-life care and conditions for which no alternative therapy exists.

Case study: CUA

This approach was used to explore the impact of alcohol screening and brief intervention to reduce heavy alcohol consumption in Canada (Bardach et al., 2019). A model was constructed which estimated the direct healthcare costs, life years gained, and quality adjusted life years (QALY) gained for the intervention versus no intervention. Screening and brief intervention was cost-effective for men and women with an Alcohol Use Disorder Identification Test (AUDIT) threshold of 8 and lower. The authors concluded that countries interested in adopting relevant public health measures to reduce the burden of alcohol related disease, may want to adapt their model by populating it with local data to explore the cost-effectiveness of the intervention in their setting.

Strengths and weaknesses of CUA

Strengths: Rigorous assessment of causality; CUA allows comparison of a range of different health programmes and policies by using a common unit of measurement (cost per QALY gained); and patients' quality of life is included in the evaluation.

Weaknesses: CUA focuses on health and wellbeing – non-health outcomes are not included; the primary perspective for the evaluation is the 'payer' although a societal perspective can be explored using sensitivity analysis; and, estimation of QALY gain is more difficult in older adults and those with mental health problems.

The Quality Adjusted Life Year (QALY)

The QALY is a health outcome that estimates health status over time by combining both duration and quality of life. The diagram below (Figure 1) illustrates the QALYs associated with two different interventions plotted over an individual's life expectancy. Treatment B provides benefit in terms of both increased survival and improved quality of life. The difference in the coloured areas (area under the curve; AUC) represents the additional QALYs gained by providing treatment B instead of Treatment A. Quality of life (or 'utility') is measured on a scale where 0 represents 'death' and 1 'perfect health', and where one QALY is equal to one year in perfect health. Therefore, a programme that delivers one year of active normal life will be rated higher than one year living with reduced quality of life due to pain or being in hospital.

Figure 1: Generic schematic representing the components of the QALY calculation (both health-related quality of life and duration of a health state) (Retina Metrics, 2016)

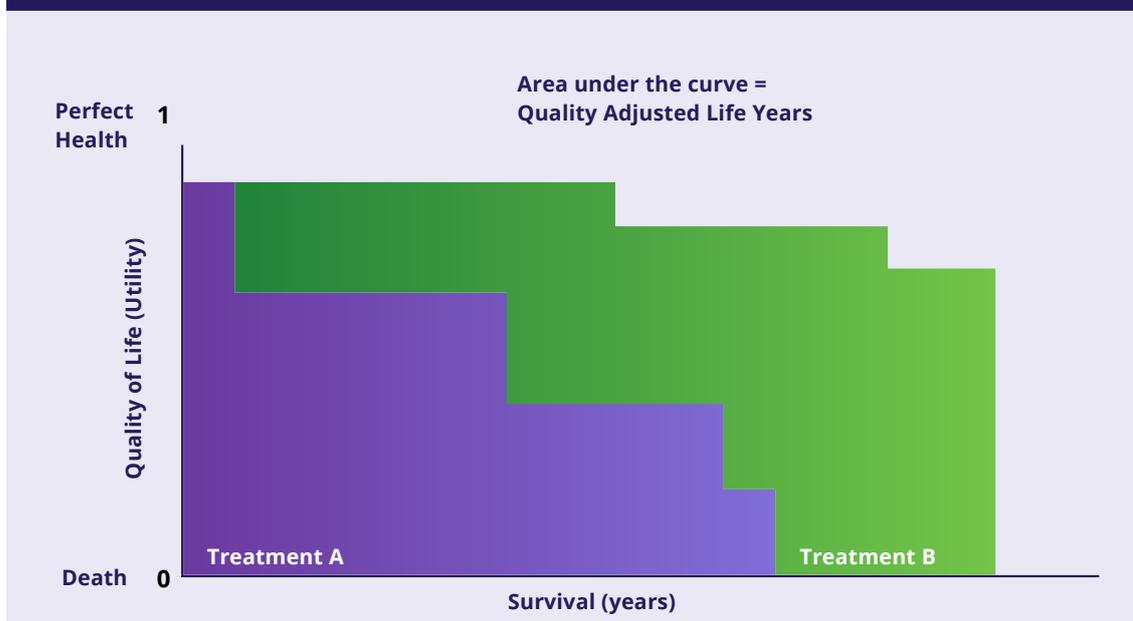


Figure 2: EQ-5D descriptive system (EuroQol Group)

Under the heading, please tick **ONE** box which best describes your health **TODAY**

MOBILITY

- I have no problems in walking about
- I have slight problems in walking about
- I have moderate problems in walking about
- I have severe problems in walking about
- I am unable to walk about

SELF-CARE

- I have no problems washing or dressing myself
- I have slight problems washing or dressing myself
- I have moderate problems washing or dressing myself
- I have severe problems washing or dressing myself
- I am unable to wash or dress myself

USUAL ACTIVITIES (e.g. work, study, housework, family or leisure activities)

- I have no problems doing my usual activities
- I have slight problems doing my usual activities
- I have moderate problems doing my usual activities
- I have severe problems doing my usual activities
- I am unable to do my usual activities

PAIN/ DISCOMFORT

- I have no pain or discomfort
- I have slight pain or discomfort
- I have moderate pain or discomfort
- I have severe pain or discomfort
- I have extrtreme pain or discomfort

ANXIETY/ DEPRESSION

- I am not anxious or depressed
- I am slightly anxious or depressed
- I am noderately anxious or depressed
- I am severely anxious or depressed
- I am extremely anxious or depressed

A number of standardised tools are available to measure QoL. One of the most frequently used instruments is the EQ-5D questionnaire (Figure 2), which measures health-related quality-of-life (HRQoL) on five dimensions (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression). Typically, the questionnaire is administered at a number of time-points with answers from the questionnaire being mapped across to values between 0 (representing worst imaginable health state) and 1 (representing best imaginable health state) based on general population preferences.

Cost-benefit analysis (CBA)

“A cost-benefit framework is a methodologically rigorous alternative to cost-utility analysis when it is important to establish causality and capture a broader set of societal benefits.”

A cost-benefit analysis (CBA) measures both the costs and outcomes of an intervention in monetary terms. This involves placing a monetary value on health benefits. As all health and non-health outcomes are converted to monetary values, CBA can consider non-health benefits together with health effects of programmes. CBAs consider non-health benefits such as cost savings (financial benefits), productivity gains (indirect benefits) and wellbeing and convenience (intangible benefits). These studies allow decisions to be more explicit and transparent as the costs and effects of different interventions are measured in the same (monetary) unit. CBA is closely related to Return on Investment (ROI) tools, which allow estimation of the net value generated by a programme or service.



Case study: CBA

An example of an ROI resource to help local commissioners in designing and implementing services to support older people's healthy ageing was developed by Public Health England (PHE) (<https://www.gov.uk/government/publications/older-adults-cost-effective-commissioning>). This centralised resource compares the ROI of services targeted specifically at older people, to improve their quality of life and/or reduce their need for local authority funded social care.

The tool is interactive, user friendly and presents ROI from four different analytical perspectives (health service, social care, health and social care and society). The data which underpins the model was identified using targeted pragmatic searches to identify economic evaluations in the area, data were extracted by topic experts, prioritised and relevant metrics calculated. This approach ensured that only studies which attained a pre-determined level of rigour were included. Disaggregating and presenting data from four different analytical perspectives allows decision makers to focus in on the metric which is most relevant to their context.

One of the programmes included in the ROI tool, was a community singing intervention based on data extracted from Coulton et al. (2015) Effectiveness and cost-effectiveness of community singing on mental health-related quality of life of older people: randomised controlled trial (presented earlier in Table 1). Table 4 presents findings from the comparison of nine interventions. Presentation of results in this format illustrates a number of salient points. The community singing intervention did not produce a positive return on investment when healthcare benefits alone were considered. However, a ROI of £1: £43.99 was achieved when health and non-health benefits were included, which suggests that for every £1 invested in a community singing programme almost £44 accrues to society.

The population which can potentially benefit from an intervention is an important consideration. Two interventions ('Help at home' scheme and 'WHELD' dementia nursing home intervention) had positive financial ROIs. However, the eligible population for the WHELD intervention was low, resulting in a low health impact in terms of population QALYs gained.

The large eligible population for a community singing intervention resulted in a similar population QALY gain to the 'help at home scheme' but at much lower cost (£225,572 compared to £3,832,498).

This illustrative example used figures from a local authority in England (York). Other local authority areas will have different population structures (especially with respect to socioeconomic status and age profile) which will impact on the metrics presented potentially influencing the ranking of interventions and decisions regarding which intervention can produce the greatest benefit for that community.

Table 4: Financial and societal ROI for each intervention in the sample analysis

Intervention	Eligible population	Intervention costs for population	Health impact (population QALYs gained)	Financial ROI (NHS)	Financial ROI (NHS and Social Care)	Societal ROI
Community Singing	11,847	£225,572	172.31	£1: -£2.01	£1: £0.17	£1: £43.99
Help at home scheme	4,311	£3,832,498	181.05	£1: £2.65	£1: £2.95	£1: £5.79
Befriending	529	£52,830	4.76	£1: £0.47	Not available	£1: £5.88
WHELD (dementia nursing homes)	127	£357,821	1.27	Not available	£1: £1.75	£1: £1.96
INTERCOM (hospital discharge)	437	£538,154	34.97	£1: -£0.44	Not available	£1: £3.50
Bundle of voluntary and community sector (VCS) services aimed at patients with long-term conditions, using social prescribing and other approaches to put patients in touch with services	574	£414,164	14.03	£1: £0.49	Not available	£1: £2.54
Health coaching	6,203	£506,694	117.86	£1: -£0.90	Not available	£1: £13.06
BELLA (self-management COPD)	437	£179,713	49.40	£1: -£0.25	Not available	£1: £16.24
Homecare reablement	4,311	£7,103,609	461.25	£1: -£0.34	£1: £0.81	£1: £4.71

In Ireland, the “Guide to Evaluating, Planning and Managing Public Investment” outlines the main appraisal methods and techniques which should be used as part of the Public Spending Code (Department of Public Spending and Reform, 2019). Economic appraisal is recommended from the societal perspective with a focus on cost benefit analysis (CBA). It does however mention the use of cost-effectiveness analysis (CEA) and cost utility analysis (CUA) for the assessment of healthcare and scientific programmes, and specifically the use of the QALY for the comparison of the benefits of health interventions. An additional approach suggested is Multi Criteria Analysis (MCA) where a range of criteria are presented (similar to the PHE tool described earlier).

Strengths and weaknesses of CBA

Strengths: Rigorous assessment of causality; a methodologically robust approach to valuing both health and non-health benefits and a societal approach is used; validated instruments and methods are used to value non-health benefits; presentation of results is in the form of an easy-to-understand ratio; and data can be disaggregated and/or re-engineered to ensure the most useful metric/perspective is being used for resource allocation decisions.

Weaknesses: This type of evaluation is resource and time intensive. Structured re-engineering of existing data requires expertise in a number of areas (systematic review, health economics, statistics).

