



Arts and Creativity in Later Life: Implications for Health and Wellbeing in Older Adults

Systematic Evidence Review

Institute of
Public Health



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Systematic Evidence Review

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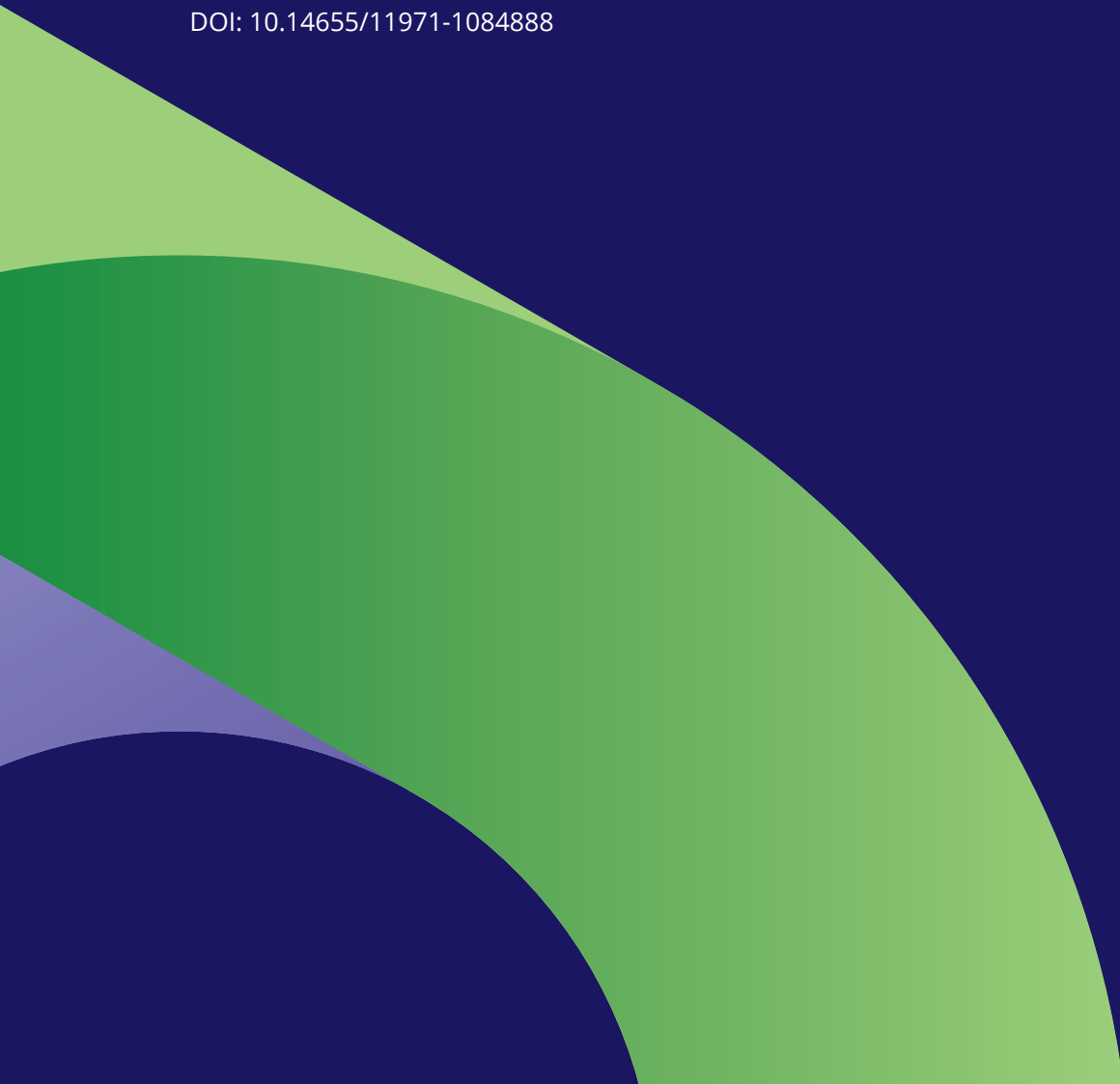


Table of Contents

| | |
|--|-----------|
| Executive Summary | 6 |
| 1. Introduction | 12 |
| 1.1 Background | 12 |
| 1.2 The Importance of Arts and Creativity | 12 |
| 1.3 Aim | 13 |
| 1.4 Research Questions | 14 |
| 2. Methodology | 16 |
| 2.1 Protocol and Registration | 16 |
| 2.2 Eligibility Criteria | 16 |
| 2.3 Search Strategy | 19 |
| 2.4 Identification of Included Studies | 20 |
| 2.5 Search Results | 20 |
| 2.6 Data Extraction and Management | 20 |
| 2.7 Quality Assessment | 21 |
| 3. Results | 23 |
| 3.1 Overview of Study Characteristics | 23 |
| 3.2 Health Outcome Measures | 23 |
| 3.3 Quality of Evidence | 26 |
| 3.4 The Impact of Arts and Creativity | 27 |
| 4. Discussion | 36 |
| 4.1 Main Findings | 36 |
| 4.2 Strengths and Limitations | 38 |
| 4.3 Considerations for Research, Policy and Practice | 39 |
| 5. Conclusion | 46 |
| 6. References | 50 |
| 7. Appendices | 65 |

List of Tables

| | |
|--|----|
| Table I: Inclusion and Exclusion Criteria | 18 |
| Table II: Physical Health and Wellbeing Measures | 24 |
| Table III: Psychological Health and Wellbeing Measures | 25 |
| Table IV: Quality appraisal of evidence scoring criteria | 26 |
| Table V: Summary Overview - Impact of Arts and Creativity Activities on Physical Health and Wellbeing Outcomes | 33 |
| Table VI: Summary Overview - Impact of Art and Creativity Activities that Maintain or Improve Psychosocial Health and Wellbeing in Older Adults. | 34 |

List of Appendices

| | |
|---|-----|
| Appendix I: Search Strategy | 65 |
| Appendix II: Arts and creativity evidence: PRISMA diagram (Moher et al. 2009) | 66 |
| Appendix III: Quality Appraisal Criteria, MMAT (Hong et al., 2018) | 67 |
| Appendix IV: Summary Characteristics Table - Dance | 69 |
| Appendix V: Summary Characteristics Table - Music and Singing | 96 |
| Appendix VI: Summary Characteristics Table - Visual Art | 113 |
| Appendix VII: Summary Characteristics Table - Drama and Theatre | 119 |
| Appendix VIII: Technical Evidence on Health and Wellbeing Outcomes | 121 |

Executive Summary



Executive Summary

Introduction

The specific aim of this systematic evidence review was to develop a better understanding of the evidence that exists in relation to the role of arts and creativity programmes for older adults and examine the effects of group based participation in arts and creativity and its impact on older people's health and wellbeing.

The systematic evidence review sought to address the following four questions:

1. How does participation in arts and creativity impact on older people's health and wellbeing outcomes?
2. Does the evidence suggest that certain art and creativity-based activities differ in effectiveness compared to others in supporting better health outcomes?
3. What information does the evidence in this field suggest should be collected as a way to measure and assess programme benefits and design?
4. What is the evidence that funding arts and creativity programmes for older people provide a return on investment?

Methodology

A mixed methods systematic review was employed. 14 relevant, electronic journal databases, grey literature and article reference lists were searched using the pre-defined search strategy, over a five-year period. The databases searched were: EMBASE, Web of Science (Social Sciences Citation Index), PsycINFO, Allied and Complimentary Medicine (AMED), ART Bibliographies Modern (ABM), Design and Applied Arts Index (DAAI), Applied Social Sciences Index and Abstracts (ASSIA), Library and Information Science Abstracts (LISA), International Bibliography of the Social Sciences (IBSS), Health and Medical Collection, Scopus, Cumulative Index to Nursing and Allied Health (CINAHL), PubMed, and Cochrane Library. Studies were eligible for inclusion if they examined the effect of arts and creativity interventions on the health and wellbeing of older adults. Identified search terms related to participation in arts and creativity (e.g., actively involved in making, or creating art) for therapeutic health and wellbeing for older adults (50+ years). In this review, arts and creativity was defined as, "Any creative or interpretive expression (whether traditional or contemporary), in whatever form" (Arts Act, 2003). Empirical research articles that contained quantitative, qualitative, or mixed methods study designs were included.

In total, 6101 records were returned for screening and 1483 duplicates were subsequently removed. The reviewers carried out an independent screening of over 4611 individual titles and abstracts to determine eligibility of each of the studies for inclusion within the review, with irrelevant records removed thereafter. A further independent screening of individual, full-text articles (n=315) was conducted. As a result, 73 studies were identified for inclusion within the review. A critical assessment of the methodological quality of eligible studies was employed using the Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018).

The review included studies from over 18 separate countries, with a cumulative sample of 7263 participants, ranging from 50 to 94 years of age. Dance was the most common form of creative arts exposure and was reported in nearly half of studies in the review in total

(n=34). This was followed by music and singing (n=26), visual and creative art (n=10), and drama and theatre studies (n=3).

Findings of the evidence: Impact of arts and creativity on health and wellbeing

In summary, the review has ascertained that participation in group arts and creativity interventions can help improve physical, psychological, and social health and wellbeing outcomes in older adults. The evidence was classified as 'strong', 'promising', 'preliminary', and 'inconclusive' in accordance with What Works Wellbeing, GRADE and CERQual guidance. An overview of the findings is presented below:

Impact of dance on health and wellbeing in older adults

- There is some relatively **strong** evidence¹ which suggests that participation in group dance on a regular basis can enhance balance and mobility, improve lower body physical strength and flexibility, increase aerobic capacity and endurance, and increase time spent in physical activity.
- **Promising** evidence² suggests that dance is associated with improvements in body composition, lipid and inflammatory profiles, as well as improving cognition and brain function.
- **Preliminary** evidence³ provides slight indications that dance can help improve independence in daily living activities and reduce the fear of falling.
- In relation to older adults living with diagnosed health conditions or diseases, **preliminary** evidence suggests that dance can help improve mood, alleviate depression, and enhance cognition in older adults living with amnesic mild cognitive impairment. It can also help alleviate depression, improve self-esteem, and satisfaction with life in older adults living with age-related, macular degeneration.
- Initial preliminary evidence also indicated that tailored dance could help improve balance, mobility and gait in older adults living with Parkinson's disease, but the evidence is inconsistent⁴ and further research is required.

Impact of music and singing on health and wellbeing in older adults

- **Promising** evidence suggests that participation in group singing and music classes on a regular basis is associated with improved cognitive function, quality of life, improved affective states, and can help preserve a sense of wellbeing in older adults.
- Some initial **preliminary** evidence suggests an association between group singing and enhanced respiratory function.
- There is also some initial evidence to show that music and singing can help improve resilience and reduce loneliness. However, at present the results are inconsistent and more evidence is needed in this area.
- High quality qualitative evidence also suggests that participation in music and singing activities can provide older adults with enhanced wellbeing, development of new skills, positive relationships, a sense of belonging and increasing social networks.

1. Strong evidence is regarded as being high quality evidence – confidence that the evidence shows a positive impact in older adults. This criterion was determined from the What Works Wellbeing guidance on evidence and is in accordance with GRADE and CERQual guidelines.

2. Promising evidence is regarded as being moderate quality evidence – encouraging confidence that there is a positive impact in older adults, but need to explore further.

3. Preliminary evidence – there is only a small indication of some impact in older adults, the evidence is limited, and need to explore much further.

4. Inconsistent evidence – the evidence was mixed and inconclusive to show an impact in older adults.

Impact of visual and creative arts on health and wellbeing in older adults

- **Preliminary** evidence suggests that visual and creative arts can help to reduce feelings of loneliness and help improve a sense of community and social connectedness, enhance perceived health status and the ability to cope with pain experiences.
- High quality, qualitative evidence suggests that participation in visual and creative art group programmes can help improve cognitive abilities, acquisition of new skills, sense of autonomy, feelings of enjoyment, and provides opportunities to develop new relationships and social connections.
- With regards to older adults living with diagnosed health conditions, **promising** evidence shows that visual and creative arts programmes, like creating watercolour paintings and art making, can help improve wellbeing in older adults living with dementia. Some initial, preliminary evidence suggests that visual and creative arts programmes can help improve daily living activities and quality life in older adults living with dementia.

Impact of drama and theatre on health and wellbeing in older adults

- Initial, **preliminary** evidence shows participation in drama and theatre classes on a regular basis can help provide emotional wellbeing benefits for older adults. However, the evidence on the impact of drama and theatre on health outcomes is limited and inconsistent and therefore, more research in this area is warranted.

Considerations for Research, Policy and Practice

A number of considerations for research, policy and practice have emerged from the evidence presented within the review. These considerations are relevant to the overarching strategic frameworks and policy documents in Northern Ireland, including, but not limited to: Making Life Better, The Mental Health Strategy, The Active Ageing Strategy, and the forthcoming Strategy for Culture and Arts.

| Considerations for Research and Evidence | |
|--|---|
| Further evidence on arts and health | Further research in a wider range of arts and creativity forms is required to develop further understanding of the evidence on the health benefits for older adults, particularly where there is a dearth of studies. |
| High quality, larger scale studies | More high quality, larger scale, robust longitudinal research, and experimental intervention studies are required to track health outcomes in older adults to a much greater degree and increase scalability. |
| Standardisation of assessments | More standardised and systematic assessments of programmes would advance meta-analysis and establish consistent treatment effects. |
| Economic evaluations | A review of the impact of economic evaluations of arts and creativity interventions is needed to determine the cost effectiveness and return on investment. This could support policy and decision-making regarding investments for future funding and commissioning of arts and health services. |

| Considerations for Practice and Policy | |
|---|---|
| Greater recognition of arts and public health | Greater recognition of the public health benefits of participation within arts and creativity should be promoted. |
| Address barriers to participation | Address barriers (social & economic) to participation in arts and creativity for older people by improving availability and accessibility to the arts for older adults. |
| Co-design approach | Implement a co-design approach with older adults and key stakeholders when designing and developing arts and creativity interventions. |
| Sustainability | Address the sustainability of arts and creativity interventions to ensure more long-term investment. |
| Embedding structures | Those implementing arts and creativity interventions would benefit from making health and wellbeing a fundamental and overarching focus of their work, embedding structures to contribute to successful health outcomes. |
| Evaluation framework | Ensure that evaluation is integral to arts and creativity programmes. The development of an evaluation framework and an evaluation toolkit are required to support those who wish to undertake an assessment of effectiveness, efficiency and economic evaluations of arts and creativity programmes. |
| Training and support in effective programme design | Training and support for the development and implementation of art and health interventions, in effective programme design and evaluation methods to inform and improve their services. |
| Cross-sectoral and strategic partnership working | Support cross-sectoral and strategic partnership working through arts and health to encourage progression of good practice and promote collaboration. For example, support collaborative working between primary care and social, community and arts sectors. |
| Strategic Policy framework | A strategic policy framework, setting the direction for participation and engagement in the arts, particularly for older adults within a health and wellbeing context. |

In addressing the four research questions, this systematic evidence review found that participation in arts and creativity has a positive impact on older people's physical, psychological, and social health and wellbeing outcomes. Variability in the evidence hinders the ability to conclusively determine whether certain art and creativity-based activities differ in effectiveness compared to others in supporting better health outcomes. The evidence in this field demonstrates various objective and subjective ways to measure and assess programme benefits and design. However, a more standardised approach to programme design, data collection and evaluation is required. There is a dearth of evidence exploring whether or not funding arts and creativity programmes for older people provides a return on investment (Crealey and O'Neill, 2021). However, the review indicated the dissatisfaction of short-term funding of interventions and the need for a more sustainable and integrated public health and arts approach.

Conclusion

The overarching message from this review is that art and creativity interventions can have positive health impacts for older adults and population health. This systematic evidence review demonstrates the importance of arts and creativity and how it can contribute to the health of older adults. The evidence shows that participation in group arts and creativity interventions helps to support the physical, mental, and social aspects of ageing. Taken together, these findings support the importance of participation in the arts for older adults and have significant implications, especially for the promotion of positive ageing, and for the prevention, or mitigation, of ill health in later life for both the public health and arts and creativity agenda.

1

Introduction



1. Introduction

This report, produced by the Institute of Public Health, provides an overview of a systematic evidence review to develop a better understanding of what the evidence tells us about the role arts and creativity plays in older people's health and wellbeing. The review assessed how effective arts and creativity interventions are in supporting better health outcomes. It considered the quality and strength of the evidence and outlined what health measures were assessed and utilised.

1.1 Background

Northern Ireland's ageing population is growing and one of the greatest successes of public health is that people are living longer than ever before. Over the last decade, the proportion of the population aged 85 and over in Northern Ireland has increased by 30% and grown at a rate five times higher than the population as a whole. Older adults will soon represent the majority of the population and projections predict that by mid-2028, there will be more people aged 65 and over than children aged 0-15 years in Northern Ireland (NISRA, 2019). Having cognisance of the fact that the population is benefitting from living longer lives, there has been a growing emphasis within policy and programmes on how we can best promote health and wellbeing and active ageing in later life.

However, whilst many people do enjoy good health into their later years the prospect of having good physiological and psychological health is not always evenly distributed amongst older adults. As people age, they can encounter a number of significant public health and wellbeing challenges across the life course. Events such as retirement or bereavement can affect some older people in terms of their physical, social, and emotional wellbeing. In addition, older people can become susceptible to loneliness, social isolation, and exclusion (Shankar et al., 2011; Steptoe et al., 2013). Furthermore, as people age, they can become more vulnerable to disease, long-term ill health conditions, injury, and mental health disorders (WHO, 2010). Notwithstanding these challenges, achieving a healthy, active lifestyle is enjoyed by many in later life and the goal of public policy is to increase the years spent in good health. In a WHO scoping report on the role of the arts, Fancourt and Finn (2019) asserts that being involved in arts and creative activities is often seen as a way of alleviating, or preventing, the deterioration of health.

1.2 The Importance of Arts and Creativity

The focus of this review is on participation in arts and creativity in later life. However, it is important to recognise that the concept of arts and creativity is broad and can be difficult to define. For the purpose of this review, we have defined arts and creativity using the characterisation set out in the Arts Act (2003) which states that it is, "Any creative or interpretive expression (whether traditional or contemporary) in whatever form" (Part 2). Participation in arts and creativity can be expressed using many different mediums such as performing arts like dance, music, singing, drama and theatre, or visual arts like painting, drawing, photography, sculpture and crafts. It can also be experienced through literature, writing, reading and poetry as well as through culture such as museums, art exhibitions and galleries. In addition, many online and digital arts have emerged over the last number

of years such as animations, filmmaking and so forth. Furthermore, enjoyment of the arts is a fundamental human right. Article 27, enshrined in the Universal Declaration of Human Rights (1948), states that, "Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits." (pg.7).

Over the last number of years, there has been a growing focus on the positive health benefits that arts and creativity programmes can have on society (Mental Health Foundation, 2012). In 2017, the UK All-Party Parliamentary Group on Arts, Health and Wellbeing, highlighted that the arts could have the potential to provide meaningful benefits to older people's lives and may be essential for healthy ageing, both physically and psychologically. The group stated that the arts may also provide an effective resource which can help meet major health service demands by relieving pressures on health services. Furthermore, a recent scoping report, commissioned by the World Health Organisation in 2019, considered the role of the arts in improving health and wellbeing outcomes for all ages and argued that the arts can affect social determinants of health through developing social cohesion and reducing social inequalities. The report also suggests that the arts play an important role in child development, the promotion of health behaviours and in the prevention of ill health (Fancourt and Finn, 2019).

However, in Northern Ireland figures show that participation in arts decreases with age and adults aged 65 years and over are consistently the least likely to have participated in the arts than any other age groups since 2007 (NISRA, 2019). Despite the general acknowledgment of the role that arts and creativity plays and its contribution to older adults' wellbeing, thus far, the evidence is only emerging. As a result, there has only been a limited number of systematic reviews which have examined the impact of participation in arts and creativity for older adults' health and wellbeing. Previous research has concentrated predominantly on arts and creativity interventions as a form of therapy, for older adults with diagnosed health conditions or diseases, or has centred on one sole art form (e.g., only dance or music).

There has been little empirical investigation which systematically reviews the evidence and examines active participation in arts and creativity, across different arts and creativity forms and to identify the impact on older adults, across both physical and psychological health and wellbeing domains. The purpose of this review, therefore, was to explore the evidence base to assess the relationship between arts and creativity interventions and its effects on health and wellbeing outcomes in older adults. In addition, this review sought to identify learning and inform future policy and programme development of arts and creativity for older people in health and community contexts.

1.3 Aim

There is growing evidence which supports the use of art-based interventions in improving health and wellbeing. However, more tangible evidence is required to help identify learning for policy and programme development.

The specific aim of the systematic evidence review was to develop a better understanding of the evidence that exists in relation to the role of arts and creativity programmes for older adults and to examine the effects of group based participation in arts and creativity and its impacts on older people's health and wellbeing.

In addition, the review looks at studies with both objective measurements of physical and psychosocial health and wellbeing indicators (quantitative measurement) as well as subjective experiences of arts and creativity on health and wellbeing (qualitative measurement).

1.4 Research Questions

The systematic evidence review sought to address the following four questions:

- How does participation in arts and creativity impact on older people's health and wellbeing outcomes?
- Does the evidence suggest that certain art and creativity-based activities differ in effectiveness compared to others in supporting better health outcomes?
- What information does the evidence in this field suggest should be collected as a way to measure and assess programme benefits and design?
- What is the evidence that funding arts and creativity programmes for older people provides a return on investment?

In the next section, a detailed account of the review methodology is provided. It outlines the eligibility criteria, search strategy, data extraction and quality assessment criteria adopted within the review.

2 Methodology



2. Methodology

2.1 Protocol and Registration

In order to carry out a review of the evidence base, a systematic review⁵ protocol was developed by the IPH, prior to the implementation of the review which detailed the proposed methods and processes. To exemplify best practice and transparency in our systematic review methodology process, the review protocol was registered with PROSPERO, the International Prospective Register of Systematic Reviews (Registration No: CRD42021234832). The review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement on the reporting guidelines for systematic reviews (Moher et al., 2009). In addition, we sought guidance on the methodology from an information specialist librarian at Ulster University. This systematic evidence review utilised a mixed methods approach.⁶ It provides a summary of both quantitative and qualitative empirical literature related to arts and creativity for older people, both nationally and internationally, between January 2013, and December 2018.

2.2 Eligibility Criteria

Specific eligibility criteria were applied when selecting studies for inclusion in the review using the PICOS framework (Schardt et al., 2007). This ascertained the key criteria for inclusion based on eligible participants, intervention exposures, health outcomes and study design to help structure and answer the research question and help guide the search strategy. Studies were eligible for inclusion if they were published empirical studies. Further inclusion criteria are detailed below and are further summarised in Table I.

2.2.1 Participant Characteristics

In recognising that there is no global agreement of what constitutes an 'older person,' for the purposes of this review, studies were included if they related to adults aged 50 years or older. This criterion was employed to ensure global inclusivity by reducing the restrictions on studies and provided an opportunity to return a greater number of inclusion studies. Studies were excluded if participants were less than 50 years of age or where the mean age of the study population was 50 or under.

2.2.2 Types of Intervention

To be included in the review, a number of inclusion criteria regarding arts and creativity interventions had to be met, namely:

- Studies which included interventions, or programmes, where older adults actively participated in group arts and creative activities, where the definition of arts and creativity was considered as 'being any creative or interpretive expression' (Arts Act, 2003), for therapeutic wellbeing.
- Arts and creativity interventions, under the guidance of an art professional, where participants actively engaged in these activities through art making rather than spectator or observational arts (i.e., those actively involved in creating, making and

5. Systematic evidence reviews are a key aspect of obtaining meaningful and significant evidence to see what interventions work, as well as identifying gaps in research and uncovering any methodological successes or shortcomings (Gopalakrishnan et al., 2013).

6. "A mixed-methods model enables us to integrate quantitative estimates of benefit and harm with more qualitative understanding from people's lives...It facilitates this critical analysis of interventions from the point of view of the people the interventions are targeting." (Harden, 2010).

performing the arts), over a number of sessions (i.e., for more than one session) were eligible.

- Dance interventions included performing a range of dance choreographies to music (such as ballroom or salsa etc). Music and singing interventions included playing an instrument, singing, or writing and creating songs. Similarly, visual arts activities included drawing, painting, sculpting and art making.
- Furthermore, studies were included if they focused on an art and creative activity for therapeutic wellbeing.

Studies were excluded if they met any of the exclusion criteria:

- Studies were excluded if they contained solely spectator, or observational, arts and studies which contained any individual arts activities in older people's homes without the support, or guidance, of an art professional. For example, singing, dancing or art at home were not included unless they were part of a wider programme. Museum, theatre or drama studies were not included if they only exclusively measured attendance. Participants had to show participation in some form of art activity. We also excluded dance studies which were performed primarily for exercise and focused solely on movement-based and aerobic exercise (such as Zumba etc) as these were not considered as forms of creative expression. Art interventions were not included if they solely focused on art viewing and appreciation, object touching or craft activities.
- Furthermore, writing narratives, poetry and storytelling studies were included if they focused on writing for wellbeing, but were excluded if they were treatment-based. For example, similar to the systematic review by Curtis et al. (2018), studies that considered the use of reminiscence were excluded, particularly if they were treatment-based. They were only eligible for inclusion if they involved creative or interpretive expression and were not provided by a primary care health professional.
- Moreover, the amount of research on arts, dance and music therapy which involved the treatment, or amelioration, of health conditions or diseases was anticipated to be relatively high. Therefore, in order not to replicate existing efforts, studies were excluded if participants were exposed to therapy for the treatment and management of both physical and psychological symptoms. We excluded studies where the arts intervention was delivered by a therapist, or clinician, and excluded studies which were based in a hospital, or clinical settings, and clinical treatment, involving medical tests and surgery.

2.2.3 Comparators

Intervention studies with comparator or control groups, in which groups or individuals participated in routine care, or usual activities, or with an alternative comparator intervention, were included. A comparator, or control group, was not a prerequisite but was utilised when presented as a comparator of the effects of an intervention or programme.

2.2.4 Outcomes

Any research article, reporting on a least one form of physical and psychosocial health and wellbeing outcome in older adults as a result of participation in arts and creativity interventions, was included within the review. Quantitative studies which used objective (e.g., accelerometers), or standardised measurements to measure change through self-

report, or by proxy (e.g., measures of quality of life, wellbeing, psychological distress assessments etc) were included. Furthermore, mixed method, or qualitative studies, which reported participants' subjective experiences identifying high-level health and wellbeing themes were included. Studies that did not adequately define, or measure, health and wellbeing domains were deemed ineligible for inclusion.

2.2.5 Type of Study Designs

The types of study designs that were eligible within the review were those that evaluated the association between arts and creativity interventions with health and wellbeing outcomes in older adults. This is a mixed methods review incorporating both quantitative and qualitative studies. Eligible studies included empirical research with various types of study designs such as Randomised Control Trials (RCTs), quasi-experimental designs, case-controls, cross-sectional studies, qualitative studies, mixed methods studies or process evaluations. Studies from all countries across the world which met the eligibility criteria were included.

Studies were excluded if they were single case reports or individual case studies, commentaries, editorials, letters, news items, discussion or opinion articles, conference, or meeting abstracts, as well as articles which were not empirical arts and creativity research. These criterion were determined to make sure the inclusion of journal articles in the review were relevant to researchers, policymakers, community and voluntary sectors and for policy making processes.

Table I: Inclusion and Exclusion Criteria

| PICOT | Inclusion | Exclusion |
|---------------------|--|--|
| Population | Older adults, 50 years of age and over. | Less than 50 years of age or where the mean age of the study population was 50 or under. |
| Intervention | Active participation in arts and creativity interventions, delivered under guidance of professional, > 1 session, therapeutic wellbeing. | Solely spectator or observational arts, performed solely for exercise purposes, without the guidance of a professional, or as a form of therapy for the treatment, or amelioration, of health conditions or disease. |
| Comparator | Participation in routine care, usual activities or where there was an alternative comparator intervention. | No exclusion criteria. |

| | | |
|-------------------|--|---|
| Outcomes | Objective and subjective measures of both physical and psychological health and wellbeing outcomes. | No clear health and wellbeing outcomes identified. |
| Study type | Quantitative: (RCT, before and after studies, Time series designs, Cross sectional designs) Qualitative, and Mixed method designs. | Single case reports or individual case studies, commentaries, editorials, letters, news items, discussion, or opinion articles etc. |

2.3 Search Strategy

Research in the area of arts, creativity, and wellbeing has been developing over the last number of years. Therefore, searches were limited to a five-year period of publication between 1 January 2013, to 31 December 2018. Only full-text journal articles published in the English language were included. The systematic searching component of the evidence review was completed through a systematic search of academic and grey literature, following PRISMA (Moher et al., 2009) guidelines. Fourteen relevant, electronic journal databases were identified and searched using a pre-defined search strategy using the PICOS framework and identified search terms for arts, creativity, and health and wellbeing for older people.