Social Return on Investment (SROI)

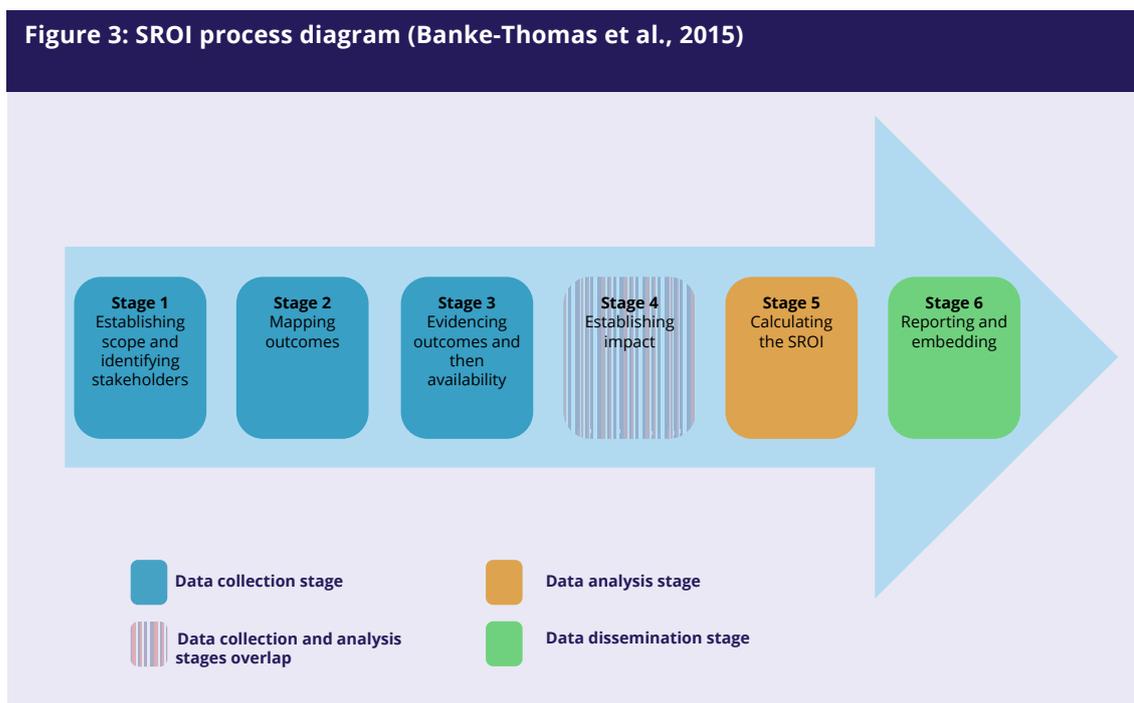
“An SROI should be performed if an organisation wishes to demonstrate the economic, social and environmental value of their work; this approach is particularly useful when an evidence base on causality already exists.”

The four types of full economic evaluation outlined above are well established. Published technical guidance (and peer review of methods) ensures the outcomes from such studies are robust, credible, transparent, and valid (internally and externally). However, production of unbiased cost-effectiveness estimates is costly and hence a trade-off exists relating to the level of certainty which is required and the resources which are available to produce this level of evidence.

Social Return on Investment (SROI) is an emerging methodology which aims to capture a wider set of benefits compared with these more established methods using a ‘triple bottom line’ of economic, social and environmental value. This approach is similar to CBA, in that all costs and benefits are monetised, however, the methods used to monetise outcomes for CBA are well-established.

The UK Cabinet Office (2009) outlined six key stages in conducting an SROI which included establishing the scope of the SROI, identifying stakeholders, mapping outcomes, evidencing outcomes, establishing impact and calculating the SROI.

Figure 3: SROI process diagram (Banke-Thomas et al., 2015)



The philosophical underpinnings of SROI are timely, especially given the requirement for those who commission public services to consider how they secure wider social, economic and environmental benefits. The valuation process is pragmatic, user friendly and results in an SROI ratio which can be interpreted in a similar way to the ROI (calculated from a CBA). However, to date, some key methodological concerns remain unresolved.

Many SROIs are performed by, or undertaken on behalf of, an organisation to establish its own 'social value' or the social value created by its own programmes. In the absence of academic peer review (if evaluations are published in the 'grey literature') this can result in significant bias – with issues of, for example, displacement, double counting, and optimism ('ratio creep'); poor comparability across programmes as choice of stakeholders and financial proxies differ; varying quality of evaluations as this is 'analyst dependent'; the 'financial proxies' used to monetise, for example, health and wellbeing gains have not been validated; technical aspects of the methodology are not standardised, for example, data used to determine value can be qualitative (self-report from stakeholders), primary or secondary quantitative data sources or any combination of the above; and inclusion of the value created for some stakeholders that may not be relevant to the resource allocation decision.

Despite these well documented criticisms, this emerging methodology offers a basis upon which to build. Daniel Fujiwara, in outlining the seven principle problems of SROI (Fujiwara, 2015) concluded that SROI has the potential to be a serious alternative to other currently accepted methods such as CBA and should improve its reputation among policymakers by learning from the challenges in other areas of social impact measurement (SIM) whilst keeping its own unique advantage to make a contribution to the field of SIM going forward.

Engagement between academic, government and charity sectors is required to increase standardisation of the methodology; to develop robust financial proxies; to improve quality, credibility and acceptance of this method through inter alia publication in peer

reviewed journals; to develop methods for 'triangulation' to improve data accuracy; to instigate methods to minimise bias (such as a 'control group' or 'before and after' designs); and to minimise subjectivity in the approach (through consensus on the choice of stakeholders, peer-review/quality assessment of analyses).

Case study: SROI

Men's sheds are community-based places designed to connect men within their communities. Activities include woodwork, pottery, photography, art, and other social activities. The concept originated in Australia in the 1970's but has since spread globally resulting in a range of benefits including skills acquisition, social belonging, enhanced well-being, increased self-esteem, greater sense of self-worth and cognitive stimulation (Culph et al., 2015; Milligan et al., 2016). In 2016, the Scottish Government allocated funding to support the development of a national Scottish Men's Shed Association.

A SROI analysis was performed to assess the value of the social outcomes created (Schroeder et al., 2015). The primary outcome was a reduction in social isolation through an increase in social integration, fostering a sense of belonging, purpose and friendship. The partners and families of participants reported improvements in the quality of their relationships, and improvements in health associated with improved social connection (such as improved mental well-being and self-esteem) which in turn were associated with reduced use of NHS services.

The annual operating costs for the Men's Shed (in the Westhill and District area of Scotland) was £5,000, with this investment creating £15,841 of value for the Shedders, £10,780 for their partners and families, £12,432 for the NHS and £9,791 for the greater community (financial proxies were used to estimate benefit). This resulted in £48,844 of value created; or approximately £10 per £1 invested (SROI 10:1).

Strengths and weaknesses of SROIs

Strengths: SROIs are relatively quick and easy to perform; results are presented in the form of an easy-to-understand ratio; and this approach can encourage stakeholder engagement and provide information which can help an organisation manage its activities and relationships to maximise value.

Weaknesses: An SROI is not underpinned by an experimental design which can rigorously assess causality; a control group (or credible counterfactual) is recommended but currently not required; many of the instruments used to assess 'value' are not standardised and/or validated; and the financial proxies used vary widely and no standardised approach to valuation is employed.

Which economic evaluation method should be used to assess public health interventions?

When choosing which type of economic evaluation method to employ, or when assessing the validity of the results from an evaluation, it is important to consider the context within which the evaluation was performed. As mentioned previously, methods to assess the cost-effectiveness of healthcare interventions are well developed and standardised. However, a number of characteristics of public health interventions differentiate them from other interventions which aim to improve health alone.

1) Establishing causality is more complex for a public health intervention

RCTs are the preferred vehicle for economic evaluations of interventions which have defined health outcomes. This design minimises bias and allows for a direct comparison between alternatives. However, the application of this experimental design can be challenging for complex multifactorial public health interventions (PHIs), which are often delivered in a non-clinical setting, where random allocation to 'control' and 'intervention' arms can be difficult and where there may be significant heterogeneity in the delivery of the intervention.

2) Established economic evaluation methods focus on measurable health outcomes

Clear technical guidance is available when undertaking economic evaluations which aim to determine the cost-effectiveness of healthcare interventions. However, a number of commentators in the literature have questioned whether these established methods, used successfully for the past two decades to prioritise healthcare interventions are suitable for assessing public health interventions [Kelly et al., 2005; Weatherly et al., 2009; and Payne et al., 2012; Edwards and Macintosh., 2019]. This is against a backdrop of intense debate within the health economics community more generally as to whether the QALYs should remain the central metric in health economic analyses as we shift away from conventional medicine towards precision (or 'personalised') medicine (Pettitt et al., 2018).

The QALY metric has been criticised as not being sufficiently sensitive to capture small but clinically meaningful changes in health status for certain diseases and conditions, especially the elderly or those on the mental health spectrum (Gareau et al., 2010; Knapp et al., 2007; Bala et al., 2000; Pinto-Prades et al., 2014; Hughes, 2005). Furthermore, important intermediate markers of 'healthy ageing' such as an improved sense of competence, social engagement and communication, may only be captured partially by the QALY.

A range of 'spill-over' effects may be incompletely captured and valued, underestimating the benefit of the intervention. To this end, a broader concept of 'value' is emerging in the assessment of health technologies, most notably, The ISPOR Special Task Force on US Value Assessment Frameworks recently described various 'novel' elements of 'value' worthy of consideration (beyond the QALY) such as severity of disease, equity, reduction in uncertainty, productivity and adherence improving factors (Drummond, 2019).

3) Focus on efficiency rather than equity

A criticism of CMA, CEA and CUA when used to appraise healthcare interventions is that the methodological underpinning of such studies is based on 'efficiency' (i.e., they aim to maximise health gain for a particular budget, irrespective of to whom that benefit accrues) whereas a central tenet of public health is to reduce social inequalities in health (i.e., 'equity'). This imbalance can be addressed explicitly in cost-effectiveness analyses using sub-group analyses; however, it is an important distinction for decision-makers to appreciate.

4) The preventative nature of public health interventions disadvantages them compared to other acute interventions

Challenges also exist in valuing 'upstream' and 'downstream' costs. 'Upstream' costs are incurred by modifying environments and behaviours which prevent adverse health effects developing, whereas 'downstream' costs are those which can be avoided by implementing change in the present. In an attempt to address these challenges, NICE defined a 'public

health reference case' distinct from the general 'reference case' used for appraisal of health technologies which provides guidance on the choice of comparator, time horizon, discount rate etc. Importantly the PH reference case allows for non-health related costs and effects to be included (if they are material to the perspective from which the analysis is being performed (for example, public sector, local government or the NHS) (NICE, 2013).

Despite the reluctance of HTA bodies to deviate from recommending a CUA framework for assessing PHIs, the use of cost benefit analysis (CBA), cost-consequence analysis (CCA), social cost benefit analysis (SCBA) social return on investment (SROI) analyses and statistical analysis of routinely collected data have gained popularity, especially within government and charity sectors. This is a pragmatic response to the requirement for timely and affordable data upon which to make decisions, as the resources and infrastructure required to undertake complex evaluations capable of generating the evidence required under the 'reference case' is beyond the remit of most government departments or charitable organisations.

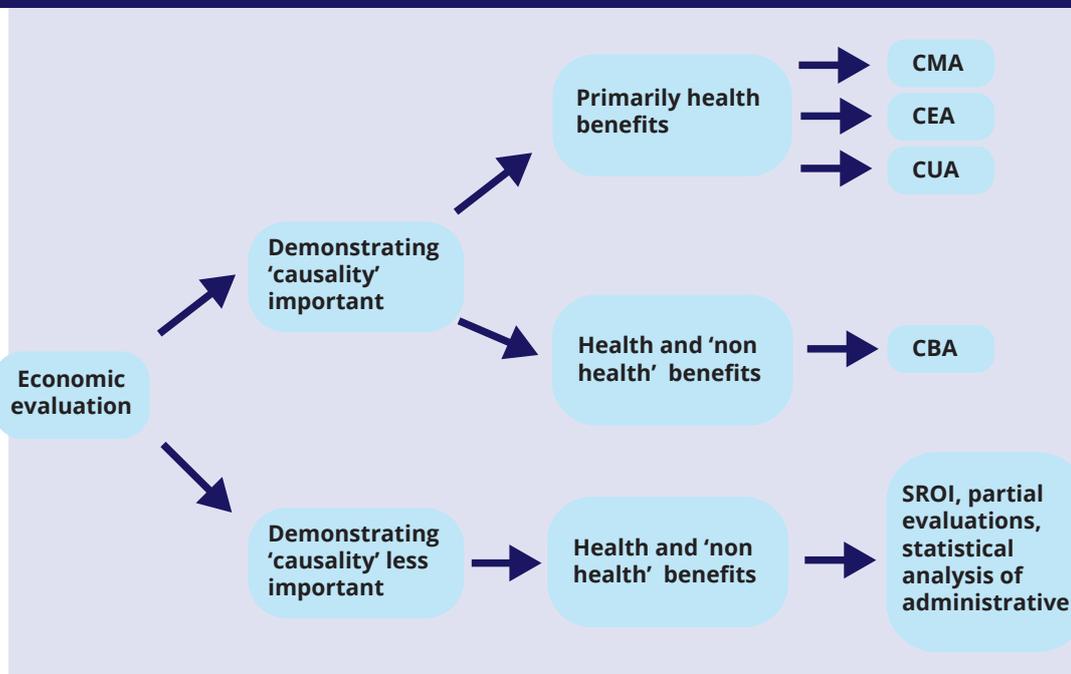
The choice of evaluation method should include consideration of the aforementioned challenges. The benefit of some interventions will successfully be captured by a CUA performed alongside a cluster RCT, other interventions with significant non-health benefits, delivered in a non-clinical setting at population level may require a more nuanced design. The following is intended as a general guide to the choice of evaluation type. It is not exhaustive, and in many cases, more than one design may be undertaken concurrently (e.g., a CUA and SROI) or a hybrid model employed.

Irrespective of the framework chosen, the aim of any evaluation should be to provide clear, transparent, and credible data which is fit-for-purpose. As much effort as resources allow should be allocated to minimising bias and establishing if the intervention works, why it works and will it work in the environment in which it will be deployed. Anything less may result in inefficient and inequitable allocation of scarce resources with consequences for population health and wellbeing. Process evaluation should be an integral component of all evaluations to enable distinction between implementation failures and ineffectiveness of interventions. Analysts must also be clear on the distinction between data which can supplement impact evaluations and unbiased data which will inform cost-effectiveness estimates.

As a general guide, two questions are important when deciding which is the most appropriate method to use (Figure 4)

- a) Is demonstrating causality a key objective of the evaluation?
- b) Can most of the benefit/impact of the intervention be meaningfully captured using a health-related outcome?

Figure 4: Choosing a type of evaluation



These two questions allow us to divide the different types of evaluation into distinct groups:

If demonstrating 'causality' is a priority AND the benefit of the intervention can be meaningfully captured using a 'health' outcome (such as 'deaths averted' or 'QALYs gained') we recommend using a **CMA, CEA or CUA**.

If demonstrating 'causality' is a priority AND the benefit of the intervention cannot be meaningfully captured using a 'health' outcome (i.e., there are significant non-health benefits, such as reducing social isolation, carer's burden etc) we recommend using a **CBA**.

If demonstrating 'causality' is not a priority (i.e., significant evidence already exists or there is 'unmet need' and the resources and/or timeline to generate this data are prohibitive) AND there are significant non-health benefits we recommend using an **SROI, partial economic evaluation or statistical analysis of administrative data**.

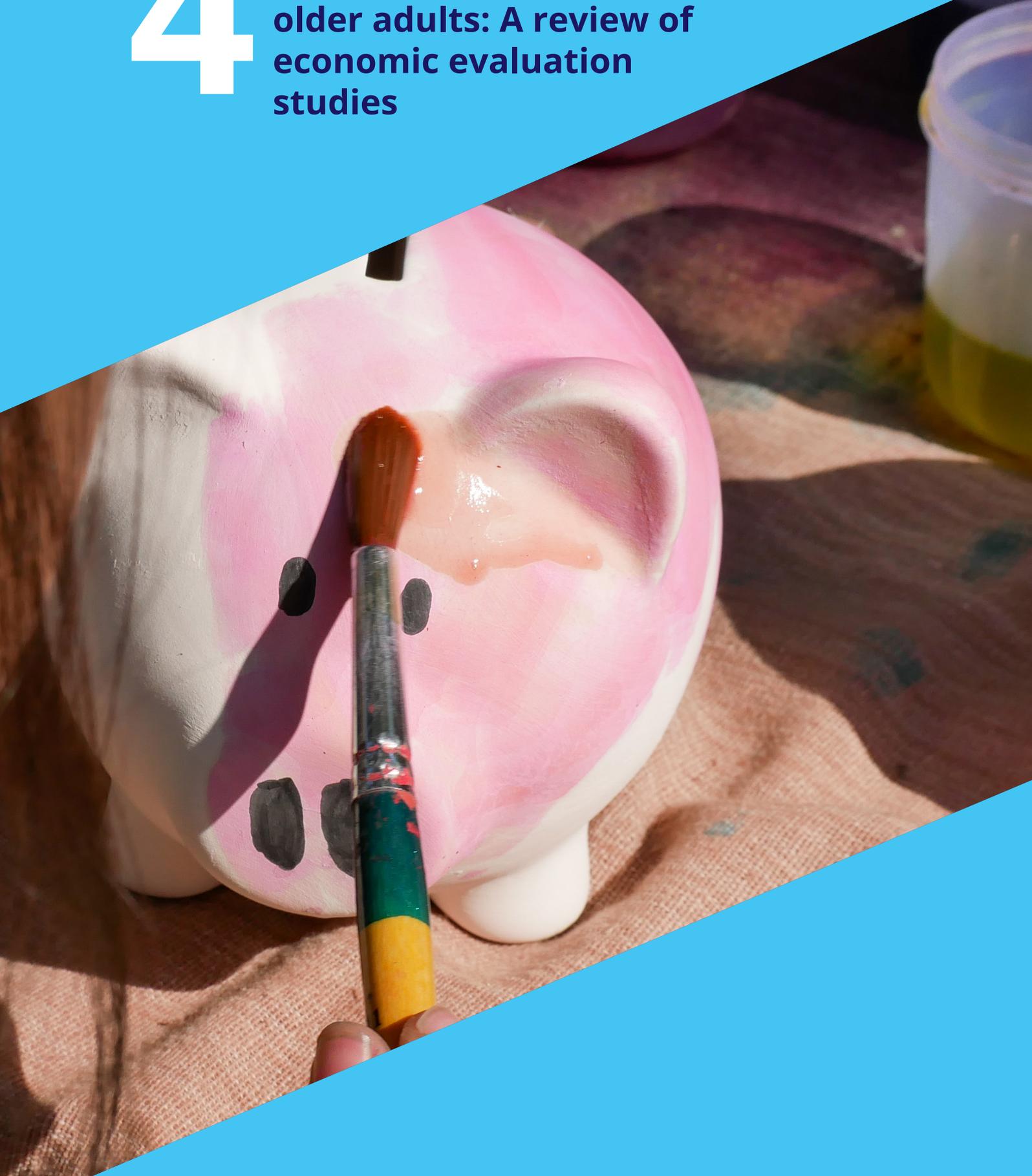
In this section, we explored a range of evaluation methods which can aid decision making by providing evidence of cost-effectiveness or value for money of public health interventions. In a perfect world, all evaluations would employ experimental designs which minimise bias, reducing the uncertainty with which purported benefits are realised. However, trade-offs with respect to the cost, timeline, and rigour of producing this evidence exists. Policy-led decisions may require less rigorous evidence 'up front', with the resources better employed assessing the impact of the programme when it has been implemented, established and bedded-in. However, where the opportunity cost of making the wrong decision is high, in either financial or humanistic terms, the choice of evaluation method should be a considered one.

Before embarking on any type of economic evaluation, it is always advisable to undertake a pilot study to determine if it is possible to collect the data required, to assess the burden of data collection for the participants and to ensure that the instruments chosen are appropriate, sensitive and specific for the chosen population. Similarly, where possible, routine data should be collected after the roll-out of an intervention to assess whether the benefits which the evaluation identified are being realised.



4

Arts and creativity interventions for improving health and wellbeing in older adults: A review of economic evaluation studies



Arts and creativity interventions for improving health and wellbeing in older adults: A review of economic evaluation studies

As outlined in the introduction to this report, population ageing is a key driver of rising health and social care expenditure, economic evaluation is an important tool to ensure that investment is directed towards cost-effective programmes, services and policies which can assist 'healthy ageing'. A large body of evidence suggests that arts and creativity interventions have positive physical, mental, and social health impacts for older adults, ageing and for population health. The primary objective of this review was to understand and assess the economic impact of arts and creativity interventions for improving health and wellbeing in older adults. A secondary objective was to determine the range and quality of available studies by setting and type of intervention, identify gaps in the current evidence base, and provide additional context and recommendations (particularly with regard to the choice of evaluative methodology in priority setting and resource allocation decisions).

Methods

This review followed the five-step approach on how to prepare a Systematic Review of Economic Evaluations (SR-EE) for informing evidence-based healthcare decisions published in Expert Review of Pharmacoeconomics and Outcomes Research (van Mastrigt et al., 2016; Thielen et al., 2016; Wijnen et al., 2016). This series of papers provided detailed guidance on the complete process of preparing a SR-EE, combining guidance from multiple organisations and collaborations of experts including ISPOR (Pharmacoeconomic Guidelines), Centre for Reviews and Dissemination (CRD) [Akers et al., 2009], Agency for Healthcare Research and Quality (ARHQ, 2008), The National Institute for Health and Care Excellence (NICE) (NICE, 2013), Cochrane Collaboration (Higgins et al., 2013), Joanna Briggs Institute (reviewers manual), GRADE working group (Brunetti et al., 2013) and the Annals of Internal Medicine (Qaseem et al., 2012).

Initiating the review

A multidisciplinary team with appropriate expertise was assembled (systematic reviewing, quantitative methods and health technology assessment methods, and library and information science) and a scoping review (involving engagement with stakeholder groups) was undertaken to identify and refine the research question.