Databases searched included:

- EMBASE
- Web of Science (Social Sciences Citation Index)
- PsycINFO
- Allied and Complimentary Medicine (AMED)
- ART Bibliographies Modern (ABM)
- Design and Applied Arts Index (DAAI)
- Applied Social Sciences Index and Abstracts (ASSIA)
- Library and Information Science Abstracts (LISA)
- International Bibliography of the Social Sciences (IBSS)
- Health and Medical Collection
- Scopus
- Cumulative Index to Nursing and Allied Health (CINAHL)
- PubMed
- Cochrane Library

A combination of the Medical Subject Headings (MeSH) subheadings and free text terms were employed and modified for each of the electronic databases. Identified search terms related to arts and creativity (arts, dance, dancing, music, singing, choir, visual, painting, drama, theatre, writing, storytelling, sculpting, performance, creative, creativity) AND health and wellbeing (health, wellbeing, physical health, social health, psychological health, mental health, quality of life) AND for older people (older adults, older people, ageing; aging). Supplementary search terms were also ascertained from similar articles. An example of the Medline search strategy can be found in Appendix I. In addition, a hand search of reference lists of pertinent systematic reviews was conducted to detect any additional studies. Furthermore, grey literature was searched through the online search engine Google and any literature published in the same timeframe was also included.

2.4 Identification of Included Studies

All results from the searches were extracted from the bibliographic databases and transferred into Refworks, where duplicates were removed in a structured process. Results were then imported into Covidence, an online platform for evidence synthesis. A further check for duplicates was conducted before initial independent reviewing of titles and abstracts of studies which was completed by two reviewers to determine potential eligibility or exclusion (LMQ and ROS). Where uncertainty around eligibility occurred, the full article was reviewed for confirmation. Results of included studies were impartially reviewed by two reviewers (LMcQ and ROS). Studies were excluded where the criteria were not met.

Where studies met the eligibility criteria, all full text articles were reviewed impartially by two reviewers (LMQ and ROS). Any inconsistencies were resolved through dialogue and agreement amongst reviewers. Agreement was reached on all occasions; however, a third reviewer was on standby to determine consensus if required. Studies were excluded where the criteria were not met and reasons for their ineligibility were detailed. Due to a high level of heterogeneity between study designs, participants and health outcomes, a narrative synthesis of the evidence is provided. Studies that explored different arts and creativity programmes were collectively clustered together.

2.5 Search Results

14 electronic journal databases were each searched using specified PICO search terms and keywords for arts and health and wellbeing for older adults and tailored for each database. In total, 6089 records were returned for screening from the electronic databases and a further 12 studies were identified through the searching of grey literature and handsearching of article reference lists (n=6101). Duplicates were then identified and subsequently removed (n=1483). The reviewers then carried out a sizeable, independent screening of over 4611 individual titles and abstracts to determine the eligibility of each for inclusion within the review. Irrelevant records (n=4296) were subsequently removed. Following this process, the reviewers further carried out an independent screening of individual full-text articles (n=315) which were reviewed to determine the eligibility of studies which met the inclusion criteria. As a result, 73 studies are included within the review. For more details on these results, see Appendix II for the detailed PRISMA Table.

2.6 Data Extraction and Management

Data was extracted using a pre-piloted, standardised extraction form. Quantitative data and qualitative data extracted from the forms included the details of: author, study design,

participant characteristics, creative arts intervention, or exposure (type of creative art, duration, frequency, conditions), physical or psychological health outcomes (measures), results (means, risk ratios, odds ratios etc) and key findings. Studies that explored different art and creativity programmes were collectively clustered together. Studies were classified into art and creativity categories, namely:

(1) Dance (2) Music and Singing (3) Visual Arts and (4) Drama and Theatre.

Studies were also classified according to comparative study type where appropriate, for example: Randomised Controlled Trials (RCTs), quasi-experimental studies, time comparator studies (e.g., pre and post-tests), no comparator studies (e.g., cross-sectional studies etc) and qualitative studies. A synthesised summary of the evidence is detailed below, with a more detailed summary provided in the technical Appendices (V-IX).

2.7 Quality Assessment

Relevant studies identified for inclusion were critically assessed utilising the Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018), (Appendix III). The type of studies assessed varied and included a mix of RCTs, quasi-experimental, case-controls and cross-sectional studies, cohort, qualitative and mixed methods. The tool was used to assess the methodological quality over five criteria (15 criteria in mixed method studies). We used these criteria to make a distinction between the quality of evidence and determined whether the studies were of high, moderate, or low quality. Data from the studies was extracted by one reviewer (LMQ) and validated by a second reviewer (ROS). The quality appraisal tool was employed to assess methodological rigour, not as a means to exclude studies of poor quality. The overall assessment record has been included within the evidence Summary Tables (Appendices V-IX).

In summary, this systematic review employed a comprehensive search strategy with over 14 electronic journal databases searched and 6101 articles were returned. Following an extensive independent screening process, this resulted in 73 studies being eligible for inclusion within the review. The next section will now consider the characteristics of included studies, identify the types of health outcome measures employed by various studies and provide an overview of the quality of evidence.

3

Results



3. Results

3.1 Overview of Study Characteristics

This section presents an overview and outlines the characteristics of included studies within the review. 73 relevant studies were included in the review. This review consisted of 43 quantitative studies, 15 mixed method studies and 15 qualitative studies. The most common form of arts examined in the studies pertained to performance arts such as dance (n=34), followed by music and singing (n=26), and drama and theatre studies (n=3). A number of visual and creative art studies (n=10) were also eligible for inclusion within the review.

In terms of study design, quantitative studies (incl. those within mixed method studies) consisted of randomised studies [Randomised Control Trials (n=15) and experimental designs (n=15)], non-randomised studies [uncontrolled pre-to-post-test designs (n=17), cross-sectional studies (n=8)] and three descriptive studies.

The included studies were conducted in a total of 18 separate countries. The majority of studies originated in the UK (n=17) and the USA (n=14). This was followed by Australia (n=10), Brazil (n=6), Germany (n=4), Ireland (n=3), Greece (n=3), Italy (n=2), Finland (n=2), China (n=2), Singapore (n=2), Canada (n=2), with the remaining studies from Croatia, Czech Republic, Columbia, Taiwan, Spain and Sweden, all with one study produced in each.

Results from across the studies detailed a cumulative sample of 7263 participants, ranging from a minimum of 5 participants in one qualitative study, (Joseph and Southcott, 2015) to a maximum of 750 participants (Sun et al., 2013) as part of a case-control design from a larger prospective study. Most studies reported higher female populations, ranging from 50 to 94 years. Whilst most of the studies involved populations that were typically healthy, older adults, 9 studies concentrated on specific groups of the older population. These involved older adults who reported living with a diagnosed health condition, or disease, namely Parkinson's disease (n=3) (McNeely et al., 2015; Westheimer et al., 2015; Shanahan et al., 2017), Dementia or Alzheimer's disease (n=3) (Windle et al., 2018; Camic et al., 2015; Gross et al., 2015), Age-related Macular Degeneration (ARMD) (n=1) (Pinniger et al., 2013), Amnesic Mild Cognitive Impairment (aMCI) (n=1) (Lazarou et al., 2017) or living with a mobility limitation (n=1) (Marquez et al., 2015).

3.2 Health Outcome Measures

Furthermore, the majority of studies reported aims to examine the impact of arts and creativity using more than one health outcome measure. Studies assessed health and wellbeing using various objective and subjective measures, with no consistency in the preference of measures implemented. These measures encompassed physical, social, environmental, and psychological domains of health and wellbeing. The most common measures utilised are summarised within Tables II and III and in Appendices IV-VIII.

Within the physical health domain, studies most commonly reported using the following standardised outcome measures:

Table II: Physical Health and Wellbeing Measures

| Health Outcome | Objective and Subjective Measures |
|---|--|
| Balance and mobility | The Tinetti test (Tinetti, 2003), Timed Up and Go test (TUG) and DTUG) (Podsiadlo and Richardson, 1991), Balance Berg Scale (Berg et al. 1992), Four-Square Step Test (Dite and Temple, 2002), the Mini-BESTest (Franchignoni et al., 2010), 8-ft up and go test (Rose et al., 2020) and 3D mobile force platform. |
| Body strength and flexibility | The Senior Fitness Test (SFT, Rikli and Jones, 2001) includes: Arm curl test, Chair-stand test and Chair sit-and-reach test, and the Back-scratch test. Isokinetic dynamometry was also carried out to measure joint range of motion. |
| Aerobic capacity, endurance, and physical activity | The Six-minute-walk test (Enright, 2003), Accelerometer, Treadmill, Heart monitor, the Physical Working Capacity Test (deVries et al., 1990) using a bicycle ergometer, the International Physical Activity Questionnaire (IPAQ, Craig et al., 2003), the Rapid Assessment of Physical Activity (RAPA, Topolski et al., 2006) scale, and the CHAMPS Physical Activity Questionnaire for Older Adults (Stewart et al., 2001). |
| Body composition, lipid and inflammatory profiles | Stadiometer, Digital weight scales, Skinfold calipers, Blood samples, Ultrasound, an Elisa kit (R&D Systems) and an automated analyser (Roche Diagnostics). |
| Falls and falls efficacy | The Falls Efficacy Scale International (FES-I, Yardley et al., 2005), the Modified Falls Efficacy Scale (MFES, Clemson et al., 2004) and self-reported occurrence of falls (Lamb et al., 2005). |
| Activities of daily living | The Instrumental and Basic Activities of Daily Living Scale (Thomas et al., 1998), Everyday Competence Questionnaire (ECQ, Kalisch et al., 2011), The Frenchay Activities Index (FAI, Christiansen, 2005), Bristol Activities of Daily Living scale (BADLS, Bucks et al., 1996), Lawton Instrumental Activities of Daily Living Scale (Lawton and Brody, 1969) and the Barthel Index (Mahoney and Barthel, 1965). |
| Sleep quality | The Pittsburgh Sleep Quality Index (PSQI, Buysse et al., 1989). |

Within the psychological health domain, studies most commonly reported using the following standardised outcomes measures:

Table III: Psychological Health and Wellbeing Measures

| Health Outcome | Objective and Subjective Measures |
|---|---|
| Wellbeing | Global perceptions of Wellbeing, Short Warwick-Edinburgh Mental Well-being Scale (Short-WEMWBS, Tennant et al., 2007), The Resilience Scale (Friborg et al., 2003), The General Health Questionnaire (GHQ30, Goldberg and Williams, 1988) and the 18-item Greater Cincinnati Chapter Well-Being Observation Tool© (Kinney and Rentz, 2005). |
| Quality of life | The World Health Organisation Quality of Life Short Form (WHOQOL-BREF, WHO, 1998), the EuroQol (EQ-VAS, EuroQol, 1990), the SF-12 (Montazeri et al., 2009, the EQ-5D-3L (Rabin and de Charro, 2001), the York- SF12 (Iglesias et al., 2001), CASP-12 (Wiggins et al., 2007), the Basic Psychological Needs Scale (Deci and Ryan, 2000), the Dementia Quality of Life (DEMQOL-4, Smith et al., 2005), and the Parkinson's Disease Questionnaire (PDQ-39, Jenkinson et al., 1997). |
| Life satisfaction | The Satisfaction with Life Scale (SWL, Diener et al., 1985) and Diener et al.'s Flourishing Scale (Diener et al., 2009). |
| Self-efficacy and self-esteem | The General Self-Efficacy Scale (Schwarzer and Jerusalem, 1995) and the Rosenberg Self Esteem Scale-10 items (Rosenberg, 1965), the General Measure of Self Efficacy (GSE, Sherer et al., 1982) and the Musical Performance Self-Efficacy Scale (Zelenak, 2010). |
| Affective states (Depression, mood, and anxiety) | The Geriatric Depression Scale (GDS, Yesavage and Sheikh, 1986, the Beck Depression Inventory (BDI, Beck et al., 1996), the Neuropsychiatric Inventory (NPI, Cummings et al., 1994), Hamilton Scale for Depression (Hamilton, 1960); the Hospital Anxiety and Depression Scale (HADS, Zigmond and Snaith, 1983), the Perceived Stress Scale (Cohen et al., 1983), the General Health Questionnaire (GHQ, Goldberg and Hillier, 1983) and the State-Trait Anxiety Inventory (Spielberger et al., 1983), and Salivary cortisol samples. |
| Loneliness | The UCLA Loneliness Scale (Russell, 1996). |

| | |
|--------------------------|---|
| Social engagement | The 6-item Lubben Social Network Scale (Lubben et al., 2006). |
| Cognition | The Repeatable Battery of Neuropsychological Status (RBANS, Randolph et al., 1998), Rey Auditory Verbal Learning Test (RAVLT, Rey, 1941); the Verbal Fluency Test (FAS, Borkowski et al., 1967), Frankfurt Attention Inventory (FAIR, Moosbrugger and Oehlschlägel, 1996), the Nonverbal Learning Test (NVL: Sturm and Willmes, 1994), the Raven Standard Progressive Matrices (RSPM, Raven, 1938), the Wisconsin Card Sorting Test (WCST-64, Heaton, 1981), the Montreal Cognitive Assessment (MOCA, Nasreddine et al., 2005); the Functional and Cognitive Assessment Scale (FUCAS, Kounti et al. 2006); Test of Everyday Attention (TEA 4, Robertson et al., 2001); Rey Osterrieth Complex Figure Test (ROCFT, Osterrieth, 1944) and Rivermead Behavioral Memory Test (RBMT, Wilson et al., 1989), the Trail Making Test (TMT; Parts A & B, Tombaugh, 2004), the Color task (Stroop C) and Color-Word task (Stroop C-W) (Trenerry et al., 1989), the Symbol Digit Modalities Test (Smith, 1982), the Wechsler Memory Scale (Wechsler, 1987), the Brief Visuospatial Memory Test (BVST, Benedict, 1997), and the Mini Mental State Examination (MMSE, Folstein et al., 1975). |
| Brain function | Magnetic Resonance Imaging (MRI) and Electroencephalogram (EEG). |

3.3 Quality of Evidence

The critical appraisal of the methodological quality of evidence within this review, ranged from low to high quality, based on core quality criteria across different types of study designs to determine study validity (Appendix III). We utilised a mixed methods appraisal scoring criteria similar to D'Amen et al.'s (2021) review, in which a criterion score of 0 to 2 was considered as being 'low', a score of 3 was considered as being 'moderate' and a score of 80% or over (4 or 5) was considered as being 'high quality' (Table IV).

Table IV: Quality Appraisal of Evidence Scoring Criteria.

| Quality | Score Criterion Met |
|-----------------|----------------------------|
| High | 4***** to 5***** (≥80%) |
| Moderate | 3*** (60%) |
| Low | 1* to 2** (≤40%) |

This resulted in the identification of a number of high methodological quality studies, with n=13, meeting the 5* criterion at 100%, and n=19, meeting the 4* criterion at 80%. 32 were moderate quality studies (3*) and 9 were low methodological quality studies (2*). Studies that were appraised as being of a high methodological quality were mainly within RCT studies. These studies provided adequate randomisation and allocation concealment of participants to intervention groups, comparability of participant characteristics at baseline, had acceptable levels of complete outcome data, good blinding processes and had good participant adherence to the interventions. Some qualitative studies were also ranked high quality against the qualitative criteria employed, showing an appropriate qualitative approach and data collection methods; findings were adequately derived from the data and interpreted sufficiently.

However, as indicated, the majority of studies were of moderate quality. Some of these studies were non-experimental, cross-sectional, or descriptive in nature, where participants did not appear to have been systematically sampled, or randomly assigned, with less fidelity in exposure measures and inadequate control of potential confounding factors or control groups. In critically appraising the quality of included studies, where the criteria were not met, the most frequent methodological reasons identified for potential risk of bias of the evidence were predominantly small sample sizes, high withdrawal or low retention rates; some had non-reporting of missing data in terms of outcomes or intervention procedures. In a small number of RCTs, it was hard to determine whether randomisation was appropriately performed and whether outcome assessors were blinded to the intervention.

In addition, there were varying degrees of appropriate, comparable standardised data collection measures among studies, along with issues in determining the size of effect. Notably, it would also appear that most studies had a higher number of female participants which is an important issue to consider in the design of art-based interventions.

3.4 The Impact of Arts and Creativity

A summary overview of results from the review will now be presented according to the corresponding art forms. In-depth details of included studies and health outcome findings can be found in the technical Appendices (IV-IX).

In order to demonstrate the level of impact of the evidence, a number of criteria were employed:⁷

- **+++ Strong** – is regarded as being high quality evidence - confidence that the evidence shows a positive impact in older adults.
- **++ Promising** – is regarded as being moderate quality evidence - encouraging confidence that there is a positive impact in older adults, but need to explore further.
- **+ Preliminary** – there is only a small indication of some impact in older adults, the evidence is limited, and need to explore much further.
- **Inconsistent** – is where evidence was mixed and inconclusive to show an impact in older adults.

7. This criterion was determined from the What Works Wellbeing guidance on evidence and is in accordance with GRADE and CERQual guidelines.

3.4.1 The Impact of Dance

Dance was the most common form of creative arts exposure and was reported in nearly half (47%; n=34) of studies in the review in total. Across the dance studies, the majority employed solely quantitative designs (n=28), this was followed by n=6 studies which used a mixed methods approach. No included studies solely used a qualitative study design.

- These studies involved 2533 participants over the age of 50 in total.
- These studies reported various types of dance choreography which participants engaged in, with Ballroom and Latin dancing being the most common form.
- The included studies examined dance interventions varying over different time durations, ranging from 4 weeks to 18 months, with 6 months being the most common intervention duration.
- Session duration times ranged from 45 to 120 mins, with 60 mins being the most common and the frequency of sessions occurred from 1 session per week to 3 sessions per week, with 2 sessions a week being the most frequent.

In summary, findings of the evidence review found that older adults who engage in dance benefit from improved physical health and functioning abilities and psychosocial wellbeing.

- There is some relatively **strong** evidence which suggests that participation in group dance on a regular basis can help enhance physical function such as balance and mobility (Cepeda et al., 2014; Rodrigues-Krause et al., 2018; Rodacki et al., 2017; Sofiandis et al., 2017; Kattenstroth et al., 2013; Pacheco et al., 2016; Garcia Gouvea et al., 2017; Bianco et al., 2014; Brustio et al., 2018; Britten et al., 2017; Shanahan et al., 2016; Serra et al., 2016; Skingley et al., 2016; Dewhurst et al., 2014), improve lower body physical strength and flexibility (Machacova et al., 2017; Rodrigues-Krause et al., 2018; Da Rocha et al., 2018; Pacheco et al., 2016; Wu et al., 2016; Skingley et al., 2016), can help increase aerobic capacity and endurance (Cepeda et al., 2014; Rodacki et al., 2017; Rehfeld et al., 2018; Shanahan et al., 2016; Pacheco et al., 2016; Dewhurst et al., 2014) and an increase in time spent in physical activity (Rodrigues-Krause et al., 2018; Merom, Mathieu et al., 2016; Britten et al., 2017).
- There is **promising** evidence that suggests dance is associated with improvements in body composition, such as reducing body weight (Stillman et al., 2018; Rodrigues-Krause et al., 2018; Wu et al., 2016) and can help improve lipid and inflammatory profiles (Rodrigues-Krause et al., 2018; Wu et al., 2016).
- There is **promising** evidence that dance, on a regular basis, can also help increase hippocampal volume (Rehfeld et al., 2017; Rehfeld et al., 2018), white matter integrity (Burzynska et al., 2017) and brain network performance (Zilidou et al., 2018).
- There is also **promising** evidence that dance, on a regular basis, can help improve cognitive function (Marquez et al., 2017; Kattenstroth et al., 2013) such as memory (Merom, Grunseit et al., 2016; Rehfeld et al., 2018, Marquez et al., 2017; Kosmat et al., 2017) and attention (Kattenstroth et al., 2013; Rehfeld et al., 2018).
- **Preliminary** evidence provides slight indications that dance can help improve independence in daily living activities (O'Toole et al., 2015) and everyday competencies (Kattenstroth et al., 2013; Bianco et al., 2014) but more evidence is required.
- There was limited evidence to suggest that dance could reduce the risk and rate of falls

but there was some **preliminary** evidence to suggest that dance can help to reduce the fear of falling in older adults (Britten et al., 2017; Wu et al., 2016).

- **Preliminary** evidence suggests that dance can improve social engagement (Brustio et al., 2018), and quality of life (Garcia Gouvea et al., 2017; Shanahan et al., 2016; Brustio et al., 2018; Skingley et al., 2016) and reduce depression, however the evidence across these outcomes is inconsistent, with studies showing a mix of both positive and null results.

In relation to older adults living with diagnosed health conditions or diseases:

- **Preliminary** evidence shows that dance can help improve mood, alleviate depression, and enhance cognition in older adults living with amnesic mild cognitive impairment, compared with a control group (Lazarou et al., 2017).
- **Preliminary** evidence also shows that Tango dance can reduce depression and improve self-esteem and satisfaction with life in older adults living with age-related macular degeneration, relative to a wait-list control group (Pinniger et al., 2013).
- Initial **Preliminary** evidence indicates that tailored dance could help improve balance, mobility, and gait (McNeely et al., 2015; Westheimer et al., 2015) in older adults living with Parkinson's disease, but the evidence is inconsistent and further research is required.

In summary, there is strong evidence that dance interventions significantly increased:

- Balance and mobility, lower body strength and flexibility, cardiorespiratory fitness and endurance.

There is promising evidence that dance:

- Reduced body weight, improved lipid and inflammatory profiles, and improved cognitive and brain function.

There are some slight indications that dance can:

- Improve independence in daily activities and reduce the fear of falling.

These findings suggest that dance is an effective intervention to help maintain balance and mobility, increase physical strength and flexibility, functional capacity, and endurance, reducing the risk of frailty and preventing functional decline, all of which are required for independence and support the ability to perform everyday tasks. There is also promising evidence that shows that dance is an effective intervention which can help promote brain health and cognition.

3.4.2 The Impact of Music and Singing

Music and singing were the second most common form of creative arts exposure and were reported in over one third of studies in the review in total (36%; n=26). Across the studies on music and singing, the majority (n=11) employed solely quantitative study designs, n=10 studies used a qualitative study design and n=5 studies employed a mixed methods approach. In total, the quantitative studies (incl. mixed methods) consisted of n=3 Randomised Control Trials, n=6 controlled pre-post designs, n=3 uncontrolled pre-post studies and n=2 cross-sectional studies and n=2 descriptive studies.

These studies involved 3950 participants over the age of 50 in total.

- There were differences in the types of music and singing interventions that participants were engaging in. Group singing, by way of a weekly group choir resulting in singing performances, was the most common intervention reported in over 22 studies, whilst 12 studies examined making music by learning and playing instruments or song-writing.
- The included studies examined music and singing programmes which varied over different time durations, ranging from 8 weeks to 4 years, with 12 weeks being the most common.
- Session duration times ranged from 60 to 150 mins, with 90mins being the most common. The frequency of sessions usually occurred once per week.

Findings from the evidence have shown that participation in group singing and music classes on a regular basis, have psychological, emotional, and social health and wellbeing benefits for older people.

- **Promising** evidence suggests that participation in group singing, or music classes on a regular basis, can help improve cognitive function (Fu et al., 2018; Sun et al., 2013; Seinfeld et al., 2013), quality of life (Coulton et al., 2015; Seinfeld et al., 2013; Johnson et al., 2013; Hallam et al., 2014, 2016), reduce depression (Coulton et al., 2015; Johnson et al., 2018; Seinfeld et al., 2013; Sun et al., 2013) and enhance mood (Johnson et al., 2018; Seinfeld et al., 2013), and can help preserve a sense of wellbeing (Creech et al., 2013; Perkins et al., 2014; Sun et al., 2013; Teater et al., 2014) in older adults.
- Some initial, **preliminary** evidence suggests an association between group singing and enhanced respiratory function (Fu et al., 2018).
- There is also some initial evidence to show that music and singing can help improve resilience and reduce loneliness (Johnson et al., 2018). However, at present, the results are inconsistent, and more evidence is needed in this area.
- **Strong** qualitative evidence also suggests that participation in group singing and music activities can help provide older adults with enhanced wellbeing, where participants felt that participation helped them gain a positive outlook, maintain autonomy, feel energised, feel happier and healthier, gain new skills and have a sense of purpose and belonging (Lee et al., 2016; Fu et al., 2018; Joseph et al., 2018; Southcott et al., 2018; Skingley et al., 2016; Baker et al., 2013). It helped them to develop positive relationships, providing opportunities to increase their social networks and connect with others which can help combat social isolation (Lee et al., 2016; Lamont et al., 2018; Skingley et al., 2016; Joseph et al., 2015; Joseph et al., 2018; Southcott et al., 2018; Baker et al., 2013).

In summary, participation in group singing and music classes on a regular basis has psychological, emotional, and social health and wellbeing benefits for older people. The evidence indicates that group singing can improve cognitive functioning, quality of life, reduce depression, increase mood, and preserve a sense of wellbeing in older adults. There is some evidence to show that music and singing can improve resilience and reduce loneliness, however, at present, the results are inconsistent, and more evidence is needed in this area.

High quality evidence from qualitative studies suggests that participation in music and singing activities provides older adults with a positive outlook, improved wellbeing, autonomy, new skills, and a sense of purpose and belonging. It indicates that music and

singing activities can provide opportunities to develop positive relationships and connect with others, increasing their social networks which can help combat social isolation.

3.4.3 The Impact of Visual and Creative Arts

Visual and creative arts were reported in 14% (n=10) of studies contained within in the review. Across the studies pertaining to visual and creative arts, (n=4) employed qualitative study designs, followed by n=3 quantitative study designs and n=3 mixed method designs. In total, the quantitative studies (incl. mixed methods) consisted of n=5 non-randomised studies (n=1 longitudinal study, n=4 uncontrolled pre-post studies) and n=1 descriptive study.

- These studies involved 738 participants over the age of 50 in total.
- These studies reported visual art making, or painting activities, and some studies included art viewing, or additional forms of art, alongside these activities.
- The included studies examined visual and creative arts programmes varying over different time durations, ranging from 8 weeks to a 3-year programme, with 12 weeks being the most common.
- Session duration times ranged from 60 to 120 mins and the frequency of sessions usually occurred once per week.

Participation in visual and creative art programmes on a regular basis may help to improve psychological and social wellbeing in older adults.

- **Preliminary** evidence suggests that visual and creative arts can help to reduce feelings of loneliness (Richmond-Cullen, 2018) and improve a sense of community and social connectedness, enhance perceived health status and ability to cope with pain experiences (Phinney et al., 2014) in older adults.
- **Strong** qualitative evidence suggests that participation in visual and creative art group programmes can help improve cognitive abilities, acquisition of new skills, enable creative engagement, help to gain a sense of autonomy, and promote a sense of enjoyment from the creation of their own work (MacLeod et al., 2016; Rose et al., 2016; Windle et al., 2018; Camic et al., 2014; Cantu et al., 2018). It can also help provide the opportunity to develop new relationships and social connections in healthy older adults and older adults living with dementia (MacLeod et al., 2016; Rose et al., 2016; Windle et al., 2018; Camic et al., 2014; Cantu et al., 2018).

With regards to older adults living with diagnosed health conditions or diseases:

- **Promising** evidence shows that visual and creative arts programmes, like creating watercolour paintings and art making, can help improve wellbeing in various domains such as interest, sustained attention, pleasure, self-esteem, decreased negative affect and sadness in older adults living with dementia (Gross et al., 2015; Windle et al., 2018).
- Some initial **preliminary** evidence suggests that visual and creative arts programmes can help improve daily living activities and quality life in older adults living with dementia (Camic et al., 2014; Windle et al., 2018).

In summary, participation in group visual and creative art classes such as art making, painting, drawing and mixed media, on a regular basis, helps to improve social wellbeing, with some preliminary evidence suggesting that it can reduce feelings of loneliness, increase a sense of community and social connectedness.

High quality, qualitative studies reveal that participation in visual and creative art activities can provide benefits to older people's mental and social wellbeing. It indicates that participation in arts and creativity classes can help provide focus on tasks, enable creative engagement, gain a sense of enjoyment and achievement, and provides the opportunity to develop new relationships and social connections.

3.4.4 The Impact of Drama and Theatre

Drama and theatre were reported in only 4% (n=3) of studies contained in the review. These studies consisted of one quantitative (uncontrolled pre-post design), one mixed methods design (pilot RCT and qualitative focus groups) and one qualitative study design.