The protocol was developed according to the recommendations from the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) 2015 statement (Moher et al., 2015). The protocol was registered within the International Prospective Register of Systematic Reviews (PROSPERO) database (registration number CRD42021267944).

Identification of full economic evaluations

Full economic evaluations such as cost-minimisation analyses (CMA), cost-effectiveness analyses (CEA), cost-utility analyses (CUA) and cost-benefit analyses (CBA) are regarded as the optimal type of evidence for inclusion in a systematic review of economic evaluations (van Mastrigt et al., 2016). However, in this review, a broader definition of the term 'economic evaluation' was adopted. The rationale behind this stemmed from the challenges inherent in undertaking full economic evaluations of complex public health interventions (Kelly et al., 2005; Weatherly et al., 2009; Payne et al., 2012; Edwards et al., 2013); and public health guidance from National Institute for Health and Clinical Excellence (NICE) which stated that "public health has aspects wider than health alone and these are more readily recognised in a local government environment. This necessitates both making the method of analysis more inclusive, and a corresponding change in perspective" [NICE, 2012]. NICE has acknowledged that cost-consequence and cost-benefit analyses methods can be appropriate for the evaluation of public health interventions. Likewise, the Treasury guidance to appraisal and evaluation in central government notes that social cost-benefit analysis (SCBA) requires "all impacts—social, economic, environmental, financial etc. to be assessed relative to continuing with what would have taken place in the absence of intervention" (HM Treasury, 1997).

Partial economic evaluations (cost analyses, cost description analyses, and cost-outcome descriptions) and social value analyses (SROI and SCBA) represent important intermediate stages in our understanding of the costs and consequences of the interventions under consideration and add important context. Hence, social value analyses were identified, extracted, and subjected to appropriate quality assessment, and discussed alongside full economic evaluations.

Selection of relevant data sources

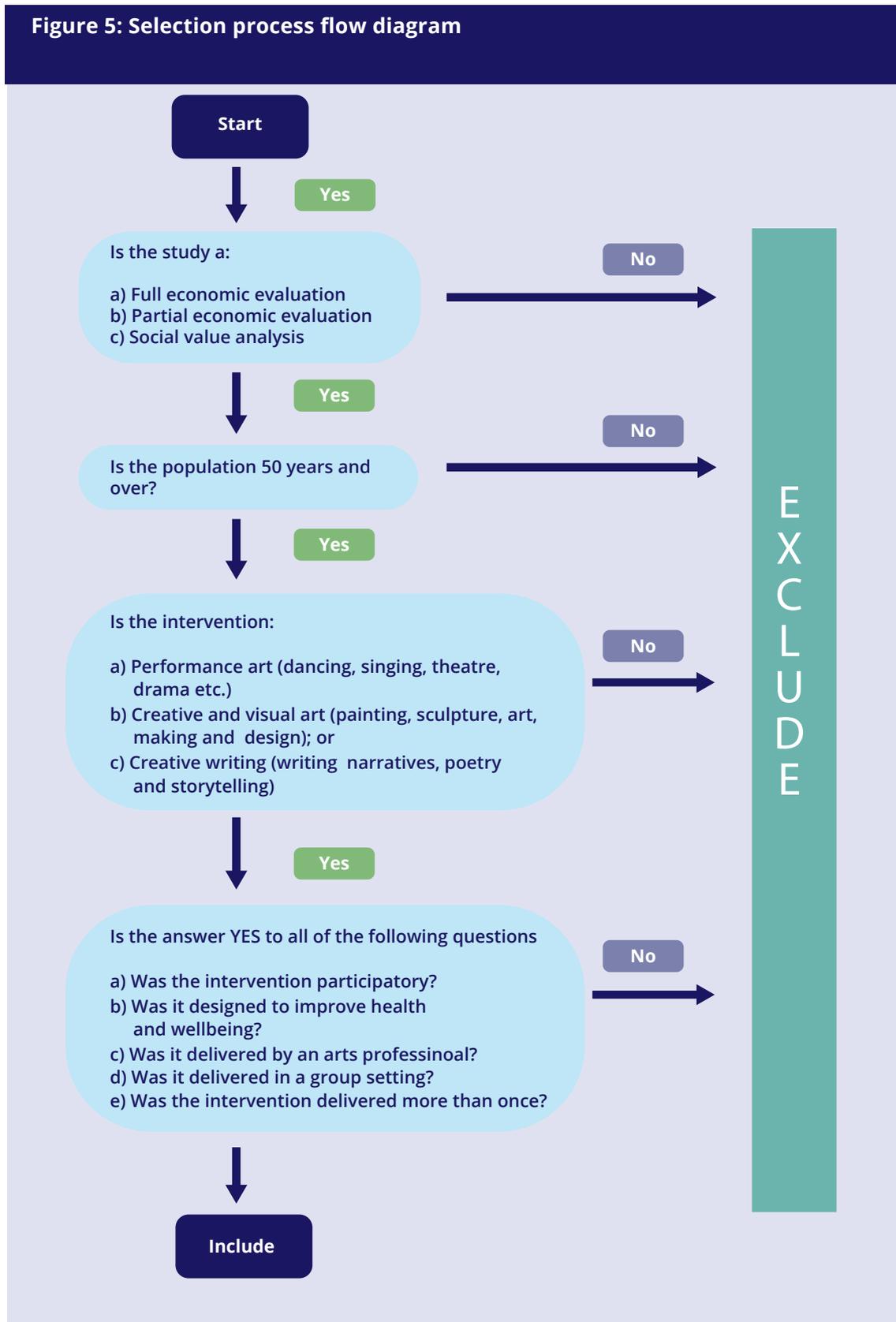
We searched Medline, Embase, Econlit and Web of Science. NHSEED (a database specifically developed for economic evaluations of healthcare interventions) was searched up to March 2015 (when it ceased publishing). Relevant citations were identified by checking references in known publications or searching for additional studies cited in articles known to be relevant. References of papers included in available systematic reviews were hand searched to consider any relevant publications which may have been missed in the search strategy. Trial registers were searched for ongoing and recently completed trials. As many economic evaluations of arts and creativity interventions (especially SROIs) are commissioned by the government and produced by non-academic institutions a comprehensive strategy for searching the grey literature for websites, individuals and organisations was developed (an indicative list is provided in the Appendix; Table A2).

Development of search strategies

Search terms

The PICO tool was used to provide a framework for developing the search strategy based on the population under consideration (P), the intervention (I), the comparator (C) and outcomes (O). Figure 5 outlines how eligibility for study inclusion, based on the PICO framework was applied and an example of search terms used is presented in the Appendix (Table A3).

Figure 5: Selection process flow diagram



Population

Studies were included if participants were aged 50 years or older or if the average age of the study population was 50 years or over. No restrictions were imposed based on gender, health status, residential status of participants, or country.

Intervention

Interventions which fell into any of the following categories were included:

1. Performance arts (dance, singing, theatre, drama etc);
2. Creative and visual arts (painting, sculpture, art making and design), and;
3. Creative writing (writing narratives, poetry, storytelling)

In addition to the criteria above, for inclusion in the review, studies had to satisfy the following criteria:

1. Be active not passive (for example, creating art, as opposed to viewing or appreciating art/attending art exhibitions or museums; participating in drama as opposed to watching a play/production; singing or playing an instrument as opposed to listening to/appreciating music);
2. Improve health *and* wellbeing (for example, a dance class aimed at improving wellbeing through increased social engagement would be included whereas one aimed at improving physical health only (e.g. exercise) would be excluded).
3. Must be delivered:
 - a. Under the guidance of arts professionals;
 - b. in a group setting;
 - c. more than once.

Comparator

There were no restrictions on the types of comparator(s). For example, the comparator can be either 'no intervention' or 'another intervention'. However, for full economic evaluations there was a clear definition of the comparator.

Outcomes

No restrictions were placed on study outcomes. However, potentially relevant primary outcomes included 'condition prevented', total cost savings, return on investment, positive net benefit, cost/QALY, productivity gains. Outcomes such as changes in social care packages, numbers of people requiring care home places, number of hospitalisations, reduction in dementia symptoms, cognitive decline, reduction in social isolation, reduction in depression, improvement in activities of daily living were also considered.

Development of search filters

Where possible existing validated search filters were used, from for example, the Inter TASC Information Specialists' Sub-Group (ISSG), appendices of Cochrane systematic reviews or other high quality systematic reviews, NHS EED, SIGN, NICE and Canadian Agency for Drug and Technology in Health (CADTH). Search terms and filters were combined using

Boolean (NEAR, AND, OR, NOT) operators. Search syntax were adjusted to the individual database and included a combination of controlled vocabulary (e.g., Medical Subject Headings) and free text words using the "OR", "NEAR" and "AND" Boolean operators. No restrictions were placed on language, perspective, follow-up duration, sample size or setting. To ensure publications relevant to current practice were included, only studies published after January 2000 were included in the review.

Handling searches

For transparency and reproducibility, all electronic database searches, hand search and grey literature searches were documented. A PRISMA flow chart was used to document study selection, illustrating the numbers of records retrieved and selection flow through the screening rounds (Liberati et al., 2009; Moher et al., 2008; Moher et al., 2009), all excluded records (with rational for exclusion) were documented. All identified references were imported and combined in a single EndNote library with duplicate records removed.

Selection of studies

Two screening rounds were conducted independently by two health economists experienced in undertaking reviews. The first round screened the title and abstract of articles based on the eligibility criteria; those selected at this stage entered a second round of full text screening with eligibility based on the inclusion and exclusion criteria outlined in Fig 5. Any disagreements were discussed among the two reviewers, and disputes resolved by a third reviewer where necessary.

Data extraction

Two reviewers extracted relevant information independently using an extraction proforma developed specifically for the purposes of this study, which included all 35 items suggested by Wijnen et al. (2016). Disagreements were resolved by discussion. Information was extracted in relation to the following factors: (1) general information including study ID, author, year, funding source, country, setting and study design; (2) recruitment details, sample size, demographic characteristics (age, gender) and baseline health data (diagnosis, comorbidities); (3) interventions, effectiveness data and cost data; (4) type of economic evaluation, perspective, payer, beneficiary, time horizon, measure of benefit and scale of intervention; (5) quality assessment, strength of evidence, any other important information; (6) results; (7) analysis of uncertainty and (8) conclusions. The outcomes for which data was sought were selected taking into account the data necessary to conduct an economic evaluation. The quality assessment/risk of bias checklists were included in the data extraction proforma, and picklists were used to enhance uniformity of responses. The data extraction form was piloted and amended to ensure consistency with respect to assessment.

Risk of bias assessment

Quality assessment of full and partial trial-based economic evaluations was performed using the CHEC-extended checklist (Evers et al., 2005). An SROI-specific quality framework consisting of 21 questions specifically developed for the purpose of systematic review was used to assess the quality of social value analyses [Hutchinson et al., 2018]. Two reviewers independently assessed the quality of the included studies. Discrepancies were resolved by discussion and consensus between the two reviewers and, where necessary, in

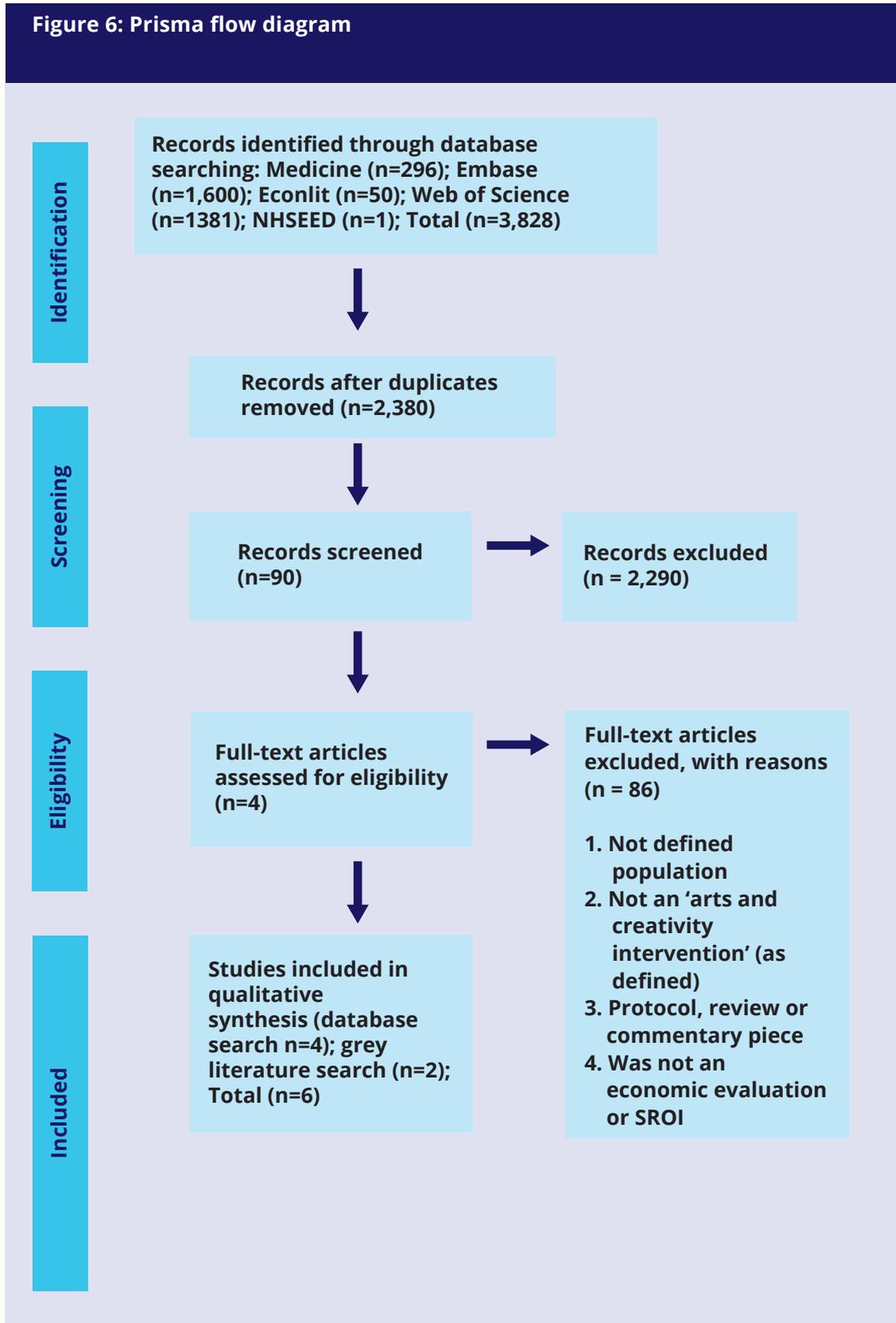
consultation with a third reviewer. A cumulative quality score is not reported as the CHEC-extended list does not include a scoring system; and some commentators have questioned whether available instruments can effectively discriminate between high- and low-quality economic evaluations (Min et al., 2021).

Results

The searches of Medline, Embase, Econlit and Web of Science and NHSEED databases returned 3,828 records (2,380 after duplicates were removed). From the title and abstract screen 90 records met the eligibility criteria (plus 2 identified in the grey literature). On the basis of abstract review (or full text screen where insufficient information was contained in the abstract) four studies (from the academic literature) and two studies (from the grey literature) were deemed to meet the inclusion criteria. The primary reasons for exclusion were the following 1) The study did not relate to older adults only; 2) the interventions did not correspond with the specified definition of 'arts and creativity' intervention; 3) the report was a protocol, review paper or commentary; 4) studies only reported efficacy or effectiveness metrics with no corresponding data on costs (Figure 6).



Figure 6: Prisma flow diagram



Six studies were identified which satisfied the inclusion criteria – key characteristics (such as study design, population, setting, perspective, comparator, time horizon, discount rate, and findings) are presented in Table 5. A more detailed summary of each study is provided in Appendix 1 (Tables A2-A7).

Table 5: Details of economic studies included in the review

	“Silver Song Club” programme	“Community of Voices” trial	The Imagine Arts programme	“Dementia and imagination” programme	“Craft Café”	“Creative Caring”
Title	Coulton et al., 2015	Johnson et al 2020	Bosco et al., 2019	Jones et al., 2020	Social Value Lab 2011	MB Associates, 2013
Study perspective	The payer	The payer	Participants	Range of stakeholders	Range of stakeholders	Range of stakeholders
Comparator(s)	Usual care	Wait-list control	No comparator	No comparator	No comparator	No comparator
Time horizon	6 months	6 month	12 month	6 months	12 months	12 months
Discount rate	n/a	n/a	3.5%	3.5%	3.5%	n/a
Health and QoL related outcomes	Health related Quality of life; mental health QoL, anxiety and depression	Psycho-social, cognitive and physical outcomes; health care utilisation and costs	Social isolation, quality in mental health and mobility, community inclusion and cognition	Wellbeing and mood; confidence; control; social isolation, physical activity	Physical exercise, loneliness, anxiety and depression, harmful behaviours e.g. smoking	Mentally active and independent; relationships
Measurement of health and QoL related outcomes	QALY (EQ-5D)	PHQ-8; TMT; The NIH Toolbox; health-care cost questionnaire	Qualitative data from reflective diaries; and range of assumptions	Specific questions on DEMQOL-proxy questionnaire	Qualitative data and range of assumptions	Forecasts based on qualitative data and range of assumptions

Source of costs/ financial proxies	National sources	National sources	Range of assumptions	HACT* social value bank; range of Assumptions	Range of assumptions	Range of assumptions
Uncertainty	CEAC	Statistical analysis	Sensitivity analysis (assumptions)	Sensitivity analysis (assumptions)	Sensitivity analysis (assumptions)	Sensitivity analysis (assumptions)
Conclusions	64% probability of being cost-effective at £30,000	No significant differences in primary outcomes (including health-care utilisation)	SROI £1.20:£1	SROI £3.20-£6.62: £1	SROI £4.86-£9.57:£1	SROI £3-£1

* <https://www.hact.org.uk/uk-social-value-bank>

All six studies were published between 2011 and 2020. Two studies used established economic evaluation methods (Coulton et al., 2015; Johnson et al., 2020) to assess the cost-effectiveness of community singing interventions (cost-effectiveness analysis and cost-outcome analysis). Four studies employed an SROI framework to assess art and/or craft interventions: two of which were published in peer-reviewed journals (Bosco et al., 2019; Jones et al., 2020) and a further two published in the grey literature (Social Value Lab, 2011; MB Associates, 2013).

Five of the studies were undertaken in the UK (Coulton et al., 2015; Bosco et al., 2019; Jones et al., 2020; Social Value Lab, 2011; MB Associates, 2013) and one in the US (Johnson et al., 2020). Four of the studies were designed for older adults (with no cognitive impairment) (Coulton et al., 2015; Johnson et al., 2020; Social Value Lab, 2011; MB Associates, 2013); one was designed for participants with or without dementia (Bosco et al., 2019), and another was specifically for older adults with dementia and their caregivers (Jones et al., 2020); Three of the studies were delivered in a community setting (Coulton et al., 2015; Johnson et al., 2020; Social Value Lab, 2011), two in care homes (Bosco et al., 2019; MB Associates, 2013) and one across a range of settings (hospital, community and residential) (Jones et al., 2020).

Established economic evaluation methods

Two studies applied an established economic evaluation framework ('Silver Song Club' and 'Community of Voices') alongside well-designed randomised controlled trials (RCTs); both evaluations closely followed the 'reference case', clearly outlining the purpose of the analysis and details of the intervention, such as target population and setting. Details of

the intervention were clearly presented. The perspective for both analyses was the 'payer' and the control groups were 'usual care' and 'waiting list' controls; cost and outcomes data were collected for 6 months at appropriate time points. The costs collected were appropriate given the perspective chosen and the unit costs applied came from nationally representative sources. Validated tools (such as the EQ-5D, SF-12, PHQ-8, TMT and NIH Toolbox Standing Balance measure) were used to objectively assess differences in outcomes between groups and robust statistical analyses were performed and results presented in a standardised manner as per best practice guidelines.

Evaluation of the 'Silver Song Club' programme was undertaken using a CUA framework and concluded that 'at a willingness to pay threshold of £30,000 the intervention had a 64% probability of being cost-effective'; furthermore, this study met the quality threshold to be included in the Public Health England (PHE) decision tool to support local commissioners in designing and implementing services to support older people's healthy ageing. Cost and outcomes data from this trial were disaggregated and used to estimate return on investment (ROI) for an indicative local authority (LA) in England, suggesting that for the eligible population in that local authority (11,847 per annum) the 'Silver Song Club' programme, if introduced, could generate 172.31 QALYs at a cost of £225,572, with a societal return on investment (ROI) of £43.99 for each £1 invested.

The 'Community of Voices' trial was a partial evaluation (outcome evaluation with healthcare utilisation assessed). This study found no statistically significant differences in the three primary clinical outcome measures defined for the trial or for resource utilisation. Significant differences were apparent on 2 out of 6 psychosocial outcomes and significant group-by-time interaction effects for loneliness and interest in life were detected. The underlying quality of the study (and data contained within the paper) could however allow recalculation of return on investment from a broader perspective.

As outlined in the previous section, the application of established economic evaluation framework to public health interventions may underestimate the value of the intervention as 'non-health benefits' are excluded. Neither of these studies attempted to capture 'spill-over' effects to other sectors, focusing on health and wellbeing gains from the perspective of the 'payer'. Both evaluations were underpinned by robust RCT designs, adhered to the reference case, compared costs and outcomes between comparator groups over an appropriate time horizon and used validated instruments (supported by statistical analysis) to determine if outcomes had been achieved (the EQ-5D was not used in the 'community of voices' trial as it was performed in the US – but adhered to the reference case for that jurisdiction).

The quality assessment checklists for both studies are presented in Table 6 where both studies were judged to be of very high quality, adhering to the 'reference case' for the jurisdiction in which they were performed (UK and USA). Due to a lack of consensus on appropriate methods for pooling cost-effectiveness estimates (Higgins and Green, 2013) and due to possible sources of heterogeneity (patients, study design and outcomes), meta-analysis was not attempted (Akers et al., 2009).