- These studies involved 42 participants in total over the age of 50.
- The included studies examined drama and theatre programmes which varied over different time durations, with the majority ranging over a 6-week duration.
- Session duration times ranged from 90 to 120 mins and frequency of sessions occurred once per week.

Participation in drama and theatre classes on a regular basis has been reported to provide emotional wellbeing benefits for older adults.

- Initial, **preliminary** evidence shows that participation in drama and theatre classes on a regular basis can help provide emotional wellbeing benefits (Chung et al., 2018) enhance self-esteem and confidence (Moore et al., 2016) in older adults.
- **Preliminary** evidence from qualitative studies suggests that participation in drama and theatre can help older adults gain positive social relations and growth of relationships, emotions and improvement of mood, self-concept, a sense of belonging and learning new skills (Chung et al., 2018; Sextou and Smith, 2015).

In summary, participation in drama and theatre classes on a regular basis has been reported to provide emotional wellbeing benefits for older people. However, there was limited evidence to suggest that drama and theatre activities can improve cognition, quality of life or empathy, mood, anxiety, and depression. It is essential that these findings take into consideration that the evidence was limited and based on a small sample of three studies with very low sample sizes. Evidence from the qualitative findings suggest that participation in drama and theatre classes can improve emotional wellbeing, a sense of belonging and positive social relationships in older adults. However, the evidence on the impact of drama and theatre on health outcomes is limited and inconsistent and therefore, more research in this area is warranted.

Overall, the findings presented in this review provide evidence to suggest that arts and creativity interventions can help improve and maintain physical health, psychological, social, and emotional wellbeing. This supports the positive impact of arts and creativity interventions as a health promotion tool. The next section will further discuss the findings, the strengths and limitations of the review and provide considerations for research, policy, and practice.

Table V: Summary Overview - Impact of Arts and Creativity Activities on Physical Health and Wellbeing Outcomes

| Types of arts and creativity |  Dance |  Music & singing |  Visual arts |  Drama & Theatre |
|---|--|--|---|--|
| Improved balance & mobility | ★★★ | | | |
| Improved muscle strength & flexibility | ★★★ | ★ | | |
| Improved cardio-respiratory fitness & endurance | ★★★ | | | |
| Improved physical activity | ★★★ | | | |
| Improved body composition | ★★ | | | |
| Improved independent living | ★ | | ★ | |
| Reduced risk of falling | ★ | | | |
| Improved brain function | ★★ | | | |
| Improved quality of sleep | | | | |
| Improved respiratory function | | | ★ | |

★★★ Strong – confidence that the evidence shows a positive impact in older adults. ★★ Promising – moderate confidence that there is a positive impact in older adults, but need to explore further. ★ Preliminary – there is only a small indication of some impact in older adults, the evidence is limited, and need to explore much further. ★ Inconsistent evidence – the evidence was mixed and inconclusive to show an impact in older adults.

Table VI: Summary Overview - Impact of Art and Creativity Activities that Maintain or Improve Psychosocial Health and Wellbeing in Older Adults.

| Types of arts and creativity |  Dance |  Music & singing |  Visual arts |  Drama & Theatre |
|--|--|--|---|--|
| Improved sense of general well being | | ★★★ | ★★★ | ★ |
| Improved quality of life | ★ | ★★★ | ★ | |
| Improved self-esteem and self-efficacy | ★ | | | ★ |
| Improved life satisfaction | ★ | | | |
| Improved cognitive function | ★★★ | ★★★ | | |
| Reduced fear of falling | ★ | | | |
| Reduced depression, anxiety, stress | ★ | ★★★ | | |
| Reduced feelings of loneliness | | ★ | ★ | |
| Improved social connections | | ★★★ | ★ | |
| Improved sense of community | | | ★ | |

★★★ Strong – confidence that the evidence shows a positive impact in older adults. ★★ Promising – moderate confidence that there is a positive impact in older adults, but need to explore further. ★ Preliminary – there is only a small indication of some impact in older adults, the evidence is limited, and need to explore much further. ★ Inconsistent evidence – the evidence was mixed and inconclusive to show an impact in older adults.

4

Discussion



4. Discussion

This evidence review represents one of the first to examine how participation in arts and creativity programmes impact older adults across various health and wellbeing outcomes. It aimed to strengthen the current knowledge and understanding on the health impacts that participation in arts and creativity provide for older adults through a systematic, narrative synthesis of the current research evidence. Specifically, it sought to examine the evidence to assess whether certain arts and creativity-based activities differ in their effectiveness in supporting better health outcomes. It also identified whether the evidence in the field suggests ways to measure and assess programme benefits and designs, as well as whether the arts and creativity interventions for older adults provide a return on investment. The supporting evidence is discussed below.

4.1 Main Findings

Evidence from across 73 studies was examined. The review has ascertained that participation in group arts and creativity interventions can improve physical, psychological, and social health and wellbeing outcomes in older adults. There was consistent evidence that participation in group dance programmes on a regular basis can be effective in improving balance and postural control, functional mobility, body muscular strength and greater flexibility in older adults. The evidence also showed that regular group dance can be effective in improving aerobic capacity and endurance, as well as improving muscle architecture parameters in older adults, in comparison to those who do not participate in group dance. All of which can contribute to being more physically active, engaging in decreased sedentary time and reducing the risk of frailty and prevention of functional decline in older age (Britten et al., 2017; Cruz-Ferreira et al., 2015).

The review found that older adults engaged in group dance activities, ranging on average from 120-180 minutes per week at varying intensity levels. The World Health Organisation and the UK Chief Medical Officer's physical activity guidelines, at the time of which this review was undertaken, suggest that older adults aged 65+ years, should aim to accrue 150 mins of moderate intensity, aerobic, physical activity throughout the week or alternatively, undertake at least 75 minutes of vigorous intensity, aerobic, physical activity throughout the week, or equivalent combinations of these forms (Bull et al., 2020; CMO, 2019⁸). The findings suggest that older adults in these programmes are incorporating physical activity into their weekly routines which increases the likelihood of meeting the physical activity guidelines. This is particularly beneficial as Cunningham et al. (2020) report that being physically active can help reduce the risk of cardiovascular disease and all-cause mortality, support cancer prevention and improve functional status outcomes among many others. The findings point to the assertion that dance can help prevent being physically inactive in older age. This is important as being physically inactive can contribute to ill-health and can lead to poorer health outcomes such as physical limitations, depression, and memory loss (Gomes et al., 2017). There is some evidence within this review to show that dance can improve body composition and lipid profiles (e.g., cholesterol) as well as enhance daily living activities. The evidence from this review suggests that participation in group dance can provide greater physical health benefits, in a fun and engaging way, and can be an attractive and effective way of reducing the risk of frailty, physical inactivity and sedentary behaviours, encouraging more healthy and active lifestyles in older adults.

8. UK Chief Medical Officers' Physical Activity Guidelines (2019): https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/832868/uk-chief-medical-officers-physical-activity-guidelines.pdf

There was also evidence to show that dance on a regular basis can help improve cognitive aspects such as memory and attention and can help improve brain function such as hippocampal volume in the brain. These findings have important implications for improving brain health and cognitive reserve, and in preserving, or preventing, the degeneration of white matter integrity in the brain which can lead to age-related deterioration in cognitive function (Burzynska et al., 2017). Some studies have also shown that dance can improve life satisfaction, social networking, self-efficacy, and quality of life, however, the evidence across these outcomes is limited and inconsistent, with studies showing a mix of both positive and null results. Although the quantitative findings showed mixed findings regarding quality of life, the qualitative findings found consistent evidence from participants that dance provided higher levels of quality of life, increased confidence, enhanced mood, more social connections, and a greater sense of enjoyment.

The review found evidence to show that participation in group singing and music classes on a regular basis can help improve psychological health in terms of cognitive function, quality of life, reduce anxiety and depression and preserve a sense of wellbeing in older adults. The evidence showed that it can also provide opportunities to increase wellbeing in older adults and help to develop social networks which in turn, can help combat social isolation. These findings are supported by the qualitative evidence and are consistent with the Daykin et al. (2018) evidence review which shows how participation in community-based music and singing can strengthen and preserve wellbeing and stave off depression, isolation, and psychological ill health in older adults.

The findings from the review suggest that, similar to group singing and music classes, participation in the visual and creative arts is also beneficial and can help improve wellbeing. Some preliminary evidence suggests that it can support the development and maintenance of social connections and relationships, help to reduce feelings of loneliness, and help create a sense of community and social connectedness. Qualitative evidence also supports these findings and further suggests that participation in visual and creative art group programmes can help improve cognitive abilities, acquisition of new skills, provide a sense of autonomy and feelings of enjoyment. Newman et al. (2020) suggest that there is real value in maintaining social connections for older adults' mental health. In a longitudinal analysis study, Santini et al. (2020) found that 'social disconnectedness' (i.e., small social networks - fewer social interactions) in older adults can predict the severity of depression and anxiety symptoms and vice versa. They also found that greater, self-perceived, social isolation (perceived low social support) in older adults facilitates the association between social disconnectedness and psychological symptoms.

Participation in drama and theatre group classes on a regular basis has been reported to provide emotional wellbeing benefits for older people. However, there was limited evidence to suggest that drama and theatre can improve cognition, quality of life or empathy, enhance mood and decrease anxiety and depression. It is essential to take into consideration that the evidence on drama and theatre was based on a small sample of three studies with very low sample sizes. The qualitative findings highlight the themes and health and wellbeing benefits identified. They suggest that participation in drama and theatre classes can help older adults gain positive social relations and the growth of relationships, emotions and improvement of mood, self-concept, a sense of belonging and learning new skills. However, the evidence examining the impact of drama and theatre on health outcomes is very limited and inconsistent. Again, more research in this area is warranted.

As there were a greater number of dance studies evidenced within this review compared with other art forms, no conclusions can be derived about which of the arts and creativity interventions are the most effective interventions for improving health and wellbeing outcomes in older adults. Further research across different forms of arts and creativity interventions such as music and singing, visual arts, theatre and drama and expressive writing are required to get a full picture of the most effective interventions for improving health in older adults.

Return on Investment

The literature pertaining to whether arts and creativity programmes provided a return on investment within the included studies was limited, with only two studies reporting on economic outcomes. For example, Coulton et al. (2015) assessed the economic outcomes of implementation and the training of staff in carrying out a group singing programme over a 12-month period. The results found that the singing intervention was found to be slightly more cost-effective than conventional activity. In addition, Johnson et al. (2017) measured health care utilization and costs for the groups over a 6-month period from pre intervention to post intervention. At baseline, the total costs were similar for the two groups, with a total cost of \$1,317 in respect to the intervention group, this was in comparison to \$1,300 for the control group. Over the 6-month duration, the health care costs for the intervention group doubled, whereas the health care costs for the control group almost tripled. However, these differences were not statistically significant.

Therefore, as the evidence was limited, a wider, more focused review of the evidence on economic evaluations of arts and creativity interventions is required. Assessing a return on investment would help to quantify the wider direct and indirect benefits of participation in arts and creativity interventions, not only on the individual, but for artists, organisations, health services and wider society. This requirement further supports the recommendations outlined in the World Health Organisation's scoping report on the role of arts and health (Fancourt and Finn, 2019) which identified the need for more cost-effectiveness analysis studies of arts interventions. Given the role of economic assessments to support policy and decision-making regarding investments for future funding and commissioning of arts and health services, the IPH has been working on a separate evidence review in this area (Creeley and O'Neill, 2021) and intends to develop a related guidance toolkit.

4.2 Strengths and Limitations

This review has several strengths in that it used a systematic, structured approach to identify and map out the current evidence of the effects of arts and creativity on older people's health and wellbeing across different art forms and health outcomes. It provided a balanced appraisal of the evidence and triangulated studies from both quantitative and qualitative methodologies. It also identified a number of gaps and considerations for future work.

However, the strength of the existing evidence should also be considered alongside the context of its limitations. Firstly, the search was limited to studies published in the English language and within a five-year year period, between 01 January 2013, to 31 December 2018, due to resource constraints. Secondly, the review was charged with addressing the health effects in older adults as a result of taking part in arts and creativity interventions. Apart from a small number of studies, most of the evidence was undertaken with healthy, older adults, as studies which identified older adults living with health conditions tended

to be underpinned by art therapy. Furthermore, it would appear that most studies have a predominant number of female participants. With this group being over-represented, it is possible that it may, with some aspects, limit transferability to the health outcomes of males.

Thirdly, during the inclusion process, the terminology used to determine eligibility criteria for arts and creativity interventions was problematic. The terms 'therapeutic' and 'therapy' were interchangeable across different studies, making it difficult to differentiate between therapy for the amelioration and management of symptoms and therapeutic art activities in some cases. In addition, there was considerably more evidence identified for dance and music and singing studies than for creative and visual arts, theatre, and expressive writing. There was also limited evidence on the cost-effectiveness of programmes. Fourthly, meta-analysis comparisons were not performed, as the homogeneity between studies was limited, due to the differences across studies as they varied in types of art and creativity activities, duration, intensity, and frequency of programmes and follow up periods, as well as in study outcomes and measures implemented. Consequently, a narrative synthesis was provided.

Finally, in critically appraising the methodological quality of included studies, methodological strengths were evident. However, the sample sizes among many studies varied and whilst a number of studies reported tenable sample sizes of over 100 participants, there were also a number of studies with small sample sizes. There was also a wide variation in the types of study designs, ranging from qualitative, small cross-sectional or pilot studies, to larger RCTs. Consequently, the evidence within this review comes from studies ranging from low to high methodological quality design with varying inconsistencies. It is important to give due consideration when generalising findings from some studies with low sample sizes and low methodological quality. However, the larger, high-quality studies within the review provided a wider generalisability. In light of this, it is essential that some specific project findings are interpreted taking these caveats into account. This, however, does not affect the methodological quality of this systematic review nor the overarching findings; it simply highlights that more empirical research into the effectiveness of arts and creativity interventions for health is required.

4.3 Considerations for Research, Policy and Practice

Some considerations for further research have emerged from the evidence presented in this report. This review has demonstrated that participation in arts and creativity programmes can make significant contributions to improving the lives of older adults. However, research examining the impact of health as a result of arts and creativity interventions for older adults, is still emerging and is currently limited across many of the various art and creativity domains. This has many implications when attempting to demonstrate the strength of the available evidence across areas.

More research in a wider range of art areas is needed to develop further understanding of the evidence of health benefits for older adults, particularly when engaging in visual and creative arts, theatre, and expressive writing where there is a dearth of studies. In addition, more research is required to understand how participation in arts and creativity interventions for older adults living with health conditions can be better supported. Furthermore, it is also important to determine the cost effectiveness and return on investment for arts and creativity programmes as a whole.⁹

9. The IPH commissioned a review to examine the evidence on economic evaluation methodologies for arts and creativity interventions for older people.

The review identified that the methodological quality of the evidence varied across studies, however, the majority of studies were of moderate quality. This is an important consideration as identification of lower methodological quality studies can lead to a lack of trust in the results and effectiveness of the study, leaving the outcomes to remain unclear (Higgins et al., 2009). If we are to strengthen and expand the evidence base, more and better-quality evidence is required. Further research should take into account the methodological quality of studies by establishing research that is sufficiently designed, implemented, and reported on to ensure that the evidence can be used effectively to inform best practice (Chalmers et al., 2009).

Many studies have reported outcomes using qualitative data collection methods such as interviews and focus groups. This is beneficial to gain an understanding of the experiences of those attending arts and creativity programmes and to provide meaningful and insightful narratives of their experiences. However, more high quality, larger scale, robust, quantitative longitudinal and experimental research studies are required. We recommend that more high-quality evidence, examining the role of arts and creativity interventions, is required to track health outcomes in older adults and to a much greater degree and to increase scalability. It is clear that further large-scale studies, with more robust study designs such as 'gold standard' interventions and larger sample sizes (which can enable comparisons between the size of effect or cohort data) are required to evidence the cumulative impact of the arts. Further research could be enhanced through the use of more standardised and systematic assessments of programmes and the scale up of arts and creativity interventions. In addition, longitudinal studies would be beneficial in considering confounding factors regarding the barriers, or impediments, of participation in arts and creativity, for health and ageing, taking into account the life challenges faced and the impact on quality of life. These studies could explore the lasting effects of participation in arts and creativity interventions and the contributions they make to continued engagement and any positive impact.

Across the studies, a wide range of health outcome indicators were measured and assessed via a variety of data collection measures to collect evidence and demonstrate impact. However, these data collection tools were often inconsistent. This can impede overall consistent reporting and synthesis to determine effect and impact. Further work is required to develop wider knowledge and understanding of how to assess and evaluate arts and creativity interventions in order to better understand the impact. Standardisation of health outcome measures for dance, music, visual arts, and theatre research would help advance meta-analysis and establish consistent treatment effects. A forum for collaboration in this area would be beneficial as would the shared learning of research and evaluation techniques to determine a more collective and standardised approach.

In summary, these findings have important implications for further research in arts, creativity and health and they should be supported and strengthened, specifically with scaled up interventions in larger study populations. In addition, studies that determine the feasibility, acceptability and efficacy of potential arts and creativity interventions across the different art forms would be worthwhile.

Considerations for Policy and Practice

A number of considerations for policy and practice have emerged from the evidence presented in this report. These considerations are relevant to the overarching strategic

frameworks and policy documents in Northern Ireland, including, but not limited to: Making Life Better, The Mental Health Strategy, The Active Ageing Strategy and the forthcoming Strategy for Culture and Arts. The evidence from this review suggests that art and creativity interventions can have positive health impacts for older adults and population health. The overarching message is the importance of the recognition and promotion of the public health benefits of participation in the arts and creativity by older adults. This could be further strengthened through cross-sectoral and strategic partnerships in both arts and health.

Address barriers to participation in arts and creativity by older people.

Overall participation in the arts remains low in Northern Ireland with a third of all adults (33%) indicating that they had participated in an arts activity at least once within the previous year (2018/19). Women were more likely to have participated in an arts activity (35%) within the previous year than men (30%), (NISRA, 2020). This has also been the case throughout the last twelve years, with a higher proportion of women participating in the arts than men, year on year. Statistics indicate that participation in the arts decreases with age. This is especially true from 45-54 years onwards, with lower proportions indicating that they had participated in an arts activity within the previous year, and this has consistently been the case since 2007/08. Adults aged 65 years and over have predominantly been the least likely to have done so (NISRA, 2020). Furthermore, considerations should be given to address the barriers, both social and economic, to participation in arts and creativity interventions, improving availability and accessibility to the arts for healthy older adults and older adults living with health conditions is a priority. The evidence indicates that the benefits of participation in arts and creativity should be more widely promoted, raising public awareness to encourage more uptake and participation and recognise the health benefits. Also, there are clear societal benefits in increasing participation and addressing barriers in terms of social economic group, disability, age, and gender, specifically to encourage more male participation.

Implement a co-design approach with older adults and key stakeholders when designing and developing arts and creativity interventions.

Employing a co-designed approach can help ensure that user voices are heard and that they are encouraged to fully contribute to the design, implementation, evaluation, and advertising of programmes to ensure best uptake. This will help to create accessible and safe places where older adults can participate in arts and creativity interventions and provide opportunities to explore, create and gain a sense of achievement in their participation as well as a sense of empowerment.

It should also be noted that arts and creativity interventions are most likely to be effective when they match the needs, interests and requirements of the users within the context of the required outcomes. Although potentially more complex to implement, one must recognise that attitudes towards participation and engagement in arts and creativity interventions can be shaped by expectations, understanding of the benefits and individual preferences. Therefore, an assessment of needs, interests and requirements and identification of the appropriate programme (e.g., linking type, optimal intensity, frequency, and duration) is required.

Support the sustainability of arts and creativity interventions.

One of the challenges for arts and creativity interventions is the short-term nature of funding. This in turn means that programmes are often only implemented over short periods of time which has implications as gains can be lost for participants when the programme ends. This review found that when programmes only last for short periods of time, the capacity to assess their effectiveness and to determine the long-term impacts on those that participate within them is limited. The findings show that participants within such programmes have indicated that they feel frustrated and disappointed when the programmes have ended due to funding constraints. Interventions would benefit from more sustainable investments, over a longer period of time, to fully embed the programme and assess longer term outcomes.

Contribution of arts and creativity to health outcomes.

Arts organisations and those implementing arts and creativity interventions would benefit from considering health and wellbeing as a fundamental and overarching focus of their work, embedding structures and operational plans to contribute to successful health outcomes.

This review shows that participation in group arts and creativity interventions helps to support the physical, mental, and social aspects of ageing. In line with the public health agenda of 'Take 5'¹⁰, for example, the review showed that arts and creativity interventions can support older adults to socially connect with others and help provide opportunities for being active, such as through dance. Creative expression, painting and making art can help older adults to develop new skills. Overall, participation in arts and creativity can help to provide a sense of belonging, giving, and sharing of work and can provide a sense of community cohesion.

Training and support for the development and implementation of art and health interventions.

The development of cross-sectoral training in the arts and health should be supported to better advance the training of public health and social care professionals to improve their knowledge, understanding and skills in this area. This review highlighted that specific training and support are needed to equip those who are implementing arts and creativity programmes with the knowledge, skills, and capacity to utilise effective programme design, evaluation methods and data collection tools to inform and improve their services.

Evaluation framework and toolkit.

The review highlighted that evaluation is integral to arts and creativity programmes. To support those who wish to undertake an assessment of effectiveness, efficiency and economic evaluations of arts and creativity programmes, the development of an evaluation framework and an evaluation toolkit is required. This would help to facilitate more robust evidence to show effectiveness and the impact of the arts on health as well as provide the resources to ensure that arts and creativity programmes are incorporated in the commissioning of health and social care services.

10. Public Health Agency. Take 5 steps to wellbeing. Belfast; 2019. Available from: <https://www.publichealth.hscni.net/publications/take-5-steps-wellbeing-english-and-11-translations>

Cross-sectoral strategic partnership working should be supported.

In particular, consideration should be given to encourage more co-operation amongst sectors on priority outcomes for older people's wellbeing in order to collaborate, where appropriate, as they deliver services aimed at improving the well-being of older people. There are clear benefits in partnership working in these areas and mechanisms for collaboration could be strengthened between health and social care sectors and the wider voluntary and community sectors (e.g., such as co-financing arts and creativity interventions by sharing and pooling of resources). The evidence indicates that there is real value in bringing together innovators and experts to strengthen links and strategically enhance health and wellbeing through creative partnerships, nationally and internationally.

Cross-sectoral, strategic partnership in the area of arts and public health should be supported to encourage progression of good practice and promote collaboration to develop, support and influence policy development and programme delivery in order to strengthen the role of arts and creativity in public health. Consideration should be given to encourage more co-operation amongst sectors, to outline the priority outcomes for older people's wellbeing and co-operate, where appropriate, as they deliver services aimed at improving the well-being of older people.

Collaborative working between social and primary care.

Evidence shows the benefits in having access to arts and creativity interventions for older adults being supported by all local health and community agencies. Through the delivery of an integrated health and social care service collaborative approach within the community, arts and creativity interventions could be a good mechanism to help facilitate the provision of health and wellbeing benefits for older adults. Fancourt and Finn (2019) have argued that a social prescription model which incorporates primary care, such as through GP referrals, with community sector support, would be beneficial. For example, it could offer an effective mechanism to engage with traditionally, 'difficult to reach' groups who may be affected by poor health and social isolation by affording the option of alternative health care provision and reducing health inequities (Vogelapoel et al., 2014). This can help maximise engagement by taking into account health inequity barriers which older adults face in terms of participation.

A strategic policy framework setting the direction for participation and engagement in the arts, particularly for older adults.

A strategic policy framework, setting the direction for the promotion of participation and engagement in arts and creativity, with clear policy actions and outcomes on the role of the arts particularly for older adults, in a health and wellbeing context is required. This is important as it will help to provide detailed objectives, priorities and action plans to deliver arts and health outcomes and determine future investments, enabling more sustainability in the sector. This will also help to deliver outcomes for older people in being able to enjoy, and in being supported to access arts and creativity programmes, whilst promoting equality, tackling poverty and social exclusion. The promotion of arts and creativity should be a fundamental part of the public health policy in Northern Ireland (e.g., within mental wellbeing and physical health frameworks, action plans, initiatives, and campaigns). This would ensure that the arts are positively recognised as being integral to public health, healthcare provision and health prevention programmes.

Covid-19.

The effect of Covid-19 has had a huge impact on society, the arts sector, and particularly, on older adults. With many uncertainties in the wider policy and practice context, the challenges are significant. It is imperative that the importance of the role of arts and creativity in health prevention and promotion is not lost. The evidence within this review highlights the positive impact of arts and creativity on older adults' health and wellbeing. It is on this account that arts and creativity interventions for older adults could be an important vehicle within the recovery process, providing opportunities for participation, community connections and confidence.

It is essential that cognisance should be taken of the increasing evidence base on the importance of participation in arts and creativity interventions in improving the health and wellbeing of older adults. Effective arts and creativity interventions which promote and improve health and health behaviours, should be shared and promoted across practice for implementation, as well as to learn from and build on their efficacy.

“Participation in the arts has significant implications for the promotion of positive health, and for the prevention, or mitigation, of ill health in later life, for both the public health and arts and creativity agenda.”



5 Conclusion



5. Conclusion

This review examined the health and wellbeing outcomes for arts and creativity interventions for older adults.

Overall, dance interventions were the most commonly investigated intervention, with the largest number of studies being of a quantitative study design. This was followed by group singing and music as the second most common (this incorporated both quantitative and qualitative designs). Few studies examined the effects of participation in both visual arts and drama and theatre. The findings indicate that participation in arts and creativity can help enhance and maintain older adults' health and wellbeing. The evidence predominantly showed:

Key Findings

Dance:

There is strong evidence that participation in group dance on a regular basis can enhance balance and mobility, improve lower body physical strength and flexibility, improve functional capacity and endurance, reducing the risk of frailty and preventing functional decline, all of which are required for independence and support the ability to perform everyday tasks. There was also promising evidence that dance can reduce body weight, improves lipid and inflammatory profiles, as well as improving cognitive and brain function. There are some slight indications that dance can improve independence in daily activities and reduce the fear of falling.

Some initial evidence suggests that dance can improve mood, depression and cognition in older adults living with amnesic mild cognitive impairment and improve self-esteem and satisfaction with life in older adults living with age-related macular degeneration. There was also some initial evidence from two studies indicating that tailored dance can help improve balance, mobility, and gait, in older adults living with Parkinson's disease, but the evidence is inconsistent and further research is required.

Singing and music:

The evidence also shows promising evidence that participation in group singing and music classes on a regular basis can improve cognitive function, quality of life, reduce affective states and preserve a sense of wellbeing in older adults. There is some evidence to show that music and singing can improve resilience and reduce loneliness. However, at present, the results are inconsistent, and more evidence is needed in this area. Strong evidence from qualitative studies suggests that participation in music and singing activities provides older adults with enhanced wellbeing, the development of new skills, positive relationships and increasing social networks.

Visual and creative art:

Participation in group visual and creative art classes such as art making, painting, drawing and mixed media, on a regular basis, helps to improve social wellbeing. Some preliminary evidence suggests that it can reduce feelings of loneliness and increase a sense of community and social connectedness. Strong evidence from the qualitative studies

indicated that participation in visual and creative art activities can provide benefits to older people's mental and social wellbeing.

In relation to older adults living with diagnosed health conditions, promising evidence shows that visual and creative arts programmes, like creating watercolour paintings and art making, can improve wellbeing in older adults living with dementia. Some initial evidence suggests that visual and creative arts programmes improved daily living activities and the quality of life in older adults living with dementia.

Drama:

Participation in drama and theatre classes on a regular basis has been reported to provide emotional wellbeing benefits for older adults. However, the evidence on the impact of drama and theatre on health outcomes is limited and inconsistent and therefore, more research in this area is warranted.

Evidence

In determining whether certain art and creativity-based activities differ in effectiveness compared to others in supporting better health outcomes, the review found that the studies were very diverse and identified variations across the study interventions, making generalisation a challenge. As indicated, there were a greater number of dance studies evidenced within this review compared with other art forms, which means no definitive conclusions can be derived when comparing which of the arts and creativity interventions are the most effective in terms of improving health and wellbeing outcomes in older adults. Further research across different forms of arts and creativity interventions, such as visual arts, theatre and drama and expressive writing, are required for a full picture of the most effective interventions for improving health in older adults.

An objective of this review was to determine what the evidence in this field suggested as a way of collecting data to measure and assess programme benefits and design. The review found that across the studies, a wide range of health outcome indicators were measured and assessed via a variety of data collection measures to collect evidence and demonstrate impact. These outcome measures were presented previously within the report. However, these data collection tools were inconsistent. Further training and support are required to develop wider knowledge and understanding in how to assess and evaluate arts and creativity interventions to better understand their impact. Further research could be enhanced through the use of more standardised and systematic assessments of programmes, the scaling up of arts and creativity interventions and standardisation of health outcome measures for dance, music, visual arts, and theatre research.