Table 6: CHEC Quality Assessment Checklist

		Coulton et al., (2015)	Johnston et al., (2018)
	Title	Silver Song Club	Community of Voices
1	Is the study population clearly described?	✓	✓
2	Are competing alternatives clearly described?	✓	✓
3	Is a well-defined research question posed in an answerable form?	✓	✓
4	Is the economic study design appropriate to the stated objective?	✓	✓
5	Is the chosen time horizon appropriate to include relevant costs and consequences?	✓	✓
6	Is the actual perspective chosen appropriate?	✓	✓
7	Are all important and relevant costs for each alternative identified?	✓	✓
8	Are all costs measured appropriately in physical units?	✓	✓
9	Are costs valued appropriately?	✓	✓
10	Are all important and relevant outcomes for each alternative identified?	✓	✓
11	Are all outcomes measured appropriately?	✓	✓
12	Are outcomes valued appropriately?	✓	✓
13	Is an incremental analysis of costs and outcomes of alternatives performed?	✓	X*
14	Are all future costs and outcomes discounted appropriately?	✓	✓
15	Are all important variables, whose values are uncertain, appropriately subjected to sensitivity analysis?	✓	✓

16	Do the conclusions follow from the data reported?	✓	✓
17	Does the study discuss the generalizability of the results to other settings and patient/client groups?	✓	✓
18	Does the article indicate that there is no potential conflict of interest of study researcher(s) and funder(s)?	✓	✓
19	Are ethical and distributional issues discussed appropriately?	✓	✓
			*No difference between groups therefore no need to perform Incremental cost effectiveness analysis

Social value analyses

The quality assessment scores for all of the SROIs reviewed were also very high suggesting that the steps involved in executing the SROI methodology was performed to a high standard (Table 7). Furthermore, no quality differences were discerned between those studies published in the academic literature compared to those in the grey literature. It must however be noted that the quality assessment checklist for SROIs does not attempt to assess 'risk of bias' (as is the case for established economic evaluations) as it is assumed that SROI is not an appropriate vehicle to determine causality.

Table 7: SROI checklist

	Jones et al., (2020)	Bosco et al., (2019)	Social Value Lab (2011)	MB Associates (2013)
Title	Dementia and imagination	Imagine Arts	Craft Café	Creative Caring
Research question				
Was a well-defined question posed?	Yes / No / Not clear			
Reason for use of SROI Method				
Were authors transparent about why SROI methodology was chosen? (e.g. strategic planning/funding requirements)	Yes / No / Not clear			
Did authors report relevant background literature/justify the need for the study?	Yes / No / Not clear / NA	Yes / No / Not clear / NA	Yes / No / Not clear / NA	Yes / No / Not clear / NA
Scope				
Was the range of stakeholders included/excluded justified?	Yes / No / Not clear			
Was the range of stakeholders wide enough to adequately answer the research question? (principle of understanding change)	Yes / No / Not clear			
Was it clear how stakeholders were involved and what data would be gathered from them?	Yes / No / Not clear			
Was ethics obtained/informed consent provided?	Yes / No / Not clear			

Theory of change/impact map				
Theory of change/impact map Was the theory of change clear? i.e. the relationships between inputs, outputs and outcomes	Yes / No / Not clear / NA	Yes / No / Not clear / NA	Yes / No / Not clear / NA	Yes / No / Not clear / NA
Were unintended outcomes (positive/negative) detailed?	Yes / No / Not clear / NA	Yes / No / Not clear	Yes / No / Not clear / NA	Yes / No / Not clear / NA
Study design				
Was the study design appropriate for the study question? (Control group, pre-post)	Yes / No / Not clear / NA	Yes / No / Not clear / NA	Yes / No / Not clear	Yes / No / Not clear
Was the sample described in detail/was the sample justified?	Yes / No / Not clear / NA	Yes / No / Not clear / NA	Yes / No / *Not clear	Yes / No / *Not clear
Analysis				
Were inputs clear with non-monetized inputs valued appropriately?	Yes / No / Not clear / NA	Yes / No / Not clear / NA	Yes / No / Not clear / NA	Yes / No / Not clear / NA
Were capital costs, as well as operating costs included?	Yes / No / Not clear / NA	Yes / No / Not clear / NA	Yes / No / Not clear / NA	Yes / No / Not clear / NA
Were costs that occur in the future 'discounted' to their present values? Was justification given for the discount rate used?	Yes / No / Not clear / NA	Yes / No / Not clear / NA	Yes / No / Not clear / NA	Yes / No / Not clear / NA
Was dead-weight clearly described and calculated?	Yes / No / Not clear / NA	Yes / No / Not clear / NA	Yes / No / Not clear / NA	Yes / No / Not clear / NA
Were the indicators valid and comprehensive? (Were the sources of all values clearly identified?)	Yes / No / Not clear / NA	Yes / No / Not clear / NA	Yes / No / Not clear / NA	Yes / No / Not clear / NA

Were the proxies valid and comprehensive? (Were the sources of all values clearly identified?)	Yes / No / Not clear / NA	Yes / No* / Not clear	Yes / No / Not clear / NA	Yes / No / Not clear / NA
Was length of benefit established and justified? (Drop-off) (In capital projects, did authors establish and differentiate between length of benefit and life expectancy of the asset?)	Yes / No / Not clear / NA	Yes / No** / Not clear	Yes / No / Not clear	Yes / No / Not clear / NA
Were limitations and biases reported?	Yes / No / Not clear / NA	Yes / No / Not clear / NA	Yes / No / Not clear	Yes / No / Not clear
Was the final SROI ratio interpreted?	Yes / No / Not clear / NA	Yes / No / Not clear / NA	Yes / No / Not clear / NA	Yes / No / Not clear / NA
Was sensitivity analysis performed? Was justification provided for the range of values (or for key study parameters) in the sensitivity analysis?	Yes / No / Not clear / NA	Yes / No / Not clear***	Yes / No / Not clear / NA	Yes / No / Not clear / NA
		* In our opinion proxies were not equivalent	*Sample described but not justified	*Sample described but not justified
		** Percentage change applied - forecast	**Not all biases reported	**Not all biases reported
		*** A 'worst case' scenario mentioned but no detail provided		

Social value analyses (published in the academic literature)

The 'Imagine Arts' (Bosco et al., 2019) and 'Dementia and Imagination' (Jones et al., 2020) programmes were evaluated using a SROI framework and published in peer-reviewed journals. In the previous section we highlighted the potential of this approach as an emerging framework to capture a broader definition of 'value' but outlined the methodological problems which remain unresolved. SROI does not yet have the pedigree of CBA and the method has yet to gain academic credibility in terms of the need to build a) a robust standardised methodology and b) a body of robust published examples of its application (Jones et al., 2020). Hence, engagement with academic peer-review is to be commended, and as such, these papers represent a step forward in the evolution of this emerging methodology.

Both evaluations executed the steps involved in performing SROI diligently. A theory of change model was constructed, and the scope of the study, stakeholders and outcomes were identified; the materiality of the outcomes determined, financial proxies applied, and impact reported alongside a calculation of an SROI ratio. In addition, technical aspects of the analysis (such as accounting for deadweight loss, displacement, attribution and drop-off) were transparently addressed. However, neither evaluation had a defined comparator or counterfactual (i.e., data were collected only for those participating in the programme).

In the 'Dementia and Imagination' study, five stakeholders were included in the analysis. Input from the state and partner organisations (financial and in-kind) were based on the running costs of the programme supplemented with data from staff diaries. Outcomes for people living with dementia, family and care givers, and care home staff were based on interviews and assignment of financial proxies (using HACT social value bank).

For example, increased physical activity was assessed using question 10 of the DEMQOL questionnaire "In the past week have you felt lively?", if a difference was observed between baseline and the end of the study, a financial proxy equivalent to "Frequent mild exercise age 50+" was assigned (21 participants: value of £5,527). Similarly, the resource invested by persons with dementia in participating in the art programme was calculated at 3 hours/session at a minimum wage of £7.20/hour (resulting in total investment by dementia patients of £19,634).

In the 'Imagine Arts' programme, qualitative interviews were used to assess outcomes and a range of assumptions used. For example, the criterion for 'improved mobility' was attending at least one art session involving physical activity (e.g., engaging with marionettes in a puppetry workshop); the financial proxy applied to this was equivalent to a package of 4 physiotherapy sessions at a cost of £240. In this evaluation, HACT social value bank proxies were rejected in favour of "existing services and products, yielding realistic alternative means to achieve similar outcomes". Both the 'Dementia and Imagination' (Jones et al., 2020) and 'Imagine Arts' (Bosco et al., 2019) programmes reported positive SROIs of between £3.20-£6.62: £1 and £1.02-1.20: £1 respectively.

SROI (published in the grey literature)

An SROI framework was applied to two further evaluations of arts and creativity Interventions which were published in the 'grey literature' (i.e., online). Similar to the two SROIs published in the peer-reviewed literature, 'Creative Caring' (MB Associates, 2013) and 'Craft Café' (Social Value Lab, 2011) no comparator (or counterfactual) was used.

Outcomes for the 'Creative Caring' programme (MB Associates, 2013), were elicited using self-report from one-to-one interviews (with older people and partner housing associations) and questionnaires administered to relatives of participants. Outcomes captured included 'to become more confident', 'to take more regular and vigorous exercise', 'make new friends, form stronger relationships', and 'undertake more physical exercise'. After accounting for attribution and deadweight loss, a SROI of £8.27: £1 was reported, i.e., a return of £8.27 for every £1 invested.

Similarly, evidence on outcome achievement for 'Creative Caring' (MB Associates, 2013) was collected using qualitative methods. Outcomes were defined for residents, their families and carers, and the care provider. Achievement of outcomes were based on predicted values (i.e., a forecast). A range of financial proxies were applied to indicate what value could be achieved under a variety of scenarios. Important outcomes such as, 'families' peace of mind', 'families getting on better' and being 'more mentally active and independent' were valued. The evaluation predicted a SROI of between £3 and £4 for every £1 invested.

These evaluations were all undertaken in accordance with current 'best practice' guidance for performing SROIs and performed extremely well as measured by the quality assessment checklist. All produced positive SROI ratios, suggesting that there is a positive return for each £1 invested in arts and creativity interventions.

Conclusions

Overall, the economic evidence for arts and creativity interventions is promising, suggesting that such interventions can be cost-effective and offer value for money as a use of public funds. However, the small number of studies and heterogeneity in their methods suggests caution is warranted with respect to their generalisability across conditions/disease areas or particular socio-demographic groups.

In summary, if arts and creativity interventions are to effectively compete for scarce resources with more traditional 'health' interventions, it is important that the methods employed going forward are capable of addressing the challenges inherent in appraising public health interventions.

Overall Recommendations

Irrespective of the method chosen, the following recommendations aim to ensure that the evidence available for decision making in a public health environment is credible, robust, transparent and reproducible:

Recommendation 1: 'Equity' should be addressed explicitly in all evaluations. CMA, CEA and CUA are concerned with 'efficiency' not 'equity', however, all three methods can explicitly address equity considerations through, for example sub-group analysis or weighting of outcomes.