A further objective of this review was to determine what the evidence shows in regard to funding of arts and creativity programmes for older adults and whether this provides a return on investment. The review found that the literature pertaining to returns on investment in art and creativity programmes within the included studies was limited, with only two studies reporting economic outcomes. A wider, more focused review of the evidence on economic evaluations of arts and creativity interventions is required to quantify the greater direct and indirect benefits of participation in arts and creativity interventions, not only for the individual, but for artists, organisations, health services and society. Subsequent to this evidence review, an additional, systematic review, examining economic evaluations of arts and creativity interventions for improving health and wellbeing in older adults has been utilised to investigate this area further (Creeley et al., 2021).

The overarching message from this review is that art and creativity interventions can have positive health impacts for older adults and population health. This systematic evidence review demonstrates the importance of arts and creativity and how it can contribute to the health of older adults. The evidence shows that participation in group arts and creativity interventions helps to support the physical, mental, and social aspects of ageing. Taken together, these findings support the importance of participation in the arts for older adults and have significant implications, especially for the promotion of positive health and for the prevention, or mitigation, of ill health in later life for both the public health and arts and creativity agenda.

“Art and creativity interventions can have positive health impacts for older adults and population health”



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7 Appendices



Appendix I: Search Strategy

MeSH Search Terms and Free Text Terms

| Population | Intervention | Outcomes |
|--------------|---|---------------|
| Old | Health | Art |
| Older Adults | Wellbeing | Creativity |
| Older People | (physical, mental, or social wellbeing) | Music |
| Seniors | Loneliness | Singing |
| Aged | Emotional | Writing |
| Elders | | Painting |
| Elderly | | Drama |
| Pensioners | | Story telling |
| Ageing | | Dance |
| Aging | | Sculpture |
| | | Performance |
| | | Poetry |
| | | Visual |

Example of Search Strategy (OVID: Medline)

exp Aging/ OR exp Aging/ OR ageing.mp. OR older people.mp. OR older adult*.mp. OR older person*.mp. OR senior*.mp. OR pensioner*.mp. OR elder*.

AND

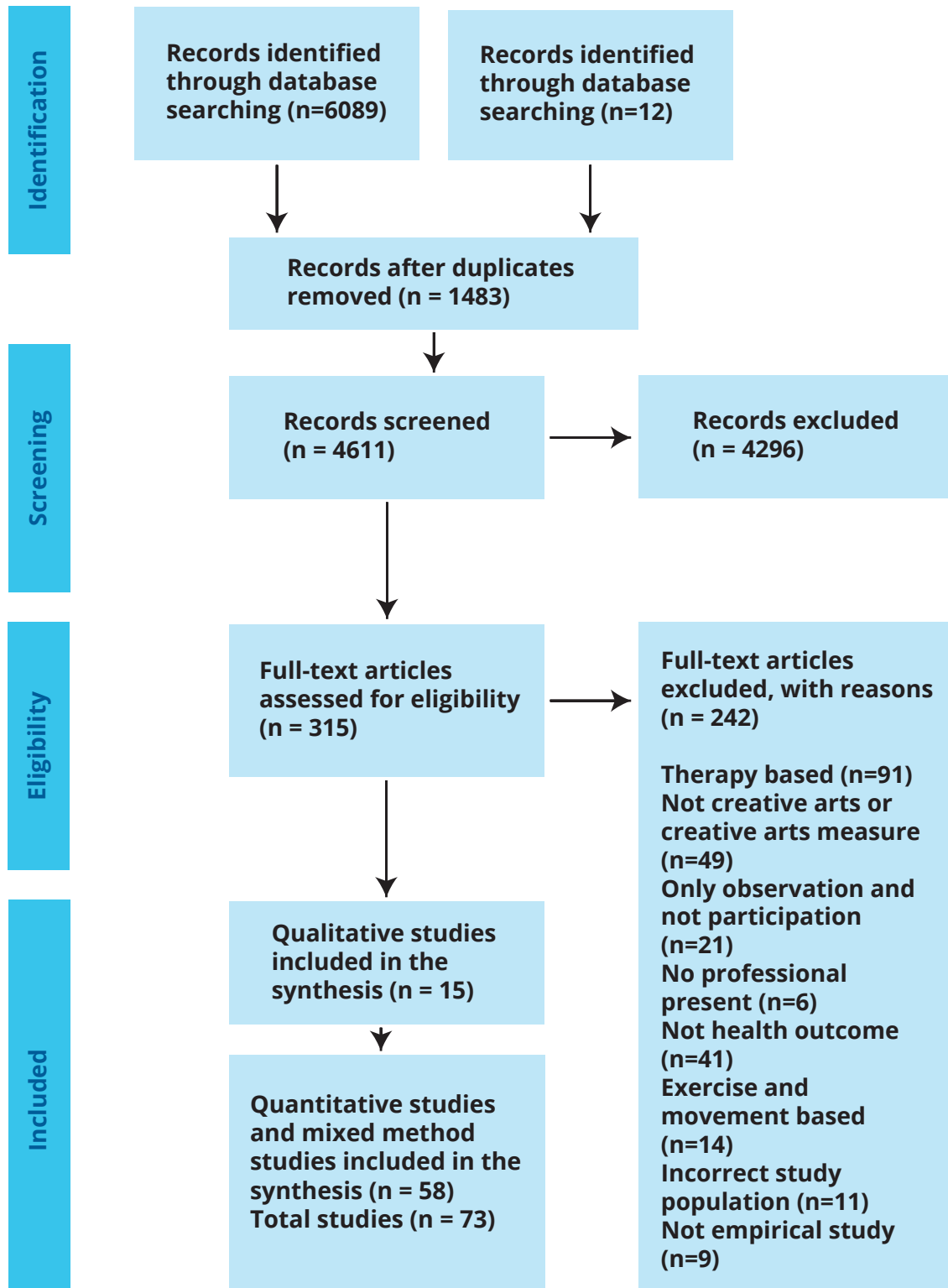
exp Well Being/ OR wellbeing.mp. OR health/ OR health promotion/ OR community health/ OR physical health.mp. OR exp Physical Health/ OR social health.mp. OR exp Mental Health/ OR psychological health.mp. OR exp "Quality of Life"/ OR loneliness.mp. OR exp Loneliness/ OR exp Anxiety/ OR anxiety.mp. OR self-esteem.mp. OR exp Self-Esteem/ OR life satisfaction.mp. OR exp Life Satisfaction/ OR happiness.mp. OR exp Happiness/ OR happy.mp. OR social wellbeing.mp. OR psychological wellbeing.mp. OR physical wellbeing.mp. OR emotional wellbeing.mp. OR mental wellbeing.mp.

AND

exp Art/ OR art.mp. OR exp Music/ OR music.mp. OR exp Arts/ OR creativ*.mp. OR singing.mp. OR exp Singing/ OR choir.mp. OR choral.mp. OR exp "Painting (Art)"/ or painting.mp. OR writing.mp. or exp Creative Writing/ OR exp Dance/ OR dancing.mp. OR storytelling.mp. OR exp Storytelling/ OR poetry.mp. drama.mp. OR exp Drama/ OR exp Sculpturing/ OR sculpture.mp. OR performance art.mp. OR theatre.mp. OR exp Theatre/

limit above to (human and English language and journal article and year="2013 - 2018")

Appendix II: Arts and creativity evidence: PRISMA diagram (Moher et al. 2009)



Appendix III: Quality Appraisal Criteria, MMAT (Hong et al., 2018)

Screening questions (for all types)

- Are there clear research questions?
- Do the collected data allow the research questions to be addressed?

Qualitative

- Is the qualitative approach appropriate to answer the research question?
- Are the qualitative data collection methods adequate to address the research question?
- Are the findings adequately derived from the data?
- Is the interpretation of results sufficiently substantiated by data?
- Is there coherence between qualitative data sources, collection, analysis, and interpretation?

Quantitative randomized controlled trials

- Is randomization appropriately performed?
- Are the groups comparable at baseline?
- Are there complete outcome data?
- Are outcome assessors blinded to the intervention provided?
- Did the participants adhere to the assigned intervention?

Quantitative non-randomized

- Are the participants representative of the target population?
- Are measurements appropriate regarding both the outcome and intervention (or exposure)?
- Are there complete outcome data?
- Are the confounders accounted for in the design and analysis?
- During the study period, is the intervention administered (or exposure occurred) as intended?

Quantitative descriptive

- Is the sampling strategy relevant to address the research question?
- Is the sample representative of the target population?
- Are the measurements appropriate?
- Is the risk of nonresponse bias low?
- Is the statistical analysis appropriate to answer the research question?

Mixed methods

- Is there an adequate rationale for using a mixed method design to address the research question?
- Are the different components of the study effectively integrated to answer the research question?
- Are the outputs of the integration of qualitative and quantitative components adequately interpreted?
- Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?
- Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?



Appendix IV: Summary Characteristics Table - Dance

| Author, year, country | Study design | Study participants | Arts intervention / exposure and duration | Health and wellbeing measures | Summary findings | MMAT Quality assessment |
|--|--|--|--|---|---|-------------------------|
| Bianco, Patti, Bellafiore, Battaglia, Sahin, Paoli, Cataldo, Mammina and Palma (2014). Italy. | Quantitative. Cross-sectional study (with a case-control design). | N=122 Age range=71-77 yrs. 80 females and 42 males. Dance intervention: n=75, with less than 3mths dance experience. Control group: n=47 normal population. | Ballroom Dance. Valzer, Polka and Mazurka classes. 2x sessions per week, 70mins. Across 3 sites. | Data collected at one time point. Measures: Berg Balance Scale; Barthel Index; and occurrence of previous falls and BMI. | The dance group performed better on the Balance Berg Scale and in activities of daily living on the Barthel Index, compared with the control group. | *** |

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|---|--|---|---|--|---|-------------|
| <p>Britten, Addington and Astill (2017)</p> <p>UK.</p> | <p>Mixed Methods.</p> <p>An uncontrolled 'pre-post' intervention design; and qualitative focus groups.</p> | <p>N=38</p> <p>Mean age = 77.3 ± 8.4 yrs. 37 females.</p> <p>Community dwelling adults attending, across 3 sites.</p> | <p>Contemporary dance.</p> <p>8 weeks.</p> <p>2x sessions per week, 90 mins.</p> | <p>Data collected:</p> <p>T1: Baseline (after 3 trial dance sessions</p> <p>T2: After 8 weeks of dance.</p> <p>Measures: International Physical Activity Questionnaire; Timed Up and Go; Falls Efficacy Scale-International; Geriatric Depression Scale.</p> | <p>Statistically significant improvements were observed with respect to depression and fall efficacy scores in dancers. A statistically significant decrease was also found in the time taken to complete the Timed Up and Go test. Moderate physical activity levels and vigorous physical activity significantly increased in dance group. Sitting time significantly decreased at weekdays. It also decreased during the weekends but was not significant.</p> | <p>***</p> |
| <p>Brustio, Liubicich, Chiabrero and Rabaglietti (2018)</p> <p>Italy.</p> | <p>Quantitative.</p> <p>Uncontrolled pre-post design.</p> | <p>N=163</p> <p>Mean age= 70 ± 4yrs. 123 females (75.5%) and 40 males (24.5%).</p> | <p>Ballroom dance.</p> <p>16 weeks.</p> <p>2x sessions per week, 60 mins. 32 classes.</p> | <p>Data collected:</p> <p>T1: Baseline</p> <p>T2: After 16 weeks of dance.</p> <p>Measures: Timed Up and Go Test and Dual Task condition; Four-</p> | <p>Post hoc analysis with Bonferroni adjustment showed an overall improvement in balance and mobility, with a statistically significant reduction in the time taken to complete the TUG, dual TUG and FSS tests, from pre to post testing. Statistically significant improvements between pre- and post-testing in quality of life (SF-12PC, SF-12 MC) and social engagement (LSNS-6) were observed.</p> | <p>****</p> |

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| | | | | Square Step Test; SF-12; 6-item Lubben Social Network Scale 6. | | |
| Burzynska, Jiao, Knecht, Fanning, Awick, Chen, Gothe, Voss, McAuley and Kramer (2017) USA. | Quantitative. RCT. | N=174 Mean age= 65.4 ± 4.46 yrs (60–79 yrs). 120 females (69%), 54 males. Dance: n=40, Walking: n=40, Walking + Nutrition: n=43 and Active Control group: n=43. | Social dance. Country dancing. 6 months. 3x sessions per week, 60 mins. Brisk walking; Walking and nutrition (daily supplement); Active control (strength, balance exercises etc). Randomised into one of four groups. | Data collected: T1: Baseline (one week before intervention) T2: After 6 months of dance. Measures: Diffusion Tensor Imaging; Virginia Cognitive Aging Battery. | Results observed a group by time interaction in changes in white matter integrity. White matter integrity in the fornix (FA region) increased in the dance group by 0.68×10^{-2} on average, while decreasing in the remaining three active groups over 6 months. | *** |

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| <p>Cepeda, Lodovico, Fowler and Rodacki (2014)</p> <p>Brazil.</p> | <p>Quantitative.</p> <p>RCT.</p> | <p>N=34</p> <p>100%, female.</p> <p>Dance group: n=19, mean age=69.1 ± 6.5yrs.</p> <p>Control group: n=15, mean age=71.5 ± 7.4yrs.</p> | <p>Ballroom dance.</p> <p>Country, Waltz, Bolero and Forró.</p> <p>8 weeks.</p> <p>3x sessions per week, 60mins.</p> <p>Control group: Maintained regular activities and refrained from unusual physical activities during the 8 weeks duration.</p> | <p>Data collected:</p> <p>T1: Baseline (one week before intervention)</p> <p>T2: After 8 weeks of dance.</p> <p>Measures: Self-reported daily activities; Six-min walk test; Tinetti Test; Timed Up-and-Go and Dual Task TUG;</p> <p>Ultrasound.</p> | <p>Pre-post comparisons showed that the dance group improved in all functional balance and mobility tests (Tinetti; TUG and dual TUG). Statistically significant improvements in performance were found in aerobic capacity and endurance (six-min walk test) in the dance group. After training, the dance group also showed greater thickness, pennation angle and fascicle length for vastus lateralis, tibialis anterior, biceps femoris, and gastrocnemius medialis muscles.</p> <p>Mean attendance at training sessions was 91.3%.</p> | <p>****</p> |
| <p>Da Rocha, Melo, Marques, Macon, Francisco, Pontes, Rica, Evangelista, Bocalini and</p> | <p>Quantitative.</p> <p>Cross-sectional study.</p> | <p>N=41</p> <p>60yrs+, 100% female.</p> | <p>Ballroom and Circular dance.</p> <p>Participated for at least 12 months in</p> | <p>Data collected:</p> <p>T1: 12 months after programme</p> | <p>The Ballroom and Circular dance groups displayed significant increases in their lower limb resistance muscular strength (chair stand test) and cardiorespiratory endurance capacity (6-min walk test), compared with a control group. However, no differences were found on anthropometric and body composition parameters between groups. However, no differences between groups were found on arm</p> | <p>***</p> |

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| <p>Pontes Junior (2018)</p> <p>Brazil.</p> | | <p>Ballroom dance: n=15, Circular dance: n=16, Control group: n=10.</p> | <p>a dance programme.</p> <p>3x sessions per week, 60 mins.</p> <p>Control group: did not dance or perform any type of physical activity.</p> | <p>Measures: Height (m); Body mass (kg); Skin folds; Chair Stand Test; Arm Curl Test; 8ft Up and Go Test; Sit and Reach; Back Scratch Test; 6-minute walk.</p> | <p>curl repetitions, sit and reach, back scratch, and agility tests.</p> | |
| <p>Dewhurst, Nelson, Dougall and Bampouras (2014)</p> <p>UK.</p> | <p>Quantitative.</p> <p>Cross-sectional study.</p> | <p>N=60</p> <p>Female=100%. Dancers: n=26, mean age= 67.6 ± 6 yrs.</p> <p>Physically active nondancers: n=34, mean age= 71.3 ± 6 yrs.</p> <p>Split into two subgroups: younger older adult group (60–70 yrs) and older</p> | <p>Scottish Country dance.</p> <p>Older dancers participated in dance for at least 10 years prior and dancers participating in on average 3x sessions per week.</p> <p>Comparator non dancer group: physically active non-dancers.</p> | <p>Data collected at one time point.</p> <p>Measures: Rapid Assessment of Physical Activity scale; BMI, Skinfold thickness; 6-min walk distance; 6-m walk time; 8-ft up-and-go time; lower body flexibility; and Romberg's test.</p> | <p>Older control group participants performed significantly poorer than their older Scottish dancing counterparts (70-80 years) on speed and agility performance on the 8-ft up and go test. Younger Scottish dancers and their age-matched control group participants performed comparably in speed and agility, with no significant differences observed. Thus, suggesting that dancing can help reduce deterioration in speed and agility over time. However, no significant differences had been observed in back and hamstring flexibility of the left and right side for any group comparators.</p> | <p>***</p> |

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| | | group (70–80 yrs). | | | | |
| Garcia Gouvea, Antunes, Bortolozzi and Marques Gomes Bertolini (2017) Brazil. | Quantitative. Pre-experimental study. Uncontrolled pre-post-test design. | N=20 Mean age= 78 yrs (60 and 89 yrs). Female= 65.0% (n=13) and Male= 35.0% (n=7). Regular visitors of two short-stay day centres. | Senior dance. 3 months. 3x sessions per week, 45mins. 40 classes. | Data collected: T1: Baseline before programme T2: After dance programme at 3 months. Measures: Berg Balance Scale; Timed Up and Go test; Beck Depression Inventory; The State-Trait Anxiety Inventory and WHOQOL-BREF questionnaire. | The results showed an increase in Berg Balance Scale scores and a reduction in the time taken to complete the Timed Up and Go test, indicating improvements in both balance and mobility. In the State-Trait Anxiety Inventory, a statistically significant decrease was observed in state anxiety from pre-to-post tests. Trait anxiety also showed a decrease however, this difference was not statistically significant. With regards to quality of life, the physical and environmental quality of life domains were significantly different across pre- and post-tests. However, no statistically significant differences in depression scores were reported over the 3 months. | *** |
| Kattenstroth, Kalisch, Holt, | Quantitative. | N=35 | Agilando dance. | Data collected: | After 6-months, among the dance group beneficial effects were found in posture (higher centre of pressure displacement in the anterior direction and in lateral displacement), reaction times, cognitive, tactile, hand/motor | ** |

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| <p>Tegenthoff and Dinse (2013)</p> <p>Germany.</p> | <p>Pre-post-test design.</p> | <p>Age range= 60–94 yrs.</p> <p>Dancers: n=25, mean age= 68.60 ± 1.45 yrs. 17 females.</p> <p>Non-dance control group: n =10, mean age=72.30 ± 1.84 yrs. 7 females.</p> | <p>24 weeks.</p> <p>1x session per week, 60 mins.</p> <p>Control group: maintained usual lifestyle.</p> <p>Random assignment.</p> | <p>T1: Baseline, before start of dance programme</p> <p>T2: After 6-months of programme.</p> <p>Measures: Alters-Konzentrations-Test; Nonverbal Geriatric Concentration Test; Frankfurt Attention Inventory; Repeatable Battery of Neuropsychological Status; Nonverbal Learning Test; Raven Standard Progressive Matrices; Everyday Competence Questionnaire.</p> | <p>performance, everyday lifestyle competency levels and subjective well-being. The control group showed no significant changes, or further degradation of performance. No significant differences in cardiorespiratory performance (VO₂peak) within both the dance and control groups at the 6-month follow-up</p> | |
|--|------------------------------|---|---|--|--|--|

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|---|--|---|---|---|---|-------|
| Kosmat and Vranic (2015) Croatia. | Quantitative. Pre-post-test design. | N=24 Mean age= 80.8 yrs. Dance group: n =12, mean age= 80.08 ± 6.1 yrs. 6 females. Control group: n =12, mean age= 79.08 ± 3.6 yrs. 9 females. | Ballroom dance. Slow Waltz. 10 weeks. 3x sessions per week, 45 mins. Control group: participated in an alternative non-dance programme. Participants were randomly assigned to two programs. | Data collected: T1: Before programme T2: Completion of programme at 10 weeks. T3: Follow-up at 5-months. Measures: Satisfaction with Life Scale; General Self-Efficacy Scale; Modified Auditory Verbal Learning Test; Wisconsin Card Sorting Test - 64. | At post-test, large effect sizes were observed for dancers on short-term auditory verbal memory (AVLT) and executive functioning (for all WCST scores - total number of errors, conceptual level responses, perseverative responses, and perseverative errors). Small effect sizes were found for AVLT score. No effect was found for dancers on satisfaction with life scores (SWLS) or self-efficacy scores (GSES). In contrast, the control group showed small to no benefits at the post-tests. | **** |
| Lazarou, Parastatidis, Tsolaki, Gkioka, Karakostas, Douka, and Tsolaki (2017) | Quantitative. Single-blind randomized | N=129 Mean age= 66.8 ± 10.1 yrs. Older | Ballroom dance. Tango, Waltz, Viennese Waltz, Fox trot, Rumba, Chachacha, Swing, Salsa, Merengue, Disco-Hustle and | Data collected: T1: Before programme | After 10 months of participation in the dance intervention, significant improvements in performance were found on global cognition (MMSE), verbal fluency tasks (FAS), memory (RBMT), visuospatial ability and executive function (TRAIL-B; ROCFT), learning and long-term memory (RAVLT), attention (TEa4), mood and depression (NPI, GDS; BDI). In comparison, no significant improvements were observed for | ***** |

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| Greece. | controlled trial. | <p>people living with aMCI diagnosis.</p> <p>Dance group: n=66, mean age= 65.89 + 10.7 yrs. 53 females.</p> <p>Control group: n=63, mean age= 67.92 + 9.4 yrs. 48 females.</p> | <p>Greek traditional Ballroom dancing.</p> <p>40 weeks.</p> <p>2x sessions per week, 60mins. 80 classes.</p> <p>Control group: did not participate in a dance programme.</p> <p>Random assignment into two groups.</p> | <p>T2: after 10 months.</p> <p>Measures: Mini Mental State Examination and Montreal Cognitive Assessment Test; Functional and Cognitive Assessment Test; Test of Everyday Attention; Rey Auditory Verbal Learning Test; Verbal Fluency Test; Rey Osterrieth Complex Figure Test; Rivermead Behavioral Memory Test; Global Deterioration Scale; Beck Depression Inventory; Hamilton Scale for Depression; Perceived Stress Scale; TRAIL-B; Neuropsychiatric Inventory.</p> | <p>control group participants, with performance notably poorer in cognition, memory, learning and attention tasks.</p> | |
| Machacova, Vankova, Volicer, Veleta and Holmerova (2017) | Quantitative. | N=189 | Ballroom dance. | <p>Data collection:</p> <p>T1: Before start of programme</p> | <p>Results found statistically significant improvements in lower body strength ability (chair stand test) and lower body flexibility (chair sit-and-reach test) for dancers at a 3-month follow-up. The dance group demonstrated some improvements in mobility and aerobic endurance, but these were not</p> | **** |

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| Czech Republic. | Multi-centre randomized controlled trial. | Mean age= 83 yrs. 91% female. (Sub-sample = 82 yrs., 88% female). Residents of seven nursing homes. | Foxtrot, waltz, cha-cha-cha, cancan, etc. 3 months. 1x session per week, 60mins. Control group: Participated in usual activities of the nursing home. Random assignment into two groups. | T2: after 3 months. Measures: Get-up-and-go test, Barthel Index, Lawton Instrumental Activities of Daily Living Scale; Senior Fitness Tests (SFTs). | significant. In comparison, a statistically significant decline was observed in the control group performance in the in get-up and-go test, instrumental activities of daily living, and in four of the senior fitness tests. This suggests that dance intervention is effective in helping to maintain mobility, aerobic endurance, and daily living, thus preventing further deterioration. | |
| Marquez, Bustamante, Eduardo, Aguinaga and Hernandez (2015) USA. | Mixed methods. Pre-post, pilot intervention and focus groups. | N=12 Focus groups. N=12, mean age= 75.08 yrs. 6 | Latin dance. BAILAMOS programme with Merengue, Cha Cha Cha, Bachata, and Salsa. | Data collection: T1: before start of programme T2: After 3 months. | Self-reported PA significantly increased, but daily accelerometer-assessed PA decreased for moderate-intensity PA. Participants reported significantly greater enjoyment of PA and improved physical quality of life. Improvements in mobility and aspects of cognition were demonstrated, however these were not significant. | *** |

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| | | <p>females and 6 males.</p> <p>Pilot, N=9, mean age= 65.2 ± 5.3 yrs.</p> <p>88.9% female.</p> <p>Self-reported mobility limitation and who were inactive.</p> | <p>3 months.</p> <p>2x sessions per week, 60 mins.</p> <p>Single group.</p> | <p>Measures: Dance logs, BMI; Physical Activity Self-Efficacy Scale; Modified Physical Activity Enjoyment Scale; CHAMPS Physical Activity Questionnaire</p> <p>for Older Adults; Short Physical Performance Battery; 400-meter walk; East Boston Memory Test; Stroop Neuropsychological Screening Test; Numbers Comparison Test; Verbal fluency; Abbreviated Late Life Function and Disability Instrument.</p> | <p>In focus group discussions, participants said they accrued more physical health benefits in comparison to other types of physical activity. Dancing improved their ability to move around, improved thinking, felt challenged, they gained a sense of satisfaction and increased self-esteem. Participants identified prior barriers before the dance programme such as personal safety, lack of availability, limited affordability, and access.</p> <p>69% retention rate.</p> <p>85% attendance.</p> | |
| <p>Marquez, Wilson, Aguiñaga, Vásquez, Fogg, Yang, Wilbur, Hughes and</p> | <p>Quantitative.</p> <p>A two-group pilot randomized</p> | <p>N=57</p> | <p>Latin dance. BAILAMOS programme with Merengue, Cha</p> | <p>Data collected:</p> | <p>Results revealed a group by time interaction for episodic memory, where the dance group showed greater improvement in episodic memory than the health education group. A main effect for time for global cognition was observed, with improvements found in both</p> | <p>***</p> |

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| Spanbauer (2017) | controlled trial. | Age range 55–80 yrs. Mostly female. | Cha Cha, Bachata, and Salsa) | T1: Prior to intervention | the dance and health education groups over 4 months. | |
| USA. | | | 4 months. 2x sessions per week, 60mins. 32 classes. | T2: After 4 months. | 66% in dance attendance. | |
| | | | Control group: Health education programme. Classes met 1x per week for 2hrs. 16 classes. | Measures: BMI; Blood pressure monitor; Trail Making Test (Parts A & B); Stroop Neuropsychological Screening Test (Color and Color-Word) Short Form; Word fluency test; Symbol Digit Modalities Test; Digit Span test; Digit Ordering Test, Logical Memory I and II. | 62% in health education attendance. | |
| | | | Randomised into either dance or control group using computer software. | | | |
| McNeely, Mai, Duncan and Earhart (2015) | Quantitative. | N=16 | Dance for PD (D4PD) | Data collected: | Measures of balance, repeated sit-to-stand performance and endurance improved from pre to post similarly in both the D4PD and Tango dance groups. Motor sign severity and functional mobility improved in the Tango group and worsened in the D4PD group. Gait velocity or health-related quality of life were not affected by either dance intervention. | *** |
| USA. | Pre-post intervention. | N=8 participants living with Parkinson's disease. Mean age=68.25 ± 10.90 yrs. 4 | 12 weeks. | T1: 1 month prior to intervention | | |

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| | | <p>females and 4 males.</p> <p>Matched to participants attending a tango dance programme, who were not living with Parkinson's disease (N=8). Mean age=67.66 ± 8.62 yrs. 4 females and 4 males.</p> | <p>2x sessions per week, 60mins.</p> <p>Comparator: Tango dance group.</p> | <p>T2: After 12-weeks of dance intervention</p> <p>Measures: Mini-BESTest; Four-Square Step Test; Five times Sit to Stand Test; 6-min Walk Test; Parkinson's Disease Questionnaire-39; Movement Disorders Society Unified Parkinson's Disease Rating Scale; Timed Up and Go Test and Dual Task TUG; GAITRite instrumented walkway system.</p> | | |
| <p>Merom, Grunseit, Eramudugolla, Jefferis, McNeill and Anstey (2016)</p> <p>Australia.</p> | <p>Quantitative.</p> <p>Two-arm randomized controlled trial.</p> | <p>N=115</p> <p>Community-dwelling older adults (mean age=69.5 ± 6.4 yrs.)</p> | <p>Collection of dances.</p> <p>Ballroom dances, Rock and Roll, Foxtrot, Waltz, and some Latin (Salsa and Rumba)</p> | <p>Data collected:</p> <p>T1: Baseline physical testing</p> <p>T2: 3 weeks later for second baseline of cognitive testing</p> | <p>A random effects model, adjusted for baseline score and covariates (age, education, estimated verbal intelligence, and community), showed a between-group effect in favour of dance was noted only for memory, BVST total learning and delayed recall. No significant between-group effects were found for social networking.</p> | <p>***</p> |