Recommendation 2: A broad perspective should be adopted when capturing costs and outcomes. HIQA and NICE both recommend a 'payer' perspective for cost-effectiveness and cost-utility analyses. Where possible, costs and outcomes should also be captured and presented from a 'societal' perspective, especially if the intervention is expected to generate significant outcomes beyond the primary health outcome. This could mean adopting a cost-benefit framework or augmenting a cost-effectiveness/cost-utility

analysis (presenting the additional non-health benefits and costs as part of a sensitivity analysis). Any deviations from, or augmentations to the 'reference case' should be clearly documented and justified.

Recommendation 3: Outcomes captured should go beyond the QALY. A CUA is the predominant method of full economic evaluation recommended by national bodies which assess the cost-effectiveness of health technologies. Public health interventions generate a broad range of outcomes which may not be sufficiently captured by the QALY. If a CUA is required, consider broadening the scope of work to include outcomes which would allow calculation of cost-benefit or presentation in a cost-consequence or multi-criterion decision analysis format.

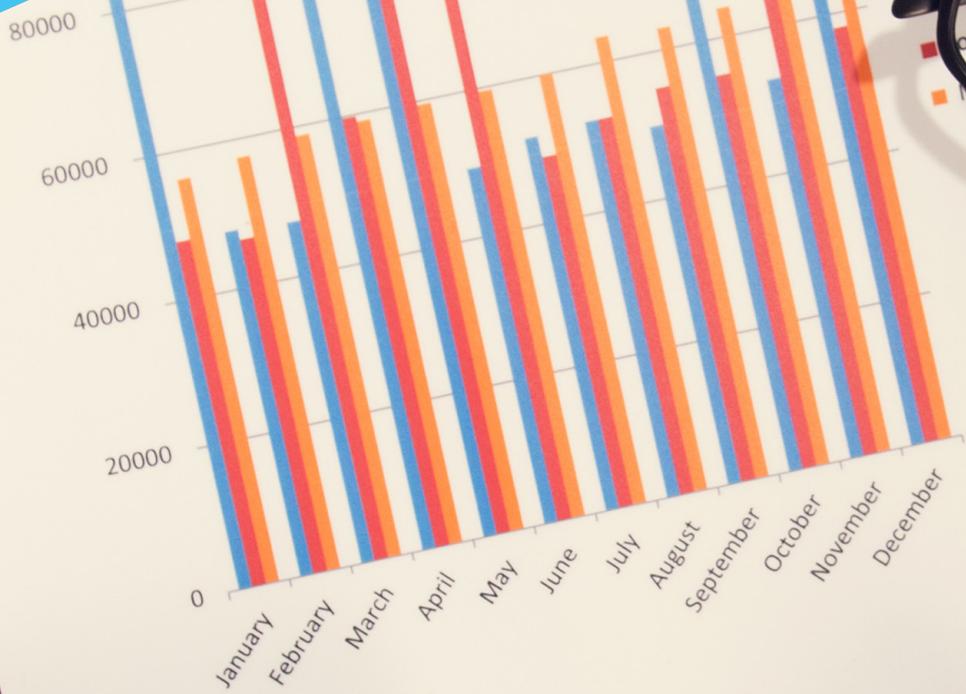
Recommendation 4: Costs and benefits falling on non-health sectors should be detailed as part of the analysis. This is of particular importance when the intervention is expected to incur costs and/or outcomes across multiple sectors.

Recommendation 5: All impact assessments should have a control group or credible counterfactual. By definition, a full economic evaluation must have a comparator or 'control' group, however, a 'credible counterfactual' is rarely included in a SROI analysis (it is recommended but not mandated). We recommend that a credible counterfactual should be a requirement. This recommendation is in line with the conclusion of a report by the London School of Economics (Gibbons et al., 2013) for the National Audit Office (NAO) which concluded that 'any impact evaluation (and subsequent value for money calculation) requires construction of a counterfactual'.

Recommendation 6: Data collection post-implementation. Irrespective of the method used to appraise cost-effectiveness or value for money, data collection post-implementation is key to ensuring that resources are allocated efficiently, and that programmes and services evolve to meet population health and wellbeing needs.

Recommendation 7: A detailed technical appendix should accompany all impact assessments to allow independent review. To ensure transparency, credibility, reproducibility, and comparison, a detailed technical appendix for a subject specialist should be constructed. This will enable the methodological and technical standard of the analysis to be assessed and allow re-engineering of output to address the specific resource allocation decision.

5 Appendices



Appendices

Table A1: Summary of the reference case for the UK and Ireland

Element of health technology assessment	Reference case UK (NICE)	Reference case Ireland (HIQA)
Defining the decision	Scope developed by NICE	Clearly stated study question outlining purpose of assessment and providing detail on perspective, proposed technology, comparators and target population
Comparator(s)	As listed in the scope	'Routine care'
Perspectives on outcomes	All direct health effects, whether for patients or, when relevant, carers	The perspective of the publicly funded health and social care system
Perspective on costs	NHS and PSS (Personal Social Services)	Only direct costs relevant to the publicly funded health and social care system
Type of economic evaluation	Cost-utility analysis with fully incremental analysis	Cost-utility analysis (or cost-effectiveness analysis in exceptional circumstances)
Time horizon	Long enough to reflect all important differences in costs or outcomes between the technologies being compared	Long enough to capture meaningful differences in future costs and outcomes
Synthesis of evidence of health effects	Based on systematic review	Evidence from RCTs; alternatively meta-analysis from homogenous sources
Measuring and valuing health effects	Health effects should be expressed in QALYs. The EQ-5D is the preferred measure of health-related QoL	Health effects should be valued using QALYs. The EQ-5D of SF-6D are the preferred measure of health-related QoL

Source of data from measurement of HRQoL	Reported directly by patients and/or carers	Reported directly by patients and/or carers
Source of data from valuation of changes in HRQoL	Representative sample of UK population	Obtained from an 'informed' general public
Equity considerations	An additional QALY has the same weight regardless of the other characteristics of the individuals receiving the health benefit	Additional QALYs gained should be assumed to be of equal value. An attempt should be made to meet the needs of decision makers by highlighting equity considerations
Evidence on resource use and costs	Costs should relate to NHS and PSS resources and should be valued using the prices relevant to the NHS and PSS	Only direct costs relevant to the publicly-funded health and social care system should be included; No agreed Irish cost model currently exists
Discounting	The same annual rate for both costs and health effects (currently 3.5%)	The same annual rate for both costs and health effects (currently 4%)

Table A2: Databases and information sources searched

Grey literature
Aesop
All Party Parliamentary Group for Arts, Health and Wellbeing
Big Lottery
Charities Evaluation Service
Creative and Credible
Cultural Commissioning Programme
National Institute for health and Clinical Excellence (NICE)
National Alliance for Arts, Health and Wellbeing
NIHR Research Design Service
New Economics Foundation
Public Health Practice Evaluation Scheme
Social Care Institute of Excellence (SCIE)
What Works Centre for Wellbeing
Willis Newson
Arts Council
The Welsh NHS confederation – Advancing Arts, Health and wellbeing
Irish Arts council
SchARRHud https://www.scharrhud.org/
ASCOT webpages https://www.pssru.ac.uk/ascot/
ICECAP webpages https://www.birmingham.ac.uk/research/activity/ mds/projects/HaPS/HE/ICECAP/index.aspx
Campbell Collaboration Library https://campbellcollaboration.org/library.html
Database of Abstracts of Reviews of Effects (DARE) CRD Database
Cochrane Database of Systematic Reviews (CDSR) Cochrane Library / Wiley

Public Health England (PHE)

National Institute for Health and Care Excellence (NICE)

Personal Social Services Research Unit (PSSRU)

Economics of Social and Health Care Research Unit

EPPI-Centre

Age UK The older adults' NHS and social care return on investment tool

Joseph Rowntree Foundation

Association of Directors of Adult Social Services

King's Fund

Nuffield Trust

Centre for Ageing and Development Research Ireland

Institute for Research and Innovation in Social Services

NIHR School for Social Care Research

IPH

CRD Database

SchARRHud <https://www.scharrhud.org/>

Campbell Collaboration Library <https://campbellcollaboration.org/library.html>

Database of Abstracts of Reviews of Effects (DARE) CRD Database

Cochrane Database of Systematic Reviews (CDSR) Cochrane Library / Wiley

Nuffield Trust

Centre for Ageing and Development Research Ireland

Institute for Research and Innovation in Social Services

NIHR School for Social Care Research

IPH

Table A3: Primary concepts and related Medical Subject Heading key word

Concept #1	Concept #2	Concept #3	Concept #4
Older adults	Arts and creativity interventions	Economic evaluation	Health and wellbeing
adult	art	cost*	memory
aged	arts	econ*	mental health
aging*	artist*	SROI	"quality of care"
ageing*	"art work"	"social return on investment"	"well-being"
cognition	music*	"social value"	"well being"
frail*	creativ*	SCBA	wellbeing
older	sing*	"social cost benefit analysis"	health*
senior	choir	ICER	"quality of life"
pensioner	choral	"incremental cost effectiveness ratio"	inequ*
elder*	painting (not paint*)	"net benefit"	disadv*
"later life"	writing	savings	"social cohesion"
"third age"	dancing[ti]	invest*	loneliness
matur*	dancer*[ti]	"net present value"	anxiety
"old age"	"story telling"	"markov model"	"self esteem"
"senior citizen"	storytelling	"benefit cost ratio"	disability
geriatr*	poetry	"breakeven threshold"	"premature mortality"
"community dwelling"	drama*	efficiency	"well becoming"
caregiver	theatr*	"resource utilisation"	wellness
"cognitive impairment"	sculptur*	money	"social inclusion"
dementia[mh]	pottery	"monte carlo"	"social participation"

alzheimers	"community arts"	markov	"social engagement"
residents	museum*	"decision analysis"	"social isolation"
"care home"	"film making"	"decision tree"	"cognitive function"
"nursing home"	"photography"	"decision model"	"self-esteem"
cognition disorders[mh]	"photography"	"health technology assessment"	"purpose in life"
homes for the aged[mh]	"performing art"	HTA	mastery
activities if daily living[mh]	"print making"	price	autonomy
aged, 80 or over[mh]	"spoken word"	prices	
"over 50 years"[tiab]	"Arts on referral"	pricing	
"over 60 years"[tiab]	"Art on referral"		
"over 70 years"[tiab]	"social prescribing"		
"over 80 years"[tiab]	craft		
"long term facility"			
"alzheimer units"			
"locked unit"			
"assisted living"			
"home health"			
"elderly population"			
"memory care"			
"geriatric home"			