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| | | <p>Dance group: (n =60, 73.3% female.</p> <p>Walking group: (n = 55, 80% female.</p> | <p>8 months.</p> <p>2x sessions per week, 60mins. 69 sessions.</p> <p>Control group: biweekly group-based walking in local community.</p> <p>Random allocation to either the dance or walking group via computer software.</p> | <p>T4: Follow-up after 8-months dance intervention.</p> <p>Measures: Trail Making Tests; Stroop Color-Word Test; Digit Span Backwards Test; Rey Auditory Verbal Learning Test; Brief Visuospatial Memory Test; Lubben's Social Network Scale.</p> | | |
| <p>Merom, Mathieu, Cerin, Morton, Simpson, Rissel, Anstey, Sherrington, Lord and Cumming (2016)</p> <p>Australia.</p> | <p>Quantitative.</p> <p>A parallel two-arm cluster randomized controlled trial.</p> | <p>N= 530</p> <p>Mean age= 78 yrs.</p> <p>85% female.</p> | <p>Folk or ballroom dance.</p> <p>12 months.</p> <p>2x sessions per week, 60mins. 80 classes.</p> | <p>Data collected:</p> <p>T1: Before intervention</p> <p>T2: 12 months</p> <p>Measures: No. of falls during 12-months; Trail Making Tests</p> | <p>Results suggest that Ballroom dancers saw greater gains in physical activity, compared to the control group. The results also indicate that social dancing did not reduce the number of falls; nor did it improve a variety of fall-related risk factors (e.g., lower leg strength, cognitive processing speed, or task shifting), apart from a small apparent improvement in gait speed, particularly among ballroom participants.</p> | <p>*****</p> |

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| | | <p>Dance group: n=279, 231 females.</p> <p>Control group: n=251, 217 females.</p> <p>From across 23 self-care retirement villages.</p> | <p>Control group: continued with regular activities.</p> <p>Randomisation using a computer-generated randomisation method.</p> | <p>Parts A&B; Physiological Performance Assessment; Short Physical Performance Battery; Gait speed; Health-related quality of life Short-Form 12 Survey.</p> | <p>The findings also suggest that older adults who had multiple falls in the previous year to the study and who were recipients of the dance intervention seemed to fall more often than their counterparts in the comparison group.</p> <p>Mean attendance at dance classes was 51%.</p> | |
| <p>Neimann, Godde and Voelcker-Rehage (2016)</p> <p>Germany.</p> | <p>Quantitative.</p> <p>Cross-sectional study.</p> | <p>N=57</p> <p>Mean age= 72.92 ± 4.50 yrs (65–81 yrs). 100% female.</p> <p>Senior dance group (n=29) (Mean experience = 13.38 yrs).</p> | <p>Senior dance</p> <p>Dancers were current members of a Senior Dance who were active for at least 5 yrs. Attending around 2x sessions per week, 60mins.</p> <p>Comparator group: No dancing experience, a non-sedentary group.</p> | <p>Data collected:</p> <p>T1 and T2: motor and cognitive tests</p> <p>T3: Brain scans conducted.</p> <p>Measures: Spiroergometry; Cardiovascular Fitness Test with Bicycle Ergometer; Electrocardiography; Foot Tapping Test; Foot Up and Go Test;</p> | <p>No differences were observed in cognitive domains such as executive control, perceptual speed, episodic memory, and long-term memory. There were also no differences found in gray matter brain volume such as VBM whole-brain analysis, and region-of-interest analysis of the hippocampus.</p> | <p>****</p> |

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| | | Non sedentary control group (n=28) | | Agility Test; 30s Chair Stand Test; The Stick-Fall Test; Backwards Beam Walk Test; One-Leg Stand (eyes open and closed); Auditory Verbal Learning and Memory Test; Modified Flanker Task; Visual Search Task; MRI scanner. | | |
| O'Toole, Ryder, Connor, Yurick, Hegarty & Connolly (2015) Ireland. | Mixed methods. (convergent parallel design) Pre-post intervention. Focus groups explored participants perceptions of the programme. | N=62 Aged over 70 (n=25, 41.7%), 91.9% female (n=57). Follow-up (n=32) | Contemporary dance. 6 weeks. 1x session per week. Across 2 sites (1x dance theatre and 1x community hall). | Data collected: T1: Baseline T2: follow-up Measures: The Frenchay Activities Index; Falls Efficacy Scale-International; and EQ-5D-3L and EQ-VAS. | Significant differences were found post programme in frequency of activity participation, and in frequency of domestic activities. No significant differences were found in falls efficacy or quality of life. Focus group discussions highlighted that participants enjoyed the programme and perceived they gained enhanced physical abilities, emotional and psychological well-being, and increased activity participation as a result of programme participation. | ** |

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| <p>Pacheco, Hoyos, Watt, Lema and Arango (2016)</p> <p>Columbia.</p> | <p>Quantitative.</p> <p>Pre-post intervention.</p> | <p>N=27</p> <p>Age range: 60-76yrs. 100% female.</p> <p>Dance group: n=15, mean age= 64 yrs.</p> <p>Control group: n=12, mean age= 63 yrs.</p> | <p>Caribbean Columbian dance.</p> <p>12 weeks.</p> <p>3x session per week, 60 mins. 36 sessions.</p> <p>Control group: No participation in dance activities.</p> | <p>Data collected:</p> <p>T1: Baseline</p> <p>T2: After 12-weeks intervention</p> <p>Measures: Senior Fitness Test Battery; the Nottingham Health Profile.</p> | <p>The dance intervention group showed statistically significant positive improvements in some components of physical fitness such as cardiorespiratory fitness, upper and lower body flexibility, agility, and dynamic balance. However, no significant changes were observed in health-related quality of life indicators for either group.</p> | <p>****</p> |
| <p>Pinniger, Brown, Thorsteinsson and McKinley (2013)</p> <p>Australia.</p> | <p>Mixed methods.</p> <p>RCT feasibility study and interviews.</p> | <p>N=17</p> <p>Tango dance (n= 8) or Wait-list control (n= 9).</p> <p>Mean age= 79.4 yrs. 100% female.</p> <p>Older adults living with age-</p> | <p>Tango dance.</p> <p>4 weeks.</p> <p>2x sessions per week, 90mins.</p> <p>Control group: wait-list control group who were offered future free</p> | <p>Data collected:</p> <p>T1: Baseline</p> <p>T2: 4 weeks at end session</p> <p>Measures: Geriatric Depression Scale; Global perceptions of Wellbeing; Satisfaction with Life</p> | <p>There was a statistically significant group effect, where the tango dance group showed a greater reduction in depression and increased self-esteem and satisfaction with life, in comparison with the control group.</p> <p>Interviews indicated that most participants stated that the main benefits of participation in dance were improvements in balance and enjoyment. Most participants reported that they liked the challenge and satisfaction of achievement best. Several participants made positive comments about the dance team and music.</p> | <p>****</p> |

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| | | related macular degeneration. | tango sessions post programme. Random allocation. | scale; Rosenberg Self-Esteem Scale. | | |
| Rehfeld, Muller, Aye, Schmicker, Dordevic, Kaufmann, Hokelmann, and Muller (2017) Germany. | Quantitative. Pre-post intervention. | N= 26 Mean age = 67.9 ± 3.3 yrs. (63–80 yrs.) Dance group: n=14, 67.21 ± 3.78 yrs., 7 females) Fitness group: n=12, 68.67 ± 2.57 yrs., 5 females. | Ballroom, Latin, square, jazz and folk dance. Chassée, mambo, cha cha cha, grapevine, jazz square). 18 months. (6 months - 2x sessions per week, 90 mins. >6 months – 1x session per week, 90 mins for 12 months) Active sports fitness control group: endurance, | Data collected: T1: Pre intervention T2: 6 months T3: After 18 months intervention Measures: Sensory Organization Test; Magnetic Resonance Images (3T, MP-RAGE). | Both dancing and fitness training led to hippocampal volume increases mainly in the left hippocampal subfields. The dancers showed additional increases in the left dentate gyrus and the right subiculum. Only dancers achieved a significant increase in in the right hippocampus. Dancing achieved significant increases in the balance composite score and improved use of all 3 sensory systems. | ** |

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| | | | <p>strength, and flexibility training.</p> <p>Randomly assigned to the experimental dance group or the control sport group.</p> | | | |
| <p>Rehfeld, Luders, Hokelmann, Lessmann, Kaufmann, Brigadski, Muller, Notger and Muller (2018)</p> <p>Germany.</p> | <p>Quantitative.</p> <p>Pre-post intervention.</p> | <p>N=52 seniors</p> <p>Aged 63–80 yrs.</p> <p>n=25 males; n=27 females.</p> | <p>Line, Jazz, Rock ‘n’ roll, Latin-American and Square dance.</p> <p>6 months.</p> <p>2x sessions per week, 90 mins.</p> <p>Control group: sport exercises e.g., cycling.</p> <p>Randomly allocated into two groups.</p> | <p>Data collected:</p> <p>T1: Baseline pre intervention</p> <p>T2: 6 months</p> <p>Measures: MRI;</p> <p>Sandwich ELISA System; TAP Test; Trail Making Tests; Verbal Word fluency; Wechsler-Memory Scale; Verbal Learning and Memory Task; Rey-Osterrieth-Complex-Figure Test;</p> | <p>Both the dance and sports interventions significantly increased their aerobic fitness, with similar levels reported. Noticeable differences were seen in the effects on brain volumes: Dancing in comparison to standard fitness activity, led to larger volume increases in more brain areas, including the cingulate cortex, insula, corpus callosum and sensorimotor cortex. Only dancing was associated with an increase in plasma BDNF levels. In relation to cognition, both the dance and sports groups improved in attention and spatial memory.</p> | <p>***</p> |

| | | | | Physical Working Capacity 130 Test. | | |
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| Rodacki, Cepeda, Lodovico and Ugrinowitsch (2017) Brazil. | Quantitative. Pre-post intervention. | N= 38 Females were assigned into 2 groups: Ballroom dancing group: n=19, mean age=69.1 ± 6.6 yrs. Control group: n=19, mean age=71.5 ± 7.5 yrs. | Ballroom and Brazilian dance. 8 weeks. 3x sessions per week, 60mins. Control group: maintained regular activities. Random allocation. | Data collected: T1: Baseline T2: After 8-weeks intervention Measures: Static and Dynamic balance assessment; Functional assessments: -6-minute walk, Tinetti test and Time Up and Go tests. | Improvements were found in the dance group, where a significant reduction in several factors of the static balance test were observed. Significant group by training effect interactions were found in the stance and tandem positions. The dynamic balance test also showed improvements in the dance group, in which significant group by training effect interactions were found for performance on the step start, preparation phase, and total time of step, but not for the balance phase. The dance group demonstrated improved functional status and significant group by training interactions were observed as the control group showed no changes, pre-post intervention in any of the variables. | **** |
| Rodrigues-Krause, Bouffleur Farinha, Ronzales Ramis, Cauduro Oliveira Macedo, Pinto Boeno, Cristina dos Santos, Vargas Jr, Lopez, Grazioli, Rocha | Quantitative. Three-arm RCT, parallel design, open label. | N= 30 Sedentary females: mean age= 65 ± 5 yrs. | Latin dance. 8 weeks. 3x sessions per week, 60mins. | Data collected: T1: Baseline T2: After 8 weeks intervention | Pre-post testing demonstrated that dancing generated increases in VO ₂ peak, lower body muscle power and static balance, comparable to walking, while the stretching group remained unaffected. Pooled effects also showed improvements in body composition, lipid, and inflammatory profiles, and daily levels of physical activity for all groups. | ***** |

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| <p>Costa, Silveira Pinto, Krause and Reischak-Oliveira (2018)</p> <p>Brazil.</p> | | <p>Dancing: n=10,</p> <p>Walking: n=10 or Stretching (active control): n=10.</p> | <p>Control group: (1) stretching classes 1x per week and (2) Walking training 3x per week.</p> <p>Randomised into three groups.</p> | <p>Measures: Ultrasound; Automated Analyzer; Treadmill; Spirometry System; Isokinetic Dynamometer; Countermovement Jump Test; Time to Up and Go Test; Chair Sit and Reach Test; Chair Raise Test; Short Form of the International Physical Activity Questionnaire.</p> | | |
| <p>Serra, Alonso, Peterson, Mochizuki, Greve and Garcez-Leme 2016</p> <p>Brazil.</p> | <p>Quantitative.</p> <p>Controlled cross-sectional study.</p> | <p>N= 110</p> <p>Average age= 67.4±5.9 yrs. 100% female.</p> | <p>Samba dance.</p> <p>Samba carnival parades in the “Wing of Baianas” (min participation in 2 carnivals).</p> <p>Training performed at least 5 months before the carnival, 2x sessions per week, 60mins.</p> | <p>Data collected: at one time point.</p> <p>Measures: Short Form of the International Physical Activity Questionnaire; Isokinetic Dynamometry for the knee extensors and flexors; Postural balance assessment completed via a mobile force platform.</p> | <p>Participation in the Samba dance is associated with better postural balance with closed eyes. The samba group showed less side to side and front to back displacement, larger amplitudes of side to side and front and back displacement, increase mean velocity and elliptical area. However, there were no differences between dancers and non-dancers for muscle strength.</p> | <p>****</p> |

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| | | | Control comparator: Age-matched older females who do not dance. | | | |
| Shanahan, Bhriain, Morris, Volpe and Clifford (2016) Ireland. | Quantitative. Observational, cross-sectional design with two groups. | N= 72 Regular set dancers (n=39, mean age=64 ± 8 yrs) and age-matched controls (n=33, mean age= 69±14.5 yrs) were recruited. | Irish Set dance. Regular participation in weekly or biweekly dance classes from 6 months previous. 1x session per week, 90 mins. Control group: did not attend dance classes during the previous 6 months. | Data collected: at one time point. Measures: Physical Activity Scale for the Elderly (PASE); Mini-BESTest; Senior Fitness Test; EuroQol EQ visual analogue scale. | When controlling for levels of physical activity, Irish Set dancers had significantly improved balance, functional capacity, and quality of life compared to the control group. No differences between the groups were observed in other measures of functional fitness. | ***** |
| Shanahan, Morris, Bhriain, Volpe, Lynch | Quantitative. | N= 90 | Irish Set dance. | Data collected: | No significant differences were observed between groups in performance scores on the MiniBEST, 6-minute walk test and health related | ***** |

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| and Clifford (2017) | Pilot multi-centre RCT. | Individuals with idiopathic Parkinson disease (PD). | 10 weeks. 1x session per week, 90 mins. Additional home dance for 20 mins, 3x per week. Control group: Continued with usual care & daily activities. Randomised into 2 groups. | T1: Baseline week before intervention T2: 11 weeks. Measures: Motor Section of the Unified Parkinson's Disease Rating Scale; Parkinson's Disease Questionnaire-39; 6-min Walk Test; Mini-BESTest. | quality of life for Irish Set dancers, over 12-weeks, compared with the control group. >40% attrition. 93.5% adherence. | |
| Ireland. | | | | | | |
| Skingley, De'Ath and Napleton (2016) | Mixed methods. | N=21 | Dance and arts programme. | Data collected: | Physical tests demonstrated improvements in posture, shoulder mobility and balance in both dance groups following the 3-month intervention, with some measures reaching statistical significance. Quality of life evaluations also showed improvement, with the psychological health subscale reaching statistical significance. | ** |
| UK. | Pre-post programme and qualitative written comments and interviews. | Mean age= 71.1 yrs (53-90 yrs). | 12 weeks. 120mins per week. Across 2x sites. | T1: Prior to dance programme T2: 12 weeks Measures: Postural assessment using video recordings and 2D analysis software; Shoulder mobility | Qualitative data showed that participants enjoyed the programme and experienced physical, psychological, and social benefits. They reported they gained enjoyment through meeting people, doing things in a group, | |

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| | | | | assessment; Adapted from the Berg Scale; Self-reported quality of life WHOQOL BREF. | engaged in specific activities and that it was fun. Recommendations for future arts interventions were given: to include consultation before, and throughout to empower, provide choice, and maximise full engagement. Suggestions also highlighted that commissioners should support arts for health projects for older people and to build in additional funding for further evaluative work. | |
| Sofianidis, Dimitriou and Hatzitaki (2017) Greece. | Quantitative. Pre-post intervention | N=32 26 females and 10 males. Dance: n= 12; 9 women, 3 men; mean age= 70.59 ± 5.78 yrs. Pilates: n=12; 8 females, 4 males; mean age 70.76 ± 5.42 yrs. Control: n= 12; 9 females, 3 males; | Latin dance. 12 weeks. 2x sessions per week, 60mins. 24 sessions. Pilates group and a Control group: No form of exercise during intervention period. Random assignment to one of three groups. | Data collected: T1: Baseline T2: After 12 weeks intervention Measures: A 3D force platform to measure centre of pressure displacement. Static balance in two tests ((1) two-leg tandem stance, with open and closed eyes; and (2) one legged stance with eyes open); Dynamic balance performance (a periodic postural sway (PS) task in the | Significant improvements were found in static and dynamic balance after 10-weeks for both Latin dance and Pilates groups. In particular, the dance group gained a significant reduction in angular displacement in the front and rear directions during the tandem stance with open and closed eyes, a decrease in the maximum centre of pressure displacements when performing the one leg stance in the front and rear and side-to-side directions, and improvements were observed in the mean magnitude of trunk sway during oscillation tasks as a result of the dance intervention. No significant differences were observed in the control group. | *** |

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| | | mean age= 70.37 ± 5.97 yrs. | | anteroposterior (A/P) direction. | | |
| Stillman, Donahue, Williams, Callas, Lwanga, Brown, Wollam, Jedrzewski, Kang and Erickson (2018) | Quantitative. Randomised pilot intervention. | N= 52 African American older adults with obesity (mean age = 68.4 ± 5.1 yrs.) | African dance. 6 months. 3x sessions per week, 60mins. Control group: cultural education. | Data collected: T1: Baseline physical and cognitive testing T2: Follow-up at 6 months, physical and cognitive testing. Measures: Treadmill, Pelstar Health-O-Meter, Stadiometer, Digital scale. | A significant group by time interaction for weight, with a small to moderate effect size was found suggesting that the African Dance group lost weight (mean=4.0 ± 6.0 lbs), compared with the Culture Education group who saw a small gain in weight, (mean=2.6 ± 3.9 lbs) over the course of the intervention. Results found no significant follow-up changes were observed for fitness after 6 months. On average, both the dance group and control groups' peak oxygen uptake improved, however these increases were not statistically significant. | *** |
| USA. | | | | | | |
| Westheimer, McRae, Henchcliffe, Fesharaki, Glazman, Ene and Bodis-Wollner (2015) | Mixed methods. Pre-post intervention. | N= 12 Mean age= 66.2 yrs. (55-82 yrs). 6 females and 6 males. Participants with idiopathic Parkinson's Disease. | Dance for PD. Tap, waltz, marching etc) 8 weeks. 75mins. | Data collected: T1: Baseline T2: After 8 weeks intervention. Measures: The Hoehn and Yahr, UPDRS | Results found significant improvements in gait and tremor scores after 8-weeks. However, no significant changes were found in depression scores or health-related quality of life scores from baseline to post-intervention in those participating in the Dance for PD intervention. However, the interviews highlighted that some participants reported benefits relating to their quality of life and wellbeing that were not reflected in quantitative changes. Participants | *** |
| USA. | | | | | | |

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| | | | 16 sessions. | (part III); The Berg Balance Scale; Beck Depression Inventory; PDQ-39 and individual interviews after the last class. | also reported physical, emotional, and social benefits. | |
| Wu, Tu, Hsu, and Tsao (2016) Taiwan. | Quantitative. Pre-post intervention. | N= 32 Age: 59 ± 4 yrs. 100% female participants. | Low impact dance. 16 weeks. 3x sessions per week, 60mins. Control group: Sedentary group. Random assignment into either a low impact dance group or control group. | Data collected: T1: Baseline T2: After 16 weeks intervention. Measures: Height and weight via Electronic Stadiometer; Fasting Blood Samples; The BMD of the lumbar spine - dual-energy X-ray absorptiometry (DXA); Goniometer; Modified Falls Efficacy Scale. | Significant improvements in joint range of motion of the lower extremities, from pre-to post intervention in the dance group. In comparison, significant interactions were not observed in the sedentary control group over time. Body fat percentage showed a significant reduction after participation in the low-impact dance group only. However, at the 16-week follow-up, the low-impact dance group and sedentary groups did not demonstrate significant differences in BMI or bone mass density. Results observed significantly lower Triglycerides and higher HDL cholesterol levels in the low-impact dance group, compared with the sedentary group over time. LDL cholesterol and blood glucose levels also significantly reduced, from baseline to post intervention. However, at the 16-week follow-up, no groups demonstrated any significant interactions for total cholesterol levels. In addition, the occurrence of falls did not differ significantly between the groups. However, a significant interaction was observed after 16-weeks where the low impact dance group showed significant | **** |

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| | | | | | improvements in falls efficacy scores compared to the sedentary group at the same period. | |
| Zilidou, Frantzidis, Romanopoulou, Paraskevopoulos, Douka, Bamidis (2018) Greece. | Quantitative. Pre-post intervention. | N= 44 Traditional dance training group: n=22, mean age 68.73 ± 4.73 yrs. Active control: n=22, mean age 66 ± 5.51 yrs. | Traditional Greek dance. 6 months. Control group: participation in cognitive educational videos. Random assignment. | Data collected: T1: 1-14 days prior to start of training. T2: After 6 months intervention. Measures: MMSE, Trail Making B Test; Geriatric Depression Scale; Fullerton Senior Fitness Test; The Berg Balance Scale; Tinetti Test; Stork Balance Stand Test; Electroencephalogram. | Results found a significant interaction between time and the dance intervention on small world property for 10,000 edges and 12,500 edges. In addition, a significant interaction was observed between time and dance intervention in the characteristic path for 15,000. The findings indicate that the dance training improved optimal network performance as estimated by the increases in small-world property. Further analysis showed that there were local network changes which created better information flow and functional re-organization of the network nodes. | *** |

Appendix V: Summary Characteristics Table - Music and Singing

| Author, year, country | Study design | Study participants | Arts intervention / exposure and duration | Health and wellbeing measures | Summary findings | Quality assessment |
|-----------------------------------|---|---|---|---|---|--------------------|
| Baker and Ballantyne (2013) | Qualitative. Focus groups. | N=8 Mean age= 80.5 yrs. 6 females and 2 males. Residents living in independent accommodation within a retirement village. | Song writing. Five song writing sessions followed by a performance. 3-week period. 90 mins sessions. | Inductive thematic analysis and deductive content analysis. | Themes: the pleasant life, the engaged life, the meaningful life. | **** |
| Bugos, Kochar and Maxfield (2016) | Quantitative. Pre-and post-assessments | N=17 Mean age was 71.24 ± 6.32 yrs (60-85 yrs.). 4 males and 13 females. Living | Piano training. Intense piano training sessions. | Data collected: T1: Pre training | Significantly enhanced musical self-efficacy post-training. No significant changes in general self-efficacy or cortisol levels found. | ** |

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| | | within the community. | 30 hours, 3 hours per day. | T2: Following a two-week control period. T3: Post training Measures: General Measure of Self Efficacy; Musical Performance Self-Efficacy Scale; Salivary cortisol samples. | | |
| Coulton, Clift, Skingley and Rodriguez (2015) | Quantitative. A pilot pragmatic individual randomised controlled trial | N=258 Mean age = 69.2 ± 7.14 yrs. 214 females (84%). Participants recruited across 4 centres. | Group singing. Silver Song Club model. 14 weeks. 90 mins. Randomly assigned to a singing group or a non-singing group comparator who | Data collected: T1: Pre intervention T2: At 3 months T3: Post intervention at 6 months. Measures: York-SF12; Hospital Anxiety and | At 3 months, significant differences were observed for the mental health components of quality of life, anxiety, and depression. At 6 months, significant differences were observed in mental health-related quality of life in favour of group singing. In addition, the intervention was found to be marginally more cost-effective than usual activities. | ***** |

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| | | | continued with normal activities. | Depression Scale; EQ-5D. | | |
| Creech, Hallam, Varvarigou, McQueen and Gaunt (2013) | Quantitative Pre-post quantitative questionnaires. | N=500 Age range=50-93 yrs. 81% female. N=398 musical intervention group. N=102, control group. Three community sites. | Instrument playing (using steel pans, guitars, ukulele, recorder, keyboard), singing, song writing. 9 months. Control group: participated in other activities e.g., language groups, book groups etc. | Data collected: T1: During second week of project T2: 9 months later Measures: 12-item CASP-12; Basic Psychological Needs Scale. | Comparisons of those engaged in music making with those participating in other activities revealed statistically significant differences on the three factors of purpose, autonomy and control, and social affirmation, with the music groups giving more positive responses. | *** |
| Davidson, McNamara, Rosenwax, Lange, Jenkins, Lewin (2014) | Mixed methods. Pre-post intervention assessments. | N=36 'Silver Chain' home care residents, living independently (mean age=79 | Singing. 8 weeks. | Data collected: T1: Pre intervention | Standard outcome measures indicated that the programme had little effect on health and well-being. However, study-specific measures indicated that many participants had positive gains. Those in the home care group required more assistance to attend and continue in the program than those in the general community. Participants reported that the community-based singing | *** |

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| | Qualitative semi-structured interviews post intervention. | yrs., 94% female) Community residents (mean age=76 yrs., 58% female). | 1 session per week, 90mins. Led by an experienced community musician at a local community centre. | T2: Post intervention at 8 weeks. Measures: UCLA Loneliness Scale Version 3; Geriatric Depression Scale; Medical Outcomes Study Short-Form; Health Survey Version 2. | facilitator was essential to the program's success. | |
| Ellis (2018) Australia. | Mixed methods. Initial descriptive survey and follow up survey. | N=21 Retirees mostly aged 65 and over. 12 females and 9 males. | Ukulele classes. Ukulele group formed by members of the local branch of the University of the Third Age (U3A). Single group. | Data collected: T1: At start of participation in classes. T2: 6 weeks later Measures: Diener et al.'s Flourishing Scale and physical ability questions. | Descriptive results reported generally fairly positive feelings about themselves, however there was little evidential change reported at follow-up as participants scored highly at the outset. Qualitative focus groups reported participants had shown a willingness to learn, differentiate particular sounds, recognise chord changes, and improve singing. Increased dexterity and flexibility, enjoyment, being part of a group, sharing ideas and support of others were also noted. | ** |
| Fu, Lin, Belza and Unite (2015) | Qualitative. | N=34 | Choral singing. | Analysis of themes. | The themes and subthemes of the perceived health benefits related to group-singing among all the participants (both residents and staff) including brain health | *** |

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| USA. | Four focus groups with residents and one focus group with staff. | Mean age= 88 ± 9 yrs. N=28 residents of an independent senior living community; and N=6 staff. | Participants and staff sharing experiences of a group singing programme. 30-60 mins session preferred. | | (reminiscences, memories and promoting cognition), psychosocial health (food for mental illness, social interactions), and lung health. | |
| Fu, Belza, Nguyen, Logsdon and Demorest (2018). USA. | Quantitative. Pre-post-test quasi-experimental design. | N=49 Mean age= 83.6 ± 6.3 yrs. 79.6% female. Residents of 3 senior living communities. | Choral singing. 12-week programme. 75 mins per week. Single group. | Data collected: T1: Pre intervention T2: Post intervention at 12 weeks. Measures: Trail making test (A & B forms); 10-word recall test; Verbal Fluency Test; Spirometer; Respiratory Pressure meter; Oximeters; CASP-19. | Significant improvements in phonological and animal semantic verbal fluency tests, immediate word recall test, maximum inspiratory and expiratory pressure, and in-session oxygen saturation were observed at follow-up. No significant changes were found for QoL, delayed word recall, psychomotor speed, and executive function. In a descriptive analysis of an end of programme survey, participants gained high levels of enjoyment, learned diaphragmatic breathing techniques, felt healthier and happier as a result of participating in the programme. | **** |