Table A4: Silver Song Club programme

	"Silver Song Club" programme
Title	Coulton S, Clift S, Skingley A, Rodriguez J. Effectiveness and cost-effectiveness of community singing on mental health-related quality of life of older people: randomised controlled trial. <i>Br J Psychiatry</i> . 2015 Sep;207(3):250-5.
Aim of study	To assess the effectiveness of active engagement in community singing on measures of mental and physical health-related quality-of-life (HRQoL), depression and anxiety for older people and evaluate cost-effectiveness
Study design	Cost-utility analysis (CUA) performed alongside a randomised controlled trial (RCT)
Target population, setting and location	258 community dwelling older adults; 60 years and older; no cognitive impairment (across 5 centres in the UK); allocated at random to 2 groups (singing v no singing); The programme was a 14-week, 90-minute programme delivered by trained facilitators in a community setting; UK based
Study perspective	The payer (i.e., Health and Social Care)
Comparator(s)	'Usual care' (i.e., adults not enrolled in a singing club)
Time horizon	Data were collected for 6 months
Discount rate	Not required as < 12 months
Outcome(s)/output	Health related Quality of life; mental health QoL, anxiety and depression
Measurement of outcomes	The primary outcome for the economic evaluation was HRQoL, assessed using the EQ-5D questionnaire for both groups at the beginning, middle (at 3 months) and end (6 months) of the study; significant differences in mental health QoL were found but no differences in physical QoL, anxiety or depression at 6 months
Source of costs/financial proxies	Health and social care resource use for both groups was captured for 6 months before the singing programme began and 6 months during which the programme ran; no significant difference in resource use was found between groups at 6 months
	The cost of delivering the singing programme (overheads, staff training, venue hire, advertising, refreshments etc.) was estimated as £18.88 per participant
	National sources were used for healthcare costs (NHS PSS)

Presentation of results

Data from the EQ-5D questionnaire was used to measure the quality-adjusted life-years (QALYs) gained; an incremental cost-effectiveness ratio (ICER) was calculated and the results presented using a cost-effectiveness acceptability curve (CEAC)

Conclusions

At a willingness to pay threshold of £20,000, the intervention has a 60% probability of being the more cost-effective option, and at a recommended willingness to pay threshold of £30,000 this probability increases to 64%

Table A5: 'Community of Voices' trial

	"Community of Voices" trial
Title	Johnson JK, Stewart AL, Acree M, Nápoles AM, Flatt JD, Max WB, Gregorich SE. A Community Choir Intervention to Promote Well-Being Among Diverse Older Adults: Results From the Community of Voices Trial. <i>J Gerontol B Psychol Sci Soc Sci.</i> 2020
Aim of study	To test effects of the intervention on the health, well-being, and health care costs of racial/ethnically diverse older adults
Study design	A two-arm cluster randomized trial design (RCT) with the 12 senior centres serving as clusters;
Target population, setting and location	390 community dwelling older adults; 90-minute choir sessions over a 44 week period at senior centres, including 3-4 informal public performances; the programme was professionally delivered; USA based
Study perspective	The payer
Comparator(s)	The comparator was a wait-list control
Time horizon	Data was collected over a 6-month period
Discount rate	Not required as < 12 months
Outcome(s)/ output	The multimodal intervention comprises activities that engage participants cognitively, physically, and socially
Measurement of outcomes	Psychosocial outcomes were measured using The eight-item Patient Health Questionnaire (PHQ-8); The primary cognitive outcome was The Trail Making Test (TMT). Physical outcomes were measured using The NIH Toolbox Standing Balance measure; Healthcare utilisation and costs were collected using a self-reported healthcare utilisation questionnaire at baseline and 6 months
Source of costs/ financial proxies	No detail was provided on the cost of providing the programme National sources were used for healthcare costs (MEPS, 2014)
Presentation of results	Sample characteristics and differences in outcomes between control and intervention groups were presented in tabular form
Conclusions	There were no significant differences at 6 months on the three primary outcomes measures PHQ-8, TMT or chair stands. Significant differences were found for 2 of the 6 psychosocial outcomes; There were significant group-by-time interaction effects for loneliness and Interest in life

Table A6: Imagine Arts programme

	The Imagine Arts programme
Title	Bosco A, Schneider J, Broome E. Maturitas. 2019 Jun;124:15-24. The social value of the arts for care home residents in England: A Social Return on Investment (SROI) analysis of the Imagine Arts programme.
Aim of study	To explore the social and economic benefits of arts activities for older people living in residential homes (with or without dementia) in England
Study design	Social return on investment analysis (SROI) – this was not performed alongside an effectiveness assessment (such as RCT or observational study)
Target population, setting and location	267 older adults in care homes (with or without dementia); The programme ran for 12 months and included older adults who had participated in at least once in the Imagine study; UK based
Study perspective	The direct perspective of participants
Comparator(s)	No comparator (acknowledged as a limitation)
Time horizon	Data was collected over a 12-month period
Discount rate	Discount rate of 3.5%
Outcome(s)/ output	People with and without dementia: Decreased social isolation; Improved mental health; Improved mobility; Greater community inclusion; Improved cognition; Care home personnel and activity co-ordinators: Improved skills in caring for older people; Increased confidence in using arts intervention. Artists: Improved knowledge on dementia; Improved confidence in using arts for older people. Care home providers: Enhanced reputation.
Measurement of outcomes	Outcome for the care home personnel, providers and artists were assess via the use of reflective diaries and In-depth interviews. Decreased social isolation was based on attending more than one workshop over 2 quarters; Improved mental health was based on attending more than one activity promoting enjoyment; improved mobility was based on attending at least one art therapy involving physical activity; greater community inclusion was judged as attending one community event; Improved cognition was attendance on at least one creative workshop
Source of costs/ financial proxies	Arts Council England and the Baring Foundation invested £176,333

	<p>A range of assumptions were used for each outcome- for example; improved mobility (based on attending one therapy involving physical activity) was assigned a value of £240/ client (equivalent to attending a package of 4 sessions of physiotherapy); The financial proxy assigned to 'increased confidence' for activity coordinators was £300 (equivalent to attending 6 confidence building workshops).</p>
Presentation of results	<p>For each stakeholder outcome, a narrative account of what assumptions were used to value the outcomes, and what was used as a financial proxy to calculate value; baseline assumptions regarding deadweight loss, displacement, attribution and drop-off reported.</p>
Conclusions	<p>SROI ratio of £1.20 for every £1 of expenditure; sensitivity analysis (worst case scenario) suggested £1.02: £1</p>

Table A7: 'Dementia and Imagination' programme

	"Dementia and imagination" programme
Title	Jones C, Windle G, Edwards RT. Dementia and Imagination: A Social Return on Investment Analysis Framework for Art Activities for People Living with Dementia. <i>Gerontologist</i> . 2020 Jan 24;60(1):112-123.
Aim of study	To explore the economic impact and social value generated by the programme. The programme aimed to improve well-being, QoL and cognitive function
Study design	Social return on investment analysis (SROI) performed alongside a non-randomised mixed methods longitudinal cohort study
Target population, setting and location	125 participants living with dementia (and their carers) across 3 research sites in England and Wales (a mixture of residential care, assessment units and community venues); delivered by artists; UK based
Study perspective	A range of stakeholders (the state, people living with dementia, their families/friends and caregivers and care home staff)
Comparator(s)	No comparator
Time horizon	Data was collected over 6 months
Discount rate	Not required as <12 months
Outcome(s)/ output	A range of outputs were identified for stakeholders these included improvements in wellbeing and mood; increased engagement with art; increased confidence; increased social support; opportunity for continuing professional development of care staff
Measurement of outcomes	Family and caregivers completed 31-item DEMQOL-proxy questionnaire and questions on perception of art activity; number of sessions delivered
Source of costs/ financial proxies	<p>The cost of delivering the art programme included £103,292 from government and £44,846 from partner organisations in kind</p> <p>Time spent (invested) by stakeholders; time spent by dementia patients engaged in the programme was costed at minimum wage (£7.20/hour) and carers at £19/hour</p> <p>Financial proxies were applied to stakeholder outcomes (using the HACT Social Value Bank (http://www.hact.org.uk/social-value-bank)), for example, £20,323 was attributed to an improvement in wellbeing associated with increased mood for dementia patients; £3,753 was attributed to increased engagement with art for families/friends and caregivers</p>

Presentation of results	The value created for each stakeholder group (for the state, the dementia patient, their families and care home staff) was presented in tabular form. A range of SROI ratios (i.e., the return on money invested) were presented for a range of scenarios
Conclusions	An input of £189,498 to deliver the programme created a social value of £980,717 across all stakeholder groups, which equated to between £3.20 and £6.62 of social value generated for every £1 invested (£3.20-£6.62: £1)

Table A8: 'Craft Café'

	"Craft Café"
Title	Craft café Creative solutions to Isolation and Loneliness Social Return on Investment, summary report by Social Value Lab 2011 (published online)
Aim of study	Craft Café seeks to reduce the isolation and loneliness experienced by older people, to enable them to make positive lifestyle changes associated with ageing and improve quality of life
Study design	Social return on investment analysis (SROI) alongside pilot study
Target population, setting and location	Craft café open 10am -4pm 3 days per week; supported by a professional artist; based in Scotland
Study perspective	A range of stakeholders (the state, people living with dementia, their families/friends and caregivers and care home staff)
Comparator(s)	No comparator
Time horizon	12 months
Discount rate	Discount rate of 3.5%
Outcome(s)/ output	Range of outcomes for older people; family members; partner housing associations; NHS
Measurement of outcomes	Outcomes were 'tracked' using interviews, tutor feedback and Housing Association performance feedback, patient records; the Quantity of Outcomes was presented as "percentage of occurrence"
Source of costs/ financial proxies	<p>£84,219 for 2010/11 from the Scottish Government and in-kind support from the Housing association and Impact Arts</p> <p>A wide range of financial proxies were used; for example, the outcome of "self-worth and fulfilment" was equated to a meaningful job working 5 hours per week £2,563; publicity gained for Housing association involvement was valued at £9,980 (equivalent to a one-page advertorial in a Glasgow newspaper)</p>
Presentation of results	The value created for each stakeholder group (for the state, the dementia patient, their families and care home staff) was presented in tabular form. A range of SROI ratios (i.e., the return on money invested) were presented for a range of scenarios
Conclusions	An input of £84,219 to deliver the programme created a social value of £696,569 across all stakeholder groups, which equated to £8.27 of social value generated for every £1 invested (£4.86-£9.57: £1)

Table A9: 'Creative Caring'

	"Creative Caring in older peoples care homes"
Title	Make my day: the impact of creative caring in older people's care homes by MB Associates (published online)
Aim of study	To keep residents mentally active and more independent; improve residents social and family relationships; improve families' peace of mind; workforce development
Study design	Social return on investment analysis (SROI); No effectiveness study
Target population, setting and location	Care home residents
Study perspective	A range of stakeholders (resident, families, care home)
Comparator(s)	No comparator
Time horizon	Not stated
Discount rate	3.50%
Outcome(s)/ output	Residents mentally active and independent; residents have better social and family relationships; family peace of mind; workforce development; better care visible to staff and families; artists improve practice
Measurement of outcomes	Indicators included, dementia care mapping, residents joining in more, team spirit, more family visits, increased demand for places at the care home; Forecasts were based on qualitative data
Source of costs/ financial proxies	Between £1,537 (per home for 9 homes) and £2,786 per care home (for 5 homes) A wide range of financial proxies were used e.g., being mentally active and independent was valued at £8,390 (what someone might pay to stay in their home); better relationships with family and friends was valued at £15,500/year
Presentation of results	An impact model was presented
Conclusions	An input of £16,912 to deliver the programme created a return on investment of £49,896; a ROI of £3: £1

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