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| <p>Hallam, Creech, Varvarigou, McQueen and Gaunt (2014) (a)</p> <p>UK.</p> | <p>Quantitative</p> <p>Pre-post-test design.</p> | <p>N=398</p> <p>Age range=50-93 yrs (Third Age (50-75) and the Fourth Age (over 75)). 81% female.</p> | <p>Music making and singing.</p> <p>Three sites: Silver Programme at the Sage, Gateshead. The Connect Programme of the Guildhall School of Music and Drama, and the Westminster Adult Education Service dept.</p> <p>Control groups (N=102) attending language, book groups etc.</p> | <p>Data collected:</p> <p>T1: Baseline</p> <p>T2: After 9 months participation in programme.</p> <p>Measures: The CASP-12 and the Basic Needs Satisfaction Scale.</p> | <p>Comparisons between those participating in the music groups and those participating in other activities revealed statistically significant differences on all 3 factors (purpose, autonomy and control and social affirmation) with the music groups giving more positive responses. There was also no deterioration in responses in the music groups between those in the third and fourth ages as might have been expected except in relation to purpose.</p> | <p>***</p> |
| <p>Hallam and Creech (2016) (b).</p> <p>UK.</p> | <p>Mixed methods.</p> <p>Quantitative: pre-post-test design. Qualitative: interviews, focus groups, and video observations of</p> | <p>N=398</p> <p>Age range=50-93 yrs (Third Age (50-75) and the Fourth Age</p> | <p>Music making and singing.</p> <p>Musical activities including singing in small and large groups, rock groups and</p> | <p>Data collected:</p> <p>T1: Baseline</p> | <p>Higher scores on the quality-of-life measures found consistently among the music participants, compared with the control group, ongoing benefits into the 4th age. Themes: cognitive benefits; Health benefits; Emotional benefits and opportunities for creativity.</p> | <p>***</p> |

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| Same study participants as Hallam et al. 2014 above. | music sessions and performances. | (over 75)). 81% female. | classes for guitar, ukulele, steel pans, percussion, recorder, music appreciation and keyboard). Three sites: (As detailed above, in Hallam and Creech, 2016a). | T2: After 9 months participation in programme. Measures: CASP-12 measure of quality of life and the Basic Psychological Needs Scale. | | |
| Johnson, Louhivuori, Stewart, Tolvanen, Ross, Era (2013). Finland. | Quantitative. Cross-sectional study. | N=117 Mean age= 71 yrs. 64% male. Recruited from 8 community choirs. | Community choir singing. Members of a choir and reported singing in a choir for an average of 33 yrs. | Data collected: at one time point. Measures: WHOQOL-Bref, 15-item Geriatric Depression Scale, Questionnaire on the Self-perceived benefits of choral singing measure. | Significant relationship between the benefits of choral singing and quality of Life in three domains - psychological, social relationships and environment but not physical. The older choral singers in the study also reported few symptoms of depression and high overall QOL and satisfaction with health. | *** |
| Johnson, Louhivuori, Siljander | Quantitative. | N=416 N=109 choir singers, Mean age = 71.3 yrs.). | Community choral singing. Choral singing members from six | Data collected: | After controlling for sociodemographic variables, the older choir singers reported significantly higher ratings on physical QOL, | ***** |

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| (2017) Finland. | Case-control, cross-sectional design. | Matched with a sample of older adults from the general population (N=307) from the HYPA dataset. Mean age = 68.8 yrs. 60–93 yrs. | choirs that were dedicated to older adults and two additional choirs that included older singers). | At one time point. Measures: WHOQOL-Bref domains (psychological and physical) | but not psychological QOL, compared to matched controls. | |
| Johnson, Stewart, Acree, Napoles, Flatt, Max and Gregorich (2018). Finland. | Quantitative. Multisite, cluster-randomized trial. | N=352 Mean age= 71.3 yrs. 76% female. N=208, randomised into an intervention group, N=178 at 6month follow up. N=182 randomised into a control group, N=170 at | Community choral singing. Community of Voices Choir intervention or 6 month wait-list group. 1 year. | Data collected: T1: baseline, prior to intervention T2: 6 months Measures: The Trail Making Test; NIH Toolbox Flanker Inhibitory Control and Attention Test; Rey Auditory Verbal Learning Test; Short Physical Performance Battery; NIH Toolbox Balance Accelerometry | Reduced feelings of loneliness and increased interest in life. Cognitive, and physical outcomes (depressive symptoms, anxiety, and positive affect), however did not change differentially. Although the control group had nearly a 50% larger increase in health care costs than the intervention group, the difference was not statistically significant. | **** |

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| | | 6month follow up. Conducted at 12 senior centres. | Weekly sessions, 90 mins. 44 sessions. Random assignment to receive intervention or wait-list control group. | Measure; 8-item Patient Health Questionnaire; 6-items from Medical Outcomes Study Social Support Survey. | | |
| Joseph and Southcott (2015) | Qualitative. Interviews. Case study of a group of choral programmes. | N=5 Members of the Choir of the U3A Hawthorn, Melbourne. | Choral singing. | Interpretative Phenomenological Analysis (IPA). | Two themes: Music engagement and Social connections. | **** |
| Joseph and Southcott (2018) | Qualitative. | N=22 Age range=50-83 yrs. | Community choral singing. Weekly rehearsal sessions and two | Interpretative Phenomenological Analysis (IPA). | Three overarching themes: Social connection, A sense of well-being, and Musical engagement. | **** |

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| | <p>Focus groups and semi-structured interviews.</p> <p>Five phenomenological case studies of a group of choral programmes.</p> | <p>The Choir of the U3A Hawthorn, Melbourne.</p> | <p>performances per year.</p> | | | |
| <p>Lamont, Murray, Hale, Wright-Bevans (2018)</p> | <p>Qualitative.</p> <p>Interviews, focus groups, observations, and a World Café participatory discussion.</p> | <p>N=42</p> <p>Phase 1: N=11 participants, age range=55-82 yrs. n=9 females, 2 males.</p> <p>Phase 2: N=31 participants, age range=58-78 yrs. n=28 females, 3 males.</p> | <p>Choral singing.</p> <p>4-year choir programme.</p> <p>Weekly.</p> | <p>Thematic analysis.</p> | <p>Five main themes: Personal investment and reward; inclusive community; always evolving yet fundamentally unchanged; a desire to connect; and leadership and organisation.</p> | <p>*****</p> |

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| <p>Lee, Davidson, Jane, and Krause (2016)</p> | <p>Qualitative.</p> <p>Four focus groups.</p> | <p>N=64</p> <p>Group A: N=7, aged 55–81 yrs. and a music facilitator.</p> <p>Group B: N=26 and a music facilitator</p> <p>Group C: n=50+, age range= 68-95 yrs.</p> <p>From three community singing groups.</p> | <p>Community choral singing.</p> <p>Group A regularly visits nursing homes to sing for people who have dementia.</p> <p>Group B comprised of people experiencing Alzheimer’s disease or dementia and their supporters, including family members, friends, and professional carers.</p> | <p>Thematic analysis.</p> | <p>Themes: Importance of singing in my life; enormous pleasure of singing with little pressure; challenge and achievement; spiritual and uplifting emotions; strength in overcoming age, disease, and hardship; good leadership; fellowship with other and purpose and meaning of singing.</p> | <p>*****</p> |
| <p>Perkins and Williamon (2014).</p> <p>UK.</p> | <p>Mixed methods.</p> <p>Pre-and post-assessments and semi-structured interviews.</p> | <p>N=98</p> <p>Study 1: Mean age = 67.87 ± 8.76 yrs.</p> | <p>Music making.</p> <p>‘Rhythm for Life’ project (group instrumental lessons or creative</p> | <p>Data collected:</p> <p>T1: Prior to intervention</p> | <p>A significant association was observed between time and group on two of the health promoting domains, namely physical activity, and spiritual growth for those learning music. Themes: Subjective wellbeing enhanced through subjective experiences of pleasure; enhanced social interactions; musically nuanced engagement in day-to-day life; fulfilment of musical ambition; ability to</p> | <p>***</p> |

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| | | N=74 females and 22 males. | music making workshops). | T2: Post intervention at 10 weeks. | make music; and self-satisfaction through musical progress. | |
| | | Study 2: (sub-group of n=21) Mean age = 64.38 yrs. (50-74 yrs.), 17 females and 4 males. | 10 weeks. Weekly sessions, 60-90 mins. Comparisons group: Self-managed learning opportunities. | Measures: Short Warwick-Edinburgh Mental Well-being Scale; Health-Promoting Lifestyle Profile II. Interpretative Phenomenological Analysis (IPA). | | |
| Seinfeld, Figueroa, Ortiz-Gil and Sanchez-Vives (2013). Spain. | Quantitative. Pre-and post-test design. | N=29 Age range= 60-84 yrs. N=13 in experimental piano group (Mean age= 69.30 ± 2.03 yrs., n=9, | Group piano training. 4 months. Weekly, 90 mins. Additional homework - practiced independently at least 45 min per | Data collected: T1: 2 weeks prior to start of intervention. T2: up to 2 weeks after a 4-month Intervention. | Significant improvements in divided attention, inhibitory control, and executive function scores, were observed in the piano training group. A positive trend was observed on performance of visual scanning scores, in comparison with the control group; however, this was not significant. Piano training also improved both psychological and physical quality of life, depression, fatigue, and positive mood. | *** |

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| | | <p>females and 4 males).</p> <p>N=16 control group (Mean age= 69.56 ± 1.43 yrs., n=13 females and 3 males).</p> | <p>day at least 5 days per week (~4 h per week).</p> <p>Control group: participated in different active leisure activities.</p> | <p>Measures: MMSE; The Adult Reading Test; Finger Tapping Test; Grooved Pegboard; Block Design; Digits Span Test; Spatial Span Test; Trail Making Test A&B; Symbol Digit Modalities Test; Stroop Test; Formal Lexical Task, Beck Depression Inventory; Profile of Mood States; The WHOQOL-BREF.</p> | | |
| Skingley, Martin and Clift (2016) | <p>Qualitative.</p> <p>A smaller component of an RCT study.</p> | <p>N=131</p> <p>N=19 semi-structured interview</p> <p>Mean age= 67.3 yrs. (58-91 yrs). 84% female.</p> | <p>Community singing.</p> <p>14-week programme.</p> | <p>Content and thematic analysis. Participants invited to write comments on their experiences.</p> | <p>The singing groups led to specific, incremental benefits to physical, psychological, social, and community well-being. Benefits tended to tail off after the program ended. Suggestions were made for the future running of such groups.</p> | ***** |

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| Soderman and Westvall (2017) | Qualitative. Ethnographic. Semi-structured interviews in groups. | N=11 Members of a senior dance group (n=8, 70–80 yrs.) and a music group (n=3, 50–65 yrs.) | Community music, folkbildning and music making. | Field notes. | Three themed categories: Dance as the foundation; musical activities to promote health and well-being; and an arena for music making and creativity. | *** |
| Southcott and Joseph (2015) Australia. | Qualitative. Focus groups. | N=5 Age range= 60-80+ yrs. | Choral singing. Members of La Voce Della Luna, an Italian women's community choir based in Melbourne. | Documentary sources and by individual and focus group semi-structured interviews. Interpretative phenomenological analysis (IPA). | Two significant themes emerged: Social connection and combatting isolation; and New horizons: music-making and social justice. | **** |
| Southcott and Sicong (2018) China. | Qualitative. A phenomenological qualitative research approach. | N=15 Age range=54-84 yrs. N=8 females and 5 males. N=2 teachers | Singing lessons. Members of a weekly singing group, attending for 2hrs per session. | Interpretative Phenomenological Analysis (IPA). | Five broad themes were identified from the data: Emotional wellbeing, Physical wellbeing, Mental wellbeing and "learning new things", Musical preferences, and Sharing music. | **** |

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| <p>Sun, Zhang, Buys, Zhou, Shen and Yuan (2013)</p> | <p>Quantitative.</p> <p>Case-controlled design. Part of larger prospective study.</p> | <p>N=750</p> <p>Average age= 61.9 ± 6.1 yrs (51-85 yrs.). N=603 (80.4%)</p> <p>females.</p> <p>Participating in a mind-body meditative approach (MBMA) programme.</p> | <p>Instrument playing, choral singing, and opera.</p> <p>15 months.</p> <p>2.5 hrs weekly.</p> <p>Random allocation into four MBMA groups or a control group: Music; Singing; Tai Chi; Dance and control group (Chinese literature, history, and Computing).</p> | <p>Data collected:</p> <p>T1: Prior to intervention</p> <p>T2: Post intervention at 15 months.</p> <p>Measures: A 44-item Health benefit measure; The Resilience Scale; The General Health Questionnaire.</p> | <p>Choral singing groups and Tai Chi showed greater significant increases in executive function, compared with a control group. Choral singing groups and music instrument groups showed significant differences in resilience and higher levels of health-related quality of life, when compared with the control group. The control group displayed larger incidence rates of depression (10%), compared with the music, singing and dance groups which displayed incidence rates of depression ranging from 2-7.5%.</p> | <p>***</p> |
| <p>Teater and Baldwin (2014).</p> | <p>Mixed methods.</p> <p>Quantitative questionnaires (descriptive) and individual interviews.</p> | <p>N=120</p> <p>Mean age= 74 yrs. N=99 females (82.5%) and 21 males (17.5%).</p> | <p>Singing.</p> <p>Members of 'Golden Oldies' singing community arts programme.</p> | <p>Data collection: one time point for survey and interview.</p> <p>Measures: 17-item questionnaire derived from three indexes: (i) Index of Arts as Self-Health Enhancers; (ii) Index</p> | <p>Quantitative descriptive analysis reported that 73.1 to 98.3% of participants agreed or strongly agreed that the singing programme contributed to their self-development, health, and sense of community. A statistically significant increase in self-reported health was observed over time, from pre-singing programme to time of questionnaire completion.</p> | <p>***</p> |

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| | | | Weekly sessions, 60 mins. | of Arts as Self-Developing Activities; and (iii) Index of Arts as Community Builders. Content analysis. | Sense of health, self-development, and social connectedness. 3 indexes: Index of Arts as Self-Health Enhancers; Index of Arts as Self-Developing Activities; and Index of Arts as Community Builders. | |
| Yap, Kwan, Tan, Ibrahim, and Bin Ang (2017). Singapore. | Quantitative. A pilot randomised controlled trial with cross over. | N=54 Mean age=74.65 ± 6.40 yrs. 94% female. N=27 participants recruited into each arm. | Music making. Rhythm centred music making with instruments e.g., Conga, Cowbell, Djembe, Ashiko Tan-tans, Dunun, Shakers, and Wood Blocks. 10-week sessions, 60mins. Random assignment using a computer | Data collected: T1: Prior to intervention T2: At 11 weeks participation in intervention T3: At 22 weeks. Measures: European Quality of Life-5 Dimensions; Geriatric Depression Scale; Pittsburgh Sleep Quality Index; Lubben Social Network Scale. | Participation in rhythm centred music making resulted in a non-significant reduction in EQ5D, GDS, PSQI score and an improvement in LSNS. In binary analysis, participation in music making resulted in a non-significant increase in odds of improvement in EQ5D, GDS, PSQI and LSNS scores, respectively. | ** |

random number generator.

Phase 1: group A, music making intervention, group B control.
Phase 2: group B music making intervention, group A control.

Appendix VI: Summary Characteristics Table - Visual Art

| Author, year, country | Study design | Study participants | Arts intervention / exposure and duration | Health and wellbeing measures | Summary findings | Quality assessment |
|---|---|--|---|--|--|--------------------|
| Camic, Tischler, Pearman and Chantal (2014) | Mixed methods. Pre-post design and interviews. | N=24 12 people living with dementia and their carers (n=12). Mean age= 78.3 yrs. (58-94 yrs.) | Art making and art gallery. 'Meet Me at MoMA' programme. (Paints, pastels, pencils, collage, modelling clay, printmaking etc) 8 weeks. Weekly, 120 mins. Across 2x art gallery sites. | Data collected: T1: Baseline T2: After 8 weeks programme Measures: The Dementia Quality of Life -4; Zarit Burden Interview; the Bristol Activities of Daily Living scale. | Results showed that statistically significant differences were found in daily activities and quality-of-life scores over time. Themes: Social impact, cognitive capabilities and art gallery setting. | **** |

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| Cantu and Fleuriet (2018) | Qualitative. Pre-post open ended survey and biographical narratives. | N=162 N=138, open ended survey N=162, biological narratives. | Art making 'GO!' community based art programme. (Painting, drawing, mixed media etc) 12 weeks. Weekly, 120mins session. | Data collected: T1: Baseline T2: After 12 weeks programme Measures: Open ended survey. | Themes: Cognitive challenge, cognitive focus, happiness as component of mental and social well-being due to creative engagement, robust sense of calmness during creative process. | **** |
| Gross, Danilova, Vandehey and Diekhoff (2013) | Quantitative. Pre-post intervention. Non-randomised study. Observation assessments. | N=76 Mean age= 84.28 ± 6.39 yrs.82.9% females and 17.1% males. Older adults living with dementia in 4 long term care facilities. | Painting in art class. The Alzheimer's Association's Memories in the Making® (MIM) art activity program. | Data collected: T1: Baseline T2: After 12 weeks programme | Interns reported significant improvements over time on the five wellbeing areas namely: interest, sustained attention, pleasure, self-esteem, and normalcy. In contrast, staff evaluations found no changes in wellbeing over the duration of the programme. | *** |

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| | | | 12 weeks. Weekly, 60 mins sessions. | Measures: 18-item Greater Cincinnati Chapter Well-Being Observation Tool©. | | |
| MacLeod, Skinner, Wilkinson and Reid (2016) | Qualitative. Participatory action research. Artistic creations, weekly logs, program leader field notes, and debriefing meeting minutes. | N=16 Age range= 55-95 yrs. N=8 female volunteers and 6 isolated older female adults and 2 males. 6 residing in long term care facilities. | Visible Voices program. 10 weeks. Weekly sessions. | Participatory approach, thematic and narrative-based analysis. Measures: Field notes, participant, and volunteer weekly written logs and two audio logs. | Five main themes: Appreciation of relationships between volunteer and participants, personal development, sense of meanings and fulfilment, aesthetic appreciation of created art pieces, and extension of thought beyond the programme. | ***** |
| Pearce and Lillyman (2015) | Quantitative. Evaluation questionnaire. Descriptive study. | N=71 N=52 participants and 19 staff. | Art making. (Painting, drawing, pencils and water-soluble fibre tip pens, artist books, quilting, etc.) 6-10 weeks. | Data collected: T1: after participation in arts programme. Measures: Standard evaluation questionnaire with closed and open questions. | Evaluations reported increased levels of self-worth and self-esteem in participants in the art projects, as well as reporting having made new friends, while having the opportunity to try out new activities. | ** |

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| | | | Across 4 creative art projects. | | | |
| Phinney, Moody and Small (2014) | Mixed methods. Pre-post study and 5 focus groups. | N=51 Age range= 55-90 yrs. Over 80% female. | Art making. (Production of a collective art piece, visual and textile media) 3-year period. Weekly workshops in community centres. | Data collected: T1: Baseline occurred in 1st year of programme. T2: At end of programme at 3yrs. Measures: Older Americans Resources and Services Activities of Daily Living Questionnaire; Community Connections Index; Perceived Social Support Scale; Morale Scale; Geriatric Depression Scale - Short Form; Rosenberg Self-esteem Scale. | Results suggest that older adults improved in perceived overall health, improved experience of pain, and a sense of community. No significant changes were observed in community involvement, perceived social support scores and activities of daily living over time. Six main themes: Provided structure and discipline, facilitating coping, requiring hard work and effort, bringing out one's artistic side, promoting social involvement, and making a contribution. | *** |
| Richmond-Cullen (2018) | Quantitative Pre-post-test design. | N=71 60 years+. 70.4% female. | Art making (majority of work were visual art but some included) | Data collected: T1: Before start of sessions | Significant decrease in loneliness by 1.38 points, following participation in the art programme. | *** |

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| | | | performance arts) 10 sessions. | T2: At end of 10 sessions. Measures: Revised UCLA Loneliness Scale. | | |
| Rose and Lonsdale (2016) | Qualitative Questionnaires completed by participants, diaries, digital video & audio recording, group discussion, individual in-depth interviews. | N=23 Mean age= 73 yrs. (65-86 yrs.) 87% female and 13% male. | Painting. Weekly, 60-120mins sessions. Two community groups. | Thematic and narrative analysis. | Elicited emotions and memories that help participants connect the past with the present, and to connect their older and younger-age selves, positively to reaffirm their older age identity. | ***** |
| Stickley, Hui, Souter, and Mills (2016) | Qualitative. Focus group interviews. | N=119 64% female and 36% male. | Visual arts 10 sessions. Community based arts. | Thematic analysis. | Themes: Age and ageing, finished product, new opportunities, aspirations for the future, personal benefits such as enjoyment, confidence, creative expression, learning new skills and social aspects. | *** |

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| <p>Windle, Joling, Howson-Griffiths, Woods, Jones, van de Ven, Newman and Parkinson (2018)</p> | <p>Mixed methods</p> <p>Longitudinal design.</p> <p>Communication and perceptions of the program were obtained through interviews and self-reports with participants and their carers.</p> | <p>N=125</p> <p>People living with mild to severe dementia across three sites (community venue, residential care).</p> | <p>Visual art, art making and viewing.</p> <p>12 weeks.</p> <p>Weekly, 120 mins sessions</p> | <p>Data collected:</p> <p>T1: Baseline, 1 week prior to programme</p> <p>T2: At 3 months</p> <p>T3: At 6 months.</p> <p>Measures: The Greater Cincinnati Chapter Well-Being Observation Tool; the Dementia Quality of Life; The Holden Communication Scale.</p> | <p>Improved scores in wellbeing (e.g., interest, attention, pleasure, self-esteem, decreased negative affect, and sadness) over the duration of the programme. No changes over time were observed for normalcy and disengagement scores. Proxy assessments of QOL showed a significant improvement over 3mths, however no significant changes were reported by participants living with dementia.</p> | <p>*****</p> |
|--|--|--|--|---|---|--------------|

Appendix VII: Summary Characteristics Table - Drama and Theatre

| Author, year, country | Study design | Study participants | Arts intervention / exposure and duration | Health and wellbeing measures | Summary findings | Quality assessment |
|--|--|--------------------------------|---|---|--|--------------------|
| Chung, Lee, Tan, Teo, Lee, Ee, Sim and Chee (2018) | Quantitative Pre-post intervention. | N=18 Mean age= 64.2yrs. | Playback Theatre. Six weeks 1x session per week, 90mins. Single group. | Data collected: T1: Pre intervention T2: Post intervention at 6 weeks. Measures: Trail Making Test-A&B; Logical Memory Test; Digit Span; Symbol Search; Scale of Positive and Negative Experience; Euro-Qol EQ-5D. | Significant improvements in emotional wellbeing in the Playback Theatre sessions. No significant differences in participant cognitive function or health related quality of life were observed over time. | *** |
| Moore, Straus, Parish, Sueko and Eyler (2017) | Mixed methods | N= 13 | A theatre-based, drama program. | Data collected: T1: Pre intervention | The drama workshop group displayed higher self-ratings of positive change in self-esteem, confidence, and happiness than the Backstage Pass group. No significant differences found for empathy, compassion, depression, or anxiety scores. Benefits - improved mood, social interactions, forging | *** |

| | | | | | | |
|-------------------------|--|---|--|--|--|----|
| | Two focus groups and Pilot RCT. | Mean age= 77yrs. Drama workshop group: n=7, 71.4% female. Backstage control group: n=6, 83.3% female. | Six weeks 1x session per week, 90mins. Control: Backstage Pass group which consisted of listening to and asking questions of theatre experts. Randomly assigned to one of two groups. | T2: Post intervention at 6 weeks. Measures: Toronto Empathy Questionnaire; Computerised Multifaceted Empathy Test; Santa Clara Brief Compassion Scale; Geriatric Depression Scale Short form; Beck Anxiety Inventory; Charity and volunteer task. | relationships, sense of belonging and connectedness. | |
| Sextou and Smith (2015) | Qualitative Semi-structured interviews and semi-immersive observations. | N=10 Age range= 55 to 82yrs. 100% female. | Applied Drama/ Theatre classes. Fallen Angels (creative drama). 1x session per week, 120mins. | Semi structured questions regarding attendance at the drama group and effect on mood and wellbeing and social relationships. | Benefits of attending drama classes were positive social relationships and belonging, positive emotions, self-concept and learning new skills. | ** |

Appendix VIII: Technical Evidence on Health and Wellbeing Outcomes

1. The Impact of Dance

1.1 Physical Health and Wellbeing

These studies examined various aspects of physical health and wellbeing including balance, mobility and posture, lower and upper body strength, flexibility and architecture, aerobic fitness and physical activity and body composition using a range of standardised measures.

1.1.1 Balance and Mobility

In total, fifteen studies assessed the relationship between participation in dance and balance and mobility. Fourteen studies found statistically significant improvements in balance in healthy older adults (Cepeda et al., 2014; Rodrigues-Krause et al., 2018; Rodacki et al., 2017; Sofiandis et al., 2017; Kattenstroth et al., 2013; Pacheco et al., 2016; Garcia Gouvea et al., 2017; Bianco et al., 2014; Brustio et al., 2018; Britten et al., 2017; Shanahan et al., 2016; Serra et al., 2016; Skingley et al., 2016; Dewhurst et al., 2014).

Two RCTs found significant improvements in balance and mobility. Rodrigues-Krause et al. (2018) conducted an RCT and examined the effects of an 8-week Latin dance intervention group with comparator walking and stretching groups in 30 older females. Static balance was assessed by participants standing in a unipedal stance, on the dominant leg and with their eyes closed. They found a significant increase in the time spent maintaining the static balance position within the dancing intervention group over time. The time spent balancing improved from a mean score of 5.44 secs (2.34 to 8.55) at baseline to 11.07 secs (6.53 to 15.62) after dance attendance at 8-weeks ($p=0.002$). These results were similar to the effects found in the physical activity walking group comparator (+8.79 secs, $p=0.001$), whilst no significant increases were found in the control group ($p=0.962$). A large effect size was observed for the dancing group ($d=1.22$ [0.27 to 2.18]). A small RCT of 34 older females compared an 8-week ballroom dance intervention with a control group. Participants were randomly allocated to either a dancing group for three sessions per week of County, Waltz, Bolero and Forró Brazilian dance (low to moderate intensity), or a control group which maintained regular activities. Post hoc analysis results showed that after 8-weeks, the dance group improved in all balance and functional ability tests with statistically significant improvements found in Tinetti scores (24.6%), from a mean score of 20.7 to 25.8 post intervention, faster Timed Up and Go (TUG) scores (29.6%), from 11.7 secs to 9.03 secs, and dual Timed Up and Go scores (46.3%), from 13.3 secs to 9.09 secs (Cepeda et al., 2014).

Three further randomised studies found significant improvements in balance and mobility. An experimental study of 38 older adults examined static and dynamic balance over 8-weeks of ballroom dancing compared with a control group who participated in usual activities. Rodacki et al. (2017) examined the effects of an 8-week ballroom dance programme in 38 older women on balance performance, in comparison with a control group who maintained regular activities. They found that the ballroom dancing group

improved their performance in a number of components of static balance and dynamic balance. Significant group by dance interactions were observed in the static balance in both the stance and tandem positions. Specifically, improvements were observed in the ability to control the centre of pressure path area ($F(1,28)=2.7$; $p<.05$) and path length (stance: $F(1,28)=9.0$; $p<.01$; tandem: $F(1,28)=8.9$; $p<.01$), reduce velocity sway (stance: $F(1,28)=7.4$; $p<.01$; tandem: $F(1,28)=18.7$; $p<.01$), and median frequency sway range (stance: $F(1,28)=2.6$; $p<.05$; tandem: $F(1,28)=11.4$; $p<.01$), compared with a control group where performances remained unchanged. The ballroom dance group also showed enhancements in the dynamic balance test, in which significant group by training main effect interactions were found for the step start ($F(1,28)=3.9$; $p<.05$), preparation phase ($F(1,28)=9.9$; $p<.01$) and total time of step ($F(1,28)=7.2$; $p<.01$), however, these were not observed in the balance phase ($F(1,28)=2.1$; $p>.05$). Improvements were also found within the dance group on Tinetti test score performance ($F(1,28)=81.3$; $p<.01$) and in the Time Up and Go test ($F(1,28)=41.6$; $p<.01$), where significant group by training main effects were noted. Intermediate to large effect sizes were observed, ranging from $d=0.59$ to 3.29 . No changes were observed in the control group from baseline to study end in any of the variables ($p>.05$).

Sofiandis et al. (2017) compared the effects of a Latin dance programme, a Pilates group, and a control group, on balance in 32 older adults. Significant improvements were found in static and dynamic balance after 10-weeks participation for both the Latin dance and the Pilates groups. As a result of participation in the intervention, the Latin dance group gained a significant reduction in angular trunk displacement when moving in a forward/backward direction during the tandem stance (placing one foot in front of the other), in both open and closed eyes conditions ($t(10)=1.958$, $p=.037$). Reductions in the maximum displacement of the centre of pressure when performing the one leg stance in the forward/backward ($t(10)=3.780$, $p=.004$) and side-to-side ($t(10)=4.119$, $p=.002$) directions were observed. In addition, improvements were found in the mean magnitude of trunk sway during oscillation tasks as a result of the dance intervention ($t(10)=3.21$, $p=.02$). Furthermore, the Latin dance intervention group was the only group to show an observed decrease in the standard deviation of the centre of pressure displacement in the metronome paced task ($t(10)=3.35$, $p=.008$) over the course of the intervention. Significant reductions were also detected in upper trunk angular displacements on tandem stance with eyes open, after the Latin dance intervention ($t(9)=2.78$, $p=.018$). In contrast, no significant differences were observed in the control group.

Similarly, Kattenstroth et al. (2013) compared the effects of a 6-month Agilando™ dance intervention with a control group who continued to engage in regular activities, in 35 older adults. After the 6-month period, the dance intervention group showed significant improvements in postural performance, displaying a higher centre of pressure displacement in the anterior direction across two subsections: to the upper right ($p=0.007$), upper left ($p=0.002$), and in the lateral direction to the lower right ($p=0.003$) and lower left ($p=0.008$), thus, indicating a greater ability in dancers to move the centre of pressure to the edge of the base of support. No differences were found within the control group and in some cases, performance of the group declined. Further analyses of individual performances over time found a significant association in posture ($r=-0.787$, $p=0.001$).

The results were also identified in observational studies. A quasi-experimental study compared a 12-week Colombian, Caribbean folk-dance intervention on dynamic balance in 27 older adult females. Pacheco et al. (2016) reported significant positive improvements in dynamic balance in dancers over time, with dancers showing a reduction in time taken

to complete the 8-ft up and go task, from a median range of 10 secs (6.8–15.8) to 7.6 secs (5.7–10.5) ($Z = -3.3$, $p = 0.001$), with a strong effect size found ($r[\Delta] = 0.68$). No significant changes were observed in the control group over time. An uncontrolled pre-post-test study compared the effects of a 16-week dance intervention in 163 older adults. The dance intervention consisted of a variety of dance styles (e.g., Slow Waltz, Tango, Foxtrot, Bachata and Country etc), which were performed twice weekly. Post hoc analyses with Bonferroni adjustment showed that after 16-weeks participation, dancers demonstrated improved performance with a significant reduction of 9.84% (MD= 1.52 secs (95% CI: 0.45–2.60), $p < 0.001$) found in the time taken to complete the TUG task, 9.12% (MD= 1.21 secs (95% CI: 0.82–1.60), $p < 0.05$) in the dual TUG and 8.14% in Four-square tasks (MD= 1.16 secs (95% CI: 0.08–2.24), $p < 0.001$), (Brustio et al., 2018).

In a similar fashion, the effects of a 3-month senior dance programme were measured over time in 20 older adults who were regular visitors of short stay, senior organisations. Results found a statistically significant increase in performance on the Balance Berg Scale with a difference of 9.3% (from a score of 44.05 at pre-test to 48.15 at post-test, $p < 0.001$), as well as an enhanced dynamic agility performance which saw a reduction of 11.5% in time taken to complete the TUG task after 3-months of dance (from 15.74 secs at pre-test to 14.16 secs at post-test, $p = 0.049$), (Garcia Gouvea et al., 2017). Britten et al. (2017) found that dancers improved their mobility after an 8-week contemporary dance programme. A statistically significant reduction of 31.2% in the time taken to complete the TUG test after 8-weeks was found, from 10.1 secs at pre-testing to 7.7 secs at the 8-week post-test ($p < 0.005$). Skingley et al. (2016) examined two 'Edna' dance groups showed that both dance groups showed significant enhancements in balance scores over 3 months, in tasks involving sitting to standing, turning, and then looking over each shoulder whilst balancing on one leg (Gravesham dance group), and tasks which involved standing unsupported with their feet together (Medway dance group), ($p < 0.05$).

In cross-sectional studies, Shanahan et al. (2016) compared an Irish Set dance group, with an age-matched control group in 39 older adults. ANCOVA analysis showed that the Irish Set dance group had significantly improved their performance in anticipatory postural control ($p < 0.001$), total mini-BESTest scores ($p < 0.001$) and reactive postural control ($p < 0.05$) in comparison with control group participants. However, no differences were observed between the groups in dynamic gait balance, sensory orientation sub-sections of the mini-BESTest and TUG scores. Serra et al. (2016) investigated the effects of a Samba dance group 'Wing of Baianas' and an age-matched control group on postural balance in 110 older, adult women. The results found a significant effect between the Samba dance group and control group. During the eyes closed condition, the Samba dance group showed reductions in side-to-side mean sway ($F(1,108) = 4.1$, $p = 0.04$), front to back mean sway ($F(1,108) = 3.3$, $p = 0.007$), larger side-to-side amplitudes ($F(1,108) = 13.5$, $p < 0.001$), larger front to back amplitudes ($F(1,108) = 11.6$, $p < 0.001$), quicker mean velocity ($F(1,108) = 8.4$, $p = 0.004$), and larger centre of pressure area ($F(1,108) = 6.7$, $p < 0.01$) compared with the control group. However, no differences between groups were observed for postural balance outcomes when completing the task with eyes open. This study suggests that participation in dance is associated with improved balance with eyes closed and offers less fluctuating, but larger and faster postural sway, compared with the control group (Serra et al., 2016).

Bianco et al. (2014) compared the performance of balance in 122 older adults either attending a 6-month ballroom dance or control group who maintained regular activities in a cross-sectional study with case-control design. Results showed that the groups differed

significantly with the dance group performing better on the Balance Berg Scale (50.5 ± 5.4) compared with the control group (30.9 ± 14.9) ($p < 0.05$). The mean value of participants within the dance group who had reported previous fall experiences, had higher scores on the Berg Balance Scale (49.4 ± 5.8) compared to those with similar experiences in the control group (26.7 ± 14.8). Finally, Dewhurst et al. (2014) compared older dancers with 10 years+ experience (70-80 years of age) with younger dancers (60-70 years of age) with age-matched control counterparts and found that older control group participants performed significantly poorer than their older Scottish dancing counterparts on speed and agility performance on the 8-ft up and go test (effect size = 1.15, $p < 0.05$). Younger Scottish dancers and their age-matched control group participants performed comparably in speed and agility, with no significant differences observed, thus, suggesting that dancing can help reduce deterioration in speed and agility over time.

In comparison, one study found no significant changes in balance and mobility as a result of participation in group dance. An RCT conducted by Machacova et al. (2017) showed that a 3-month ballroom dance intervention demonstrated some improvements in mobility (from a mean get up and go score of 8.38 ± 2.55 to 8.62 ± 2.37), but this was not significant. However, a statistically significant deterioration was observed in performance scores in the control group on the get up and go test (from a mean score of 8.82 ± 1.80 to 8.39 ± 2.20 $p = 0.008$). A general linear model analysis showed that the control group's performance on the 8-ft timed test, had deteriorated over the 3 months ($p = 0.047$). This suggests that the dance group maintained their performance in mobility, in comparison with the control group who saw a deterioration in mobility after 3 months.

1.1.1.1 Older Adults living with Parkinson's Disease

With regards to older adults living with health conditions, two out of three studies found significant improvements in balance and mobility in older adults living with Parkinson's disease (McNeely et al., 2015; Westheimer et al., 2015). A quasi-experimental study examined the impact of a Dance for Parkinson's disease (D4PD) intervention group and a Tango dance group over 12 weeks, in 16 older adults living with Parkinson's disease. The study found a significant effect of time, with improved performance on MiniBESTest scores ($F(1,14) = 5.167$, $p = 0.039$) from pre-test ($M = 19.63 \pm 2.92$) to post testing ($M = 20.13 \pm 5.06$) after participation in the 12-week dance interventions. Significant time interactions were displayed in the five times sit to stand test, ($F(1,14) = 12.016$, $p = 0.004$; $F(1,14) = 12.661$, $p = 0.003$, respectively) showing improved scores over the 12 weeks, with a reduction of 2.21 secs in time taken to complete the tests, from pre-test ($M = 13.51$ secs ± 3.60) to post testing ($M = 11.26$ secs ± 2.73). Similarly, performance in the four-square step test demonstrated a significant improvement in scores over time ($F(1,14) = 12.661$, $p = 0.003$), with a reduction of 1.04 secs in time taken to complete the tests, from pre-test ($M = 8.61$ secs ± 3.06) to post testing ($M = 7.57$ secs ± 2.19). Similar improvements were reported in both dance intervention groups. With regards to the TUG test, a significant group by time main interaction effect was observed. However, the D4PD group demonstrated a small decline in TUG average performance ($F(1,14) = 5.413$, $p = 0.036$) taking longer (MD = +0.51 secs, an increase of 5.78%) to complete at post-testing whereas an enhanced performance was observed in their Tango dance counterparts, with the TUG completed in a faster time (MD = 0.97 secs, a reduction of 9.15%). In addition, no significant interaction effects were found for the dual task TUG test or gait velocity for either dance group (McNeely et al., 2015).

Furthermore, Westheimer et al. (2015) conducted an uncontrolled, pre-post-test study of an 8-week Dance for Parkinson's Disease (DfPD) dance intervention in which 12 older

adults living with Parkinson's disease participated in 16 sessions with a variety of dance such as jazz, tap, ballet, waltz etc. They reported a significant improvement in total UPDRS III scores of 10.4% from pre-test ($M=28.8 \pm 9.6$) to post dance intervention ($M=25.8 \pm 9.4$, $p=0.035$), with a small effect size observed ($d=-0.32$).

In comparison, one study found no significant changes in balance and mobility as a result of participation in group dance in older adults living with Parkinson's disease. In a feasibility study with a randomised control design, Shanahan et al. (2017) found no significant differences were observed between an Irish Set dance group and a control group in 90 older adults living with Parkinson's Disease on balance performance after a 12-week dance intervention. No significant changes were observed in balance performance measured with the MiniBEST, as a result of participation in an Irish Set dance intervention over 12 weeks.

1.1.2 Body Muscle Strength and Flexibility

Nine studies also assessed the relationship between participation in dance and physical functional performance indicators in terms of body strength and flexibility. Six studies found statistically significant improvements in body muscle strength or flexibility in older adult dancers (Machacova et al., 2017; Rodrigues-Krause et al., 2018; Da Rocha et al., 2018; Pacheco et al., 2016; Wu et al., 2016; Skingley et al., 2016).

Two RCTs found significant improvements in muscle strength and flexibility as a result of participating in dance group interventions. An RCT conducted by Machacova et al. (2017) compared a 3-month ballroom dance intervention and a control group in 189 older adults who were residents of nursing homes. They found statistically significant improvements in lower body strength ability (chair stand test, from 7.62 repetitions (± 3.81) to 10.27 reps (± 4.20), $p < .05$) and lower body flexibility (chair sit-and-reach test, from -4.30 cm (± 9.26) to -1.37 cm (± 7.36), $p < .05$) at a 3-month follow-up. In comparison, the control groups performance in lower body strength and flexibility significantly declined over time. These findings suggest that the dance intervention helped to improve lower body strength and flexibility whilst decelerating the decline in functional status in older adults residing in nursing homes. Similarly, Rodrigues-Krause et al. (2018) found improved lower body muscle power measured via the counter movement jump test (from baseline $M=11.2$ cm (9.3-13.1) to $M=12.2$ cm (10.3-14.0) after 8-weeks participation in the dance intervention), with a moderate to large effect size ($d=1.00$ [0.07 to 1.33]) reported. A similar result was found for the walking group condition; however, no differences were observed in the stretching group. Positive pooled main effects over time were also observed in the chair raise test and lower body flexibility ($p > .05$). However, no significant changes were found for knee extensors isometric peak torque or knee extensors concentric peak torque across groups or time in both groups.

Significant results were found in experimental studies. An experimental pre-post intervention study, Wu et al. (2016) compared a 16-week low impact dance group with a sedentary group in 32 older adults, reported significant improvements in some 'joint range of motion' of the lower limbs, specifically increased extensions of the knee and knee torque, ankle inversion, and ankle dorsiflexion in the dominant leg (Mean difference= $+7.1$, MD= $+2.8$, MD $+3.4$, MD= $+5$, respectively) and nondominant leg (MD= $+7.3$, MD= $+2.4$, MD= $+4.2$, MD= $+5$, respectively) over time, from pre to post intervention in the dance group. The dance group also performed significantly higher than those observed in the sedentary group in the dominant leg (MD= $+3.8$, MD $+1.6$, MD= $+9.2$, MD= $+6.8$, respectively) and nondominant leg (MD= $+1.7$, MD $+1.6$, MD= $+4.2$, MD= $+5$, respectively)

($p < .05$). Ankle eversion was observed across time in the dance intervention ($MD = +6$) and differed between groups ($MD = 6.4$) in the dominant leg, but not the nondominant leg. In comparison, significant interactions in the joint range of motion domains were not observed in the sedentary control group over time. In addition, no significant differences for knee flexion or ankle plantar flexion of the dominant or nondominant leg were evident within or between groups. Another experimental study by Pacheco et al. (2016) found statistically positive improvements in lower body strength in older adults attending a Caribbean, Colombian dance intervention, in comparison to a control group ($U = 35.5$, $p = 0.006$). In addition, a Wilcoxon signed rank test showed that the dance intervention yielded significant positive improvements in lower body flexibility ($Z = -3.2$, $p = 0.001$), upper body flexibility ($Z = -2.9$, $p = 0.002$), and lower body strength ($Z = -2.7$, $p = 0.004$). An intermediate effect size was observed in lower body strength ($r = 0.42$). No significant improvements were observed in upper body strength in the dance group or in all the above measures for the control group, with the exception of lower body flexibility ($p = 0.042$).

Two observational studies also observed significant improvements. A pre-post-test study compared a 3-month dance programme in two sites over time and found significant improvements in left shoulder mobility in both dance groups ($p < 0.05$). Whilst no significant improvements were identified in right shoulder mobility, the mean scores for both right and left shoulder mobility reduced from baseline to post testing at 3 months. A lower score indicated an improvement in mobility (Skingley et al., 2016). In a cross-sectional study which assessed 41 female older adults at the end of a 12-month programme (either attending a ballroom dance group, circular dance group or a control group), Da Rocha et al. (2018) found that both the ballroom and circular dance groups displayed significant increases in their lower limb resistance muscular strength (Ballroom: $M = 13 \pm 2$ reps, Circular: $M = 13 \pm 4$ reps) compared with the control group ($M = 10 \pm 2$ reps, $p < 0.01$). However, no significant differences were observed between groups regarding their upper limb fitness, lower body flexibility and upper body flexibility.

In contrast, three studies found no statistically significant group differences between dancers and non-dancers on body muscle strength and flexibility. Merom, Mathieu et al. (2016) found no significant differences in leg strength at a 12 month follow up between groups ($p = 0.91$). In addition, Serra et al. (2016) found no significant differences in muscle strength regarding isokinetic peak torque, total work and flexor and extensor ratios between dancers and non-dancers. Dewhurst et al. (2014) found no significant differences had been observed in back and hamstring flexibility of the left and right side for any group comparators. No statistically significant differences were found for dancers on shoulder range of motion performance. The only differences noted were increased distances from younger control group participants to their older control group comparators (effect size = 0.40, $p < .05$).

1.1.3 Aerobic Capacity, Endurance, and Physical Activity

Thirteen studies examined the association between dance and aerobic capacity, endurance, and physical activity in older adult dancers. Overall, ten studies found statistically significant improvements as a result of participation in group dance. Eight studies reported improvements in aerobic capacity and endurance (Cepeda et al., 2014; Da Rocha et al., 2018; Dewhurst et al., 2014; Rodacki et al., 2017; Shanahan et al., 2016; Pacheco et al., 2016; Rehfeld et al., 2018; Rodrigues-Krause et al., 2018), and three reported significant improvements in physical activity (Rodrigues-Krause et al., 2018; Merom, Mathieu et al., 2016; Britten et al., 2017) in healthy, older adult dancers.

1.1.3.1 Aerobic Capacity and Endurance

The evidence shows that healthy older adults who participated in group dance were more likely to gain improvements in their aerobic capacity, endurance, and physical activity than those who did not dance. Two RCTs examined the association between aerobic capacity and dance in older adults. Rodrigues-Krause et al. (2018) found increased VO₂ peak performance after 8 weeks' participation in the dance and walking groups compared with no observed changes identified in the control group, with a moderate effect of $d=0.71$ reported for the dance group ($-0.19-1.62$). In their RCT study, Cepeda et al. (2014) reported that the dance intervention improved in aerobic capacity and endurance with an observed performance increase of 30% on the six-minute-walk test.

Randomised studies also showed a significant improvement in fitness. Rodacki et al. (2017) found significant increases observed in the six-minute-walk test ($F[1,28] = 161, 161.8$; $p<.01$), from pre to post test, whilst no changes were found for control group participants, in a study of 30 older women in an 8-week ballroom dance programme. Rehfeld et al. (2018) compared a dance group (e.g., Line dance, Jazz, Latin American etc.) and a sports group over 6 months and reported that both the dance and sports groups had significantly increased their aerobic fitness over time on the Physical Working Capacity (PWC) test ($F[1,32] = 11.4, p=0.002$). No group differences were observed indicating that participation in either a 6-month dance or sports group can improve aerobic fitness over time.

Pacheco et al. (2016) found that significant improvements in cardiorespiratory fitness over 12 weeks ($z=-3.4, p=.001$), with a strong effect size noted ($r= .68$) in a study which examined a Colombian, Caribbean Folk-dance group over time. In addition, three cross-sectional studies examined physical fitness in older adult dancers. Shanahan et al. (2016) reported that the Irish Set dance group performed significantly better on the six-minute-walk test 450 (± 72.5) mins compared to the age-matched control group 395.5 (± 95) mins ($p=0.001$)

Da Rocha et al. (2018) compared the effects of a 12-month ballroom and circular dancing group with a control group who had not performed any form of dance or physical activity. They found that both the ballroom dance group (432 ± 103 mins) and circular dance group (384 ± 88 mins) displayed significantly higher rates of cardiorespiratory endurance capacity on the 6-minute-walk test, compared with the control group (300 ± 77 mins) ($p 0.01$). Similarly, a cross-sectional study found that the performance of control group participants was significantly lower than the older Scottish dancers for cardiorespiratory fitness on the six-minute-walk distance (effect size = 1.62) and six-minute -walk time tests (effect size = 0.77). (Dewhurst et al., 2014).

1.1.3.2 Physical Activity

With regards to physical activity, two RCTs examined its relationship with dance on older adults and found that physical activity was more likely to increase as a result of participation in dance. Rodrigues-Krause et al. (2018) found increased levels of time spent weekly in physical activity through walking continuously for 10 mins using the International Physical Activity Questionnaire, with an average increase of 72 mins, from 92 mins (22-163) per week to 164 mins (100-229) per week after 8-weeks participation in a dance intervention ($p<.001$).

Merom, Mathieu et al. (2016) compared a 6-month social dancing intervention (folk or ballroom dancing with a wait-list control group in 522 older adults who resided in retirement villages. The parallel, two-arm cluster randomised trial reported that after

6-months participation in the intervention, the dance group had improved their exercise by 110 mins on average in comparison to the control group who had improved by 18mins on average. The ballroom dance group participants were shown to have improved their incidental physical activity by 142 mins, compared with control group participants who had improved incidental physical activity by 113mins on average. These adjustments persisted and remained comparable at the 12 months follow-up, with some further increasing their incidental physical activity by 134mins, apart from participants in the folk-dance group who showed decreases of -42mins over the 6 to 12-month period.

In a pre/post intervention study, Britten et al. (2017) found that older adults aged 65+ who attended an 8-week contemporary dance programme gained significant increases in MVPA ($t= 2.19$) of 62.5 mins per week, and in vigorous physical activity ($t= 2.59$) with an increase of 17.2 mins per week spent. They study also reported a significant decrease in sitting time in weekdays, of 102.2 mins per week. No changes were observed in time spent walking or time spent sitting at weekends. Participants within the study also reported that participating in dance provided them with the means of being physically active.

In contrast, three studies found no statistically significant improvements, in cardiorespiratory performance (Kattenstroth et al., 2013; Machacova et al., 2017; Stillman et al., 2018). Kattenstroth et al. (2013) found no significant differences in cardiorespiratory performance (VO_{2peak}) within both the dance and control groups at the 6-month follow-up. An RCT study of 189 older adults who were nursing home residents, compared the effects of an 8-week ballroom dance intervention to a control group. They reported no significant increases in aerobic endurance in dancers, however, a significant decline was observed in the control group, as measured by the 2-minute step test, thus indicating the dance intervention helped to maintain aerobic endurance (Machacova et al., 2017). Stillman et al. (2018) compared a 6-month African dance intervention with a culture education control group on the peak oxygen uptake in 28 older adults who were living with obesity. Results found no significant follow-up changes were observed for fitness ($F(1,22) < .001$, $p = .988$) after 6 months. On average, both the dance and control groups' peak oxygen uptake improved, however, these increases were not statistically significant.

1.1.3.1 Older Adults living with Parkinson's Disease or living with a Mobility Limitation

Three studies also assessed the relationship between participation in dance and aerobic endurance and physical activity. Two studies found significant improvements in aerobic endurance (McNeely et al., 2015) and physical activity (Marquez et al., 2015) in older adults living with a health condition.

A pre-post intervention study which compared a tango dance group and a Dance for Parkinson's disease (D4PD) group over 12-weeks found that in the main, both the Tango and Dance 4 Parkinson's Disease dance groups displayed improvements in aerobic endurance. Performance on the 6-min walk test, showed a significant time interaction ($F[1,14]= 5.884$, $p = 0.029$), indicating that endurance improved over time, from baseline to follow-up as a result of participation in both the D4PD ($M=1556.75 \pm 225.99$ ft to $M=1607.00 \pm 192.18$ ft) and tango dance ($M=1381.88 \pm 372.98$ ft to $M=1488.00 \pm 356.10$ ft) interventions (McNeely et al., 2015). In addition, Marquez et al. (2015) examined the effects of a 3-month Latin dance programme 'BAILAMOS' on physical activity performance in 9 older Latino adults who were living with a mobility limitation. They found that participants in the Latin dance programme demonstrated significantly improved, self-reported physical

activity ($d=1.39$) and reported a greater enjoyment of physical activity ($d=0.61$). However daily accelerometer objectively assessed physical activity declined for MVPA ($d=0.29$).

However, in comparison, a feasibility RCT which compared a 10-week Irish Set dance programme with a comparator control group in 90 older adults with Parkinson's disease reported that no significant changes were found between groups in cardiorespiratory performance on the 6-minute walk test. In addition, they found that endurance had reduced over the course of the intervention for both groups, but that the control group demonstrated this to a larger extent (Shanahan et al., 2017).

1.1.4 Body Composition and Lipid and Inflammatory Profiles

Six studies assessed the relationship between participation in dance and body composition in older adults. Overall, four studies found a significant improvement as a result of participation in group dance. Three studies found statistically significant improvements in body composition (Stillman et al., 2018; Rodrigues-Krause et al., 2018; Wu et al., 2016), lipid and inflammatory profiles (Rodrigues-Krause et al., 2018; Wu et al., 2016) and one study found significant improvements in muscle architecture (Cepeda et al., 2014) in older adult dancers.

1.1.4.1 Body Composition

Three RCTs demonstrated significant improvements in body composition. In their RCT, Rodrigues-Krause et al. (2018) found interaction effects observed over time, showing improvements in body composition (weight, from 66.4 (60.3–72.5) kg to 65.6 (59.8–71.3) kgs, $p=.003$, $d=0.45$), visceral adipose tissue (VAT, from 45.3 (32.8–57.3) mm to 35.9 (26.8–41.5, $p<.045$, $d=0.61$)), waist (84.4 (78.5–90.2) cm to 82.7 (77.5–88), $d=0.19$, $p<.001$), and hip (102.4 (97.2 a 107.6) cm, to 101.5 (96.7 a 106.4), $d=0.32$, $p<.001$) after 8-weeks participation in a dance intervention. No significant changes were observed in quadricep muscle thickness over time. In a randomised pilot intervention, Stillman et al. (2018) also compared an African dance intervention with a culture education group in 28 older adults who were living with obesity. A significant group by time interaction for weight, with a small to moderate effect size ($\eta p^2=.31$) was found suggesting that the African Dance group lost weight (mean= 4.0 ± 6.0 lbs), compared with the Culture Education group who saw a small gain in weight, (mean= 2.6 ± 3.9 lbs) over the course of the intervention. In addition, Cepeda et al. (2014), observed significant improvements in the lower limb muscle architecture in ballroom dancers, where a group by training interaction was found. After participation in the 8-week ballroom dance training, the dance group observed significantly greater thickness, pennation angle, and fascicle length for the 'vastus lateralis, tibialis anterior, biceps femoris, and gastrocnemius medialis' muscles. These differences remained unchanged for the control group from baseline to the follow-up tests.

In a pre-post intervention study, Wu et al. (2016) compared a 16-week low-impact dance with a sedentary control group in older female adults and found that the body fat percentage of the low impact dance group had reduced over time and was significantly lower than that of the sedentary group after the intervention (MD= 2.4%, from $32.4 \pm 6.5\%$ to 30.0 ± 6.0 , $p<.01$). Body fat percentage showed a significant reduction after participation in the low-impact dance group only. However, in relation to body mass index and bone mass density, the low-impact dance group and sedentary group did not demonstrate a significant difference within or between groups at the 16-week follow-up.

In contrast, two cross-sectional studies found no statistically significant differences in anthropometric and body composition parameters. A cross-sectional survey in older senior women who had regularly participated in a ballroom dance or circular dance programme, for at least 12 months found no differences between groups with regards to anthropometric and body composition parameters (e.g., BMI, waist and hip circumference, waist-hip ratio) in both the ballroom and circular dance groups, compared with the control group (Da Rocha et al., 2018). In addition, a cross-sectional study found that all the anthropometrical and body composition assessments (BMI, skinfold thickness, and waist-to-hip ratio) were equivalent across both the dance group and the control group, indicating no differences between groups (Dewhurst et al., 2014).

1.1.4.2 Lipid and Inflammatory Profiles

Rodrigues-Krause et al. (2018) found that after participation in an 8-week dance intervention, interaction effects were observed over time and showed improvements in inflammatory profiles such as a reduction in C-reactive protein (MD=0.14, $d=0.23$, $p<0.001$), and tumor necrosis factor alpha (TNF- α , MD=1.06, $p<0.001$, $d=0.51$); and in lipid profiles, such as a reduction in low-density lipoprotein cholesterol (LDL-C, MD=7.5 mg/dL, from 130.7 (115.2–146.1) to 123.2 (95.7–150.6, $d=0.32$, $p=0.035$) and an increase in high-density lipoprotein cholesterol levels (HDL-C, MD=4.4 mg/dL, from 41.8 (30.9–52.6) to 46.2 (35.4–51.0), $d=0.36$, $p<0.001$). No significant changes were observed in glycemia, insulin, insulin resistance and Triglyceride levels over time. Wu et al. (2016) compared a 16-week low-impact dance with a sedentary group in older female adults. Results showed significantly lower Triglycerides (MD=11 mg/dL, from 108.0 ± 16.8 to 97.0 ± 16.2 , $p=.011$) and increased high-density lipoprotein (HDL-C, MD=5.3 mg/dL, from 53.5 ± 9.1 mg/dL to 58.8 ± 6.3 mg/dL) cholesterol levels in the low-impact dance group, compared with the sedentary group after participation in the 16-week intervention. Follow-up testing also showed that low-density lipoprotein cholesterol (LDL-C, MD=7.3 mg/dL, from 138.5 ± 15.6 mg/dL to 131.2 ± 16.2 mg/dL) and blood glucose levels (MD=6.7 mg/dL, from 106.8 ± 11.5 mg/dL to 100.1 ± 15.4 mg/dL) significantly reduced over the 16-week period, from baseline to post intervention. However, at the 16-week follow-up, the low-impact dance group and sedentary groups did not demonstrate any significant interactions for total cholesterol levels.

1.1.5 Falls and Fall Efficacy

Overall, four studies assessed the relationship between participation in dance and falls occurrence and fall efficacy in healthy older adults. Two studies found statistically significant improvements in fall efficacy scores in healthy older adults who took part in dance group activities (Britten et al., 2017; Wu et al., 2016).

In a pre-post intervention, Britten et al. (2017) investigated the results of participation in 8-weeks of contemporary dance on fear of falling in three groups of older adults ($n=22$). They found statistically significant reductions in the mean score on the Fall Efficacy Scale (FES-1) score, from 27.6 (9.9) to 23.7 (8.6) after 8-weeks indicating a reduced fear of falling ($p < 0.005$). Wu et al. (2016) found that the occurrence number of falls did not differ significantly between the groups during the duration of the dance programme. However, a significant interaction was observed after 16-weeks where the low impact dance group showed significant improvements in falls efficacy scores (11.4 ± 1.5) compared to the sedentary group at the same period (9.0 ± 0.8 , $p= .011$).

However, in contrast two studies found no statistically significant improvements in reducing the number of falls (Merom, Mathieu et al., 2016) and falls efficacy (O'Toole et

al., 2015). A parallel two-arm cluster randomised trial conducted by Merom, Mathieu et al. (2016) found that social dancing did not produce any significant effects in fall counts between a comparator control group (0.80 falls for each person, yearly) and the dance group (1.03 falls for each person, yearly). A post hoc analysis revealed that fall counts were greater amongst dance group participants with past reports of several falls experienced prior to the study (IRR: 2.02, $p=0.23$), and among the folk-dance group (IRR: 1.68) suggesting the intervention was ineffective in reducing the amount of falls. The authors suggest that a combination of participants with different degrees of fall-risk, the presence of active participants and somewhat low attendance rates may explain the findings. Furthermore, O'Toole et al. (2015) investigated the effects of a dance programme over 6 weeks, on falls efficacy in older adults in a quasi-experimental, pre-post-test study and reported that no significant differences were found in falls efficacy.

1.1.6 Activities of Daily Living

Overall, four studies assessed the relationship between participation in dance and activities of daily living and everyday competencies in healthy older adults. Three studies found statistically significant improvements in activities in daily living in healthy older adults who took part in dance (Kattenstroth et al., 2013; O'Toole et al., 2015; Bianco et al., 2014).

A quasi-experimental pre-test post-test design found in 60 older adults found significant differences after a 6-week contemporary dance programme in 'frequency of activity participation', encompassing domestic activity. 'Frequency of activity participation' (FAI) total scores increased significantly after 6-weeks participation in contemporary dance ($p<0.04$). Significant improvements were also observed in 'frequency of participation in domestic activities' ($p<0.05$). No significant changes were observed in the 'work' and 'leisure' activity subscales or in the 'outdoor activity' subscale of the FAI (O'Toole et al., 2015). In another study, Kattenstroth et al. (2013) found a small significant improvement in lifestyle and general everyday competency levels in participants within the dance intervention group ($p=0.004$), while no differences were found for participants in the control group ($p=0.722$) after 6 months.

In their cross-sectional study which compared a 6-month ballroom dance programme with a control group, Bianco et al. (2014) found that that the groups differed significantly with the dance group, with both males and females performing better in activities of daily living on the Barthel Index (97.4 ± 9.3 and 98.5 ± 5.2 respectively) compared with the control group (76.7 ± 35.9 and 76.7 ± 32.2). The mean value of participants within the dance group who had reported previous fall experiences, had higher scores on the Barthel Index (97.0 ± 9.8) compared with those with similar experiences in the control group (67.8 ± 36.0).

In contrast, one study found no significant improvements in daily activities for dancers though the control group reported a decline in some domains of basic activities (Machacova et al., 2017). Machacova et al. (2017) compared a 3-month ballroom dance intervention, with a control group in 189 older adults who reside within in a nursing home in a multi-centred, randomised control trial. Significant declines were noted in individual domains of basic activities such as dressing, and a trend towards significance in walking in the control group, with no changes observed for the dance group. In addition, a significant decline in instrumental activities of daily living was also observed in the control group. The authors suggest that the dance intervention was effective in the prevention and deterioration of declines in activities of daily living.

1.2 Psychological Health and Wellbeing

1.2.1 Psychological Distress

Overall, two studies examined the relationship between dance and depression and anxiety, in older adults. One study found a significant improvement in depression (Britten et al., 2017) and one study found a significant improvement in anxiety (Garcia Gouvea et al., 2017).

In respect of depression, one study found a statistically significant reduction in depression scores in older adults who participate in dance programmes (Britten et al., 2017). This evidenced by Britten et al. (2017) who investigated the effects of 8-weeks of contemporary dance (16 sessions) on depressive state in three groups of healthy older adults from the local community ($n=38$, mean age= 77.3 years) in an uncontrolled pre-post intervention design. Results revealed a statistically significant decrease in the mean Geriatric Depression Scale (GDS) ($t(18) = 1.99$, $p < 0.05$). However, in comparison Garcia Gouvea et al. (2017) found no statistically significant reduction in depression scores (BDI) ($p < 0.831$) in 20 older adults after 3 months. Findings indicated that from baseline to post-test intervention, the results of the Beck Depression Inventory showed no statistically significant differences in depression.

With regards to anxiety, in a pre-experimental study Garcia Gouvea et al. (2017) measured the effects of the senior dance intervention on anxiety. They compared a sample of 20 older adults participating in a 3-month Senior Dance intervention, at baseline and follow-up. The findings demonstrated a statistically significant reduction in state anxiety scores of 12.6% ($p < 0.001$) in older adults who participated in the Senior Dance classes. However, this was not the case for State-Trait anxiety where a decrease of 7.4% in scores was not statistically significant ($p = 0.073$).

1.2.1.1 Older Adults living with Health Conditions

Overall, three studies examined the relationship between dance and depression and mood in older adults living with a health condition. Two studies found significant improvements in depression (Lazarou et al., 2017 and Pinniger et al., 2013).

In relation to older adults living with diagnosed with amnesic mild cognitive impairment (MCI), Lazarou et al. (2017) explored the effects of international ballroom dancing on mood and depression in 129 older adults (mean age = 66.8 years). In a pre-post intervention, participants were randomly allocated into either a 10-month ballroom dance intervention group or a wait-list control group. Significant improvements were found in the performance mood and depression scores of the ballroom dancing intervention group on the Neuropsychiatric Inventory (NPI) ($p = 0.024$), Global Deterioration Scale (GDS) ($p = 0.007$) and the Beck Depression Inventory (BDI) ($p = 0.04$), for older adults after participating in the 10-month ballroom dance intervention, relative to the control group where no statistically significant improvements were found. In some cases, the control group showed a deterioration in performance. Pinniger et al. (2013) examined depression in 17 older adults living with age-related macular degeneration and found that the Tango dance group participants showed significant reductions in depression relative to a wait-list control group. In comparison with the control group, the Tango dance group showed a higher reduction in depression ($F(1,14) = 15.65$, $p = .001$, partial $\eta^2 = .53$).

In contrast, one study found no statistically significant reduction in depression scores in older adults living with Parkinson's disease (Westheimer et al., 2015). Westheimer et

al. (2015) examined the effects of depression among 12 older persons with Parkinson's Disease completing an 8-week (16 sessions) Dance for PD (DfPD®) intervention. No significant changes were found in depression (BDI) scores from baseline to post-intervention in those participating in the Dance for PD intervention.

1.2.2 Cognitive Function

Overall, seven studies assessed the relationship between participation in dance and cognitive function in healthy older adults. Five studies found statistically significant positive improvements in facets of cognitive function scores in healthy older adult dancers, such as improved visuospatial memory (Merom, Grunseit et al., 2016; Rehfeld et al., 2018), episodic memory (Marquez et al., 2017), global cognition (Marquez et al., 2017; Kattenstroth et al., 2013), attention (Kattenstroth et al., 2013; Rehfeld et al., 2018), auditory verbal memory (Kosmat et al., 2017) and executive function (Kosmat et al., 2017).

Two randomised control trials were identified. In a two-arm randomised control trial, 115 older adults were randomly allocated into either a social ballroom dance intervention group or walking group over 8-months. Between group effects were found in support of dance on visuospatial immediate and delayed memory, based on the performance on the Brief Visuospatial Memory Test (BVRT) total learning scores ($d=0.29$) and BVRT delayed recall scores ($d=0.34$) (Merom, Grunseit et al. 2016). In another two-group pilot randomized controlled trial, 57 older Latino adults participated in either a 'BAILAMOS®' dance intervention or a health education programme. Results showed a group by time interaction for episodic memory ($p<0.05$), indicating that participants in the dance intervention showed further improvements in episodic memory, compared with the comparator health learning cohort. Effects over time were observed for global cognition ($p <0.05$) was also observed, with participants in both the dance and education groups improving over the 16-week period (Marquez et al., 2017).

Three randomised studies which also featured comparator groups found significant improvements in cognition in dancers over time. Kattenstroth et al. (2013) found significant improvements in attention scores, in the number of completed signs ($p=0.008$) and errors ($p=0.043$) as assessed by the Frankfurt Attention Inventory (FAIR) and cognitive performance scores assessed by the Repeatable Battery of Neuropsychological Status (RBANS) ($p\leq 0.001$) for those in the 6-month 'Agilando™' dance intervention, compared with no differences found in the control group. Significant improvements were also found in the dance group on all tests that measured reactions times ($p\leq 0.001$), while no improvements were found in those within the control group, or of further degradation. Similarly, in a pre-post exploratory study, Rehfeld et al. (2018) examined the effects of a 6-month dance programme, compared to conventional fitness training in 38 older adults. Results showed that both the dance and fitness groups improved in attention ($F(1,37) = 9.48$; $p = .004$; $\eta^2 = .218$) and visuospatial memory in both immediate recall ($F(1,37) = 38.04$; $p < .001$; $\eta^2 = .54$) and delayed ($F(1,37) = 28.37$; $p < .001$; $\eta^2 = .455$) recall performance, after the 6-month dance intervention. No significant group by time interactions were observed between the two active groups.

In addition, Kosmat et al. (2017) examined a ballroom dance intervention in 24 older adults and found significant improvements in some aspects of cognitive function, such as short-term auditory verbal memory (Auditory Verbal Learning Test, $MD = -0.733$, $p = 0.039$), and executive functioning (improved consistently with less total errors identified in the Wisconsin Card Sorting Test ($MD = -13.000$, $p = 0.001$), improved conceptual level responses

(MD=17.500, $p=0.001$), fewer perseverative responses and fewer perseverative errors, (MD=-10.583, $p=0.005$) in the dance intervention group, after 10-weeks and in comparison, with the control group. Furthermore, these improvements were retained subsequently at the 5-month follow-up.

In contrast, two studies revealed no statistically significant differences in aspects of cognitive function (Merom, Mathieu et al., 2016; Neimann et al., 2016). Merom, Mathieu et al. (2016) examined executive function in 522 older adults attending either a folk dancing intervention or ballroom dancing intervention or control group, over 12 months, in a parallel two-arm cluster randomised control trial. Results found no significant intervention effects in executive functioning scores (TMT-Part B= 2.8s, 95% CI: -6.2, 11.8; TMT-Part A= 0.8s, 95% CI: 0.6, 1.0) at 12 months. In a cross-sectional study, Neimann et al. (2016) found no significant differences in performance on cognitive tests such as 'executive control', 'perceptual speed', 'episodic' and 'long-term memory' in older senior dancers when compared with an age-matched, non-dance control group.

1.2.2.1 Older Adults living with Health Conditions

Two studies examined the relationship between dance and cognitive function with older adults who reported living with a health condition. One study found a statistically significant increase in cognition in older adults living with amnesic mild cognitive impairment (Lazarou et al., 2017).

One study found a statistically significant increase in cognition scores in older adults living with a diagnosed health condition. Lazarou et al. (2017) explored the effects of a 10-month international ballroom dancing on cognitive functioning in 129 older adults with amnesic mild cognitive impairment (aMCI). Participants were randomly allocated to either a ballroom dance group consisting of ballroom dance routines such as Tango, Waltz, Foxtrot, Salsa, Swing etc, or into a control group who received no dance intervention and continued their usual activities. Results found that the dance group significantly improved their performance of verbal fluency tasks (FAS, $p=.005$), global cognition (MMSE, $p=.000$), short-term and long-term memory (RBMT1, $p=.004$; RBMT2, $p=.001$), visuospatial ability and executive function (TRAIL-B) and (ROCFT-copy, $p=.000$) (ROCFT-delay, $p=.000$), learning and long-term memory (RAVLT total, $p=.003$), and in attention scores (TEA4, $p=.002$) after 10-months. In comparison, no significant improvements were observed for control group participants, with performance notably poorer in cognition, memory, learning and attention tasks.

In contrast, one study found no significant increases in cognition in older adults living with mobility conditions (Marquez et al., 2015). A mixed methods study by Marquez et al. (2015) examined verbal fluency in older Latin dancers in a mixed methods study. Results observed small positive effects in the Stroop Neuropsychological Screening ($p=.54$ and $p=.65$; $d=0.09$ and $d=0.11$) and Numbers Comparison tests ($p=.65$; $d=0.12$), however, these findings were not significant.

1.2.3 Brain Function

Overall, five studies assessed the relationship between participation in dance and brain function in healthy older adults. Four studies found statistically significant positive improvements in brain function in healthy older adult dancers, such as improved white matter integrity (Burzynska et al., 2017), brain network performance (Zilidou et al., 2018), and brain volume (Rehfeld et al., 2017; Rehfeld et al., 2018).

In an RCT study, Burzynska et al. (2017) examined the effects of a 6-month dancing intervention on cognition and white matter integrity in 174 older adults (mean age=60-79 years). Participants were randomly allocated into either a dance group, walking group, walking and nutrition group or an active control group three times per week. Results found that a group by time interaction was observed in changes in white matter integrity. White matter integrity in the fornix (FA region) increased in the dance group by 0.68×10^{-2} on average, while decreasing in the remaining three activity groups over 6 months. The findings suggested that dance may support the preservation or improvements in white matter health and facilitate the delay of white matter deterioration.

One study investigated the effects of dance on network performance in an experimental intervention study. Zilidou et al. (2018) investigated whether a 6-month traditional Greek dance intervention can improve cognitive network performance of 44 older adults (mean age= 68.7 years). Participants were randomly allocated into either a dance training group (60mins session, 2x per week) or active cognitive training control group. Results found significant interactions between time and the dance intervention on 'small-world property for 10,000 edges' ($p < 0.05$) and '12,500 edges' ($p < 0.05$). In addition, a significant effect was observed between time and dance intervention in the 'characteristic path for 15,000' ($p < 0.05$). The findings indicate that the participation in dance enhanced "optimal network performance as estimated by the increases in small-world property". Subsequent findings also showed that "local network changes resulting in better information flow and functional re-organization of the network nodes".

Two intervention studies examined the impact of dance on brain volume. Rehfeld et al. (2017) examined the effects of an 18-month dancing intervention on hippocampal subfield volumes in 26 older adults who were randomly assigned to a dance ($n=14$, 67.2 years) or fitness group ($n=12$, 68.7 years). When examining hippocampal subfield volume, both the dance and fitness groups showed a main effect of time, with hippocampal volume increases mainly in the left hippocampal subfield. Exploratory post hoc t-tests demonstrated that dancers showed additional significant increases in more subfields such as the left dentate gyrus and the right subiculum, where no observed changes were found in the fitness group. Similarly, Rehfeld et al. (2018) examined brain plasticity in a 6-month dance intervention (90mins sessions, 2x per week) in 38 older adults (63-80 years), compared with conventional fitness training group. Results observed evident differences in the effects on brain volume. In comparison to a traditional fitness group, greater volume increases in additional brain areas in dancers were observed, involving the 'cingulate cortex', 'insula', 'corpus callosum' and 'sensorimotor cortex'. Only the dancing intervention was related to increased plasma brain-derived neurotrophic factor levels.

However, in contrast, only one study found a null association between dance and brain volume in older adults. Neimann et al. (2016) examined gray matter brain volume in 57 older adults (72.9 years), who were either senior dancers or who were in a non-sedentary comparator group without dance experience. The findings reveal no significant differences observed in gray matter volume in the brain (for either voxel-based volume or hippocampal region brain analysis) in dancers when comparing to a non-sedentary age matched control group.

1.2.4 Quality of Life

Overall, seven studies examined the relationship between dance and quality of life in healthy older adults. Four studies found statistically significant improvements in quality-

of-life scores in older adults who took part in dance group activities (Garcia Gouvea et al., 2017; Shanahan et al., 2016; Brustio et al. 2018; Skingley et al., 2016).

Three uncontrolled, pre-post studies reported improvements in quality of life. Garcia et al. (2017) conducted an uncontrolled pre-post study in which a group of which older people (n=20, aged between 60-89 years) participated in a senior dance group for 3 months (40 classes). Quality of life was evaluated at pre-test and again at the end of the 3 months programme. Dancers reported improved quality of life, showing statistically higher scores in two of the four domains of quality of life ($p<0.004$) after the 3 months. The physical ($p<0.011$) and environmental ($p<0.001$) quality of life domains were significantly different pre and post-test. Brustio et al. (2018) examined the effects of a dancing intervention for 16 weeks (32 classes) on quality of life in a sample of n=163 older people (mean age=70 years) in a pre-post-test design. Results showed significant positive improvements in quality of life from taking part in the dance group. A post hoc analysis with Bonferroni, revealed a statistically significant increased score between baseline and post-testing in SF-12 physical health component (MD=-3.33 points; $p<0.05$) and mental health component (MD=-3.09 points). The results found that participants gained significant improvement in quality of life when participating in a 16-week dance class. Furthermore, Skingley et al. (2016) carried out a mixed methods study consisting of pre-post evaluations of older adults (n=21, mean age 71.1 years), participating in two groups of 3-month dance and arts 'Edna' programmes. Results showed that when analysed by domains, there was a significant difference in the psychological health domain following participation in the Edna programme when compared to the baseline scores ($t=-2.259$, $p<0.05$). This, however, was not evident for physical, social and environment domains of WHOQOL ($p<0.05$).

In an observational cross-sectional design study, Shanahan et al. (2016) examined quality of life in older, regular Irish Set dancers (n=39, mean age=64 years) who were attending weekly or biweekly set dancing classes 6 months prior to the study, compared with age-matched controls (n=33, mean age=69 years). The findings indicated that after 6 months, regular Irish Set dancers reported a significantly higher quality of life ($p=0.007$) in comparison to age-matched controls.

In contrast, no statistically significant differences were reported in three studies in relation to quality-of-life scores and participation in dance classes in older adults (Merom, Mathieu et al., 2016; Pacheco et al., 2016; O'Toole et al., 2015). In a cluster randomised control trial study, Merom, Mathieu et al. (2016) investigated a 12-month community folk, or ballroom dancing intervention impacted on the physical and mental health-related quality of life. Older adults (n=530, mean age=78 years) from self-care retirement villages were randomly allocated to a dance group (n=279) where they participated in a twice weekly social dance programme or in a control group (n=251) in which participants continued to spend time in their regular activities. Results found that quality of life scores on the SF-12 survey had decreased for both groups from baseline to post-test after 12 months (dancing group: physical domain score=-3.2 and mental domain score=-2.7; control group: physical domain score=-3.5 and mental domain score=-1.6). However, the differences reported were not statistically significant. When stratified by dance form, results showed a non-significant decrease within the mental health domain solely amongst the folk dancing participants (-2.1, $p=0.18$).

In a pilot intervention study, Pacheco et al. (2016) observed no significant differences for any of the domains of health-related quality of life scores in older people participating in a 12-week Colombian, Caribbean Folk-dance intervention (n=15, $z=-0.91$; $p=0.39$) pilot study,

compared with a comparator group ($n=12$, $z=-2.4$; $p=0.014$). In a mixed methods design using a quasi-experimental pre-post-test intervention design and focus groups, O'Toole et al. (2015) investigated the effects of 6-weeks of dance on health-related quality of life in older adults ($n=35$, aged 50+ years). No significant differences were found in quality of life. This intervention had a short duration period in comparison with some of the other dance interventions.

1.2.4.1 Older Adults living with Health Conditions

Four studies examined the relationship between dance and quality of life with older adults who reported living with a health condition. All four studies reported some gains in quality of life; however, these gains were not statistically significant in any of the included studies (Shanahan et al., 2017; Westheimer et al., 2015; McNeely et al., 2015; Marquez et al., 2015).

Three studies examined quality of life in older adults living with Parkinson's disease. In a randomised control trial, Shanahan et al. (2017) aimed to explore the effects of a 10-week Irish Set dancing intervention with older people with idiopathic Parkinson's Disease ($n=90$, mean age= 69 years). They reported greater non-significant gains in health-related quality of life for Irish Set dancers than those in the control group who maintained usual care (>40% attrition noted). Westheimer et al. (2015) examined the effects of quality of life among older persons with Parkinson's Disease. In a mixed methods study, 12 participants (mean age = 66.2 years) completed an 8-week (16 sessions) Dance for PD (DfPD®) intervention. No significant changes were found on health-related quality of life (PDQ-39SI) scores from baseline (25.3) to post intervention (25.1). Some participants reported benefits relating to their quality of life and wellbeing that were not reflected in quantitative changes. McNeely et al. (2015) compared a Tango dance intervention with a mixed style dance intervention Dance for PD (DfPD®) over a 12-week duration (24 sessions). Eight participants with Parkinson's Disease (mean age= 68.3 years) were matched to participants involved in a Tango dance class (mean age= 67.7 years). Results reported that no significant interactions of time or by groups were noted on the PDQ-39 scores of health-related quality-of-life.

Additionally, one mixed methods study examined older dancers with mobility limitations ($n=9$, mean age= 65.2 years) in a single group, 3-month pilot pre-post 'BAILAMOS®' Latin dance intervention. Marquez et al. (2015) reported improved physical quality of life in Latin dancers, with a small effect size ($d=0.31$), however, this not significant.

1.2.5 Self-efficacy and Self-esteem

Overall, one study investigated the relationship between dance and general self-efficacy in healthy older adults. However, the study reported a null association in self-efficacy or self-esteem in older adult dancers (Kosmat et al., 2017). No differences were found in the general self-efficacy between the experimental dance group and control group after participation in a 10-week dance intervention on a sample of 22 healthy older adults living in a residential care setting. Results found neither a significant main effect, nor group by session interactions were found.

1.2.5.1 Older Adults living with Health Conditions

One study examined the relationship between dance and self-esteem with older adults who reported living with a health condition. A statistically significant improvement in self-esteem after participation in dance classes in older adults with age-related macular

degeneration (ARMD). In an RCT study, Pinniger et al. (2013), examined the effects of Tango dance classes on self-esteem in 17 older adults with ARMD who were randomised to a 4-week Tango dance class (2 times per week) or into a 'wait-list control' condition. Tango group dancers showed significant increases in self-esteem ($F(1, 14) = 115.95, p < .001$, partial $\eta^2 = .89$) at post-testing relative to the controls.

1.2.6 Life Satisfaction

One study investigated the relationship between life satisfaction in healthy older adult dancers. This study found no statistically significant improvements in life satisfaction as a result of participation in dance classes. Kosmat et al. (2017) investigated the efficacy of a 10-week dance intervention life satisfaction on a sample of 22 older adults living in a residential care setting. Participants were randomly allocated to a slow waltz dance group or a control group and tested prior to the intervention and again at 5 months follow-up. Results found no significant main interaction effects and the group by session interactions were significant to a slight extent. When analysed after the completion of the intervention, no changes were observed over duration of the sessions in the dance group, and a significant decrease was found in the control group between post intervention and at follow-up testing ($MD = -2.00, p < 0.05$).

1.2.6.1 Older Adults living with Health Conditions

One study investigated the relationship between life satisfaction in older adult dancers living with age-related macular degeneration (Pinniger et al., 2013). Evidence on the impacts of dance on life satisfaction was limited, with one study reporting statistically significant improvements in satisfaction with life (Pinniger et al., 2013). In a RCT study, Pinniger et al. (2013), reported a moderate effect of increases in satisfaction of life in Tango dance on quality of life in 17 older adults with age-related macular degeneration (ARMD) who were randomised to a 4-week tango dance intervention (8 x 1.5 hr sessions) or wait-list control condition. Tango group dancers showed significant increases in satisfaction with life ($F(1, 14) = 18.65, p = .001$, partial $\eta^2 = .57$) at post-test, relative to the controls. In the qualitative aspect of the study, participants described "what they liked best about the activity was the challenge and satisfaction of achievement, while several people made positive remarks about the tango team and music."

1.2.7 Social Engagement

Two studies assessed the relationship between dance and social engagement in healthy older adults. One study found a statistically significant improvement in social engagement scores in healthy older adults from taking part in dance group activities (Brustio et al., 2018).

Brustio et al. (2018) examined social engagement in 163 older adults (mean age = 70 years) who participated in a 16-week dance intervention for 60 minutes, twice a week. Results found that significant improvements in social engagement were noted after the 16-week dance training intervention. A post hoc analysis revealed that dance participants performed significantly higher on social engagement scores in the Lubben Social Network Scale ($MD = -1.56$, points $p < 0.001$), between baseline and post-testing, indicating dance participants achieved higher social support levels.

In contrast, one study found no statistically significant changes in social networking as a result of participation in dance classes. Merom, Grunseit et al. (2016) examined an 8-month

(69 sessions) ballroom dancing intervention through a two-arm randomised control trial in 115 older adults (mean age= 69.5 years) and reported no significant between-group effects for social networking (between social dancing and walking) ($p>.05$).

1.3 Qualitative Findings

Qualitative studies also encapsulated improvements to both psychological and physical health and wellbeing in older adult dancers, and the results echo health outcomes identified in quantitative findings. Qualitative research on dance and the effects on older adults has reported a number of social and psychological wellbeing and physical health themes.

Skingley et al. (2016) interviewed 21 participants with regards to their views of participation in the 'Edna' arts and dance programme as part of an evaluation. Participants reported that they enjoyed the programme and expressed that they really enjoyed the 'social side', meeting people through the programme and participating in doing things as a group. The social benefits reported formed the largest noted benefit, with participants frequently reporting how they have enjoyed meeting other people, enjoy others company, and admire their skills. Participants reported psychological benefits from engaging in arts and dance such as greater confidence, enjoyment, and fun, losing inhibitions, and feeling uplifted. The majority of participants believed that they had learned new skill acquisition and art and dance abilities. Many participants also noted how they desired the programme to continue in the future. Participants also noted physical benefits from taking part such as improvements in their physical wellbeing such as shoulder movements, posture, breathing, feeling energised or general movement and exercise.

As part of a mixed methods study, O'Toole et al. (2015) carried out qualitative focus groups with 35 older people attending dance classes. Participants reported that they enjoyed the programme and perceived an enhancement in their physical abilities, increased energy levels and a 'new lease of life'. They also reported feeling less restricted in their physical movements. In addition, participants reported having increased emotional and psychological wellbeing and positive experiences as a result of participation in the programme in which they received a realisation that they were more capable than they realised prior to participation. Some participants also noted feeling better, having improved mood and increased confidence following the programme. Furthermore, participants reported the benefits of participation in that they had seen improved in their activity levels with regards to participation in both the home and community and had become less restricted from being in their home. Participants also noted favourable aspects of the programme, they found it fun, the content enabled them to exercise in an enjoyable manner and they particularly enjoyed the "integration of free movement into the dance routines". They enjoyed the non-judgemental attitude of the instructors and felt that the routines were adapted to suit their level of physical ability. Again, participants noted that they would like to see continuation of the programme in the future.

Britten et al. (2017) examined the benefits of participating in a contemporary dance intervention. Qualitative analyses revealed that participants reported both physical and psychological benefits ascribed to participation in the dance programme. Physical benefits reported were seeing decrease pain, stiff joints, improved energetic levels, balance, and co-ordination. Psychological benefits were also noted, as participants reported how they perceived the programme 'use(d) their brain' to practise routines. They also reported positive effects on their quality of life and mental health. Participants within the

programme also noted some barriers to participation (e.g., physical barriers were identified as living with existing health conditions reduced their ability to perform some of the dance routines but noted that the instructor adapted these to facilitate easier movements. Location and community centres were perceived as being important, alongside accessibility, financial cost, and travel).

1.3.1 Older Adults living with Health Conditions

Two qualitative studies investigated the impact of dance in older adults living with diagnosed health conditions. Marquez et al. (2015) carried out focus groups with 12 older people who reported having a mobility limitation as part of a wider mixed methods study examining Latin dance programme BAILAMOS©. Participants noted that they favoured dancing as they believed it is a total body movement and is a social activity. Participants perceived that dancing accrued more benefits for their physical health in comparison to other types of physical activity and it improves their ability to move around. Participants also noted the cognitive benefits such as it 'improves your thinking'. Participants also noted that the programme challenged them, and they gained satisfaction in accomplishments, they also reported an increase in their self-esteem. Previous barriers were noted by participants such as not to being able to participate in dancing due to personal safety and the lack of availability and access to programmes (e.g., some dance programmes and facilities not available, limited times, cost accessibility and affordability).

Westheimer et al. (2015) examined the impact of dance for PD on older people with Parkinson's disease. As part of this study, interviews were conducted with 12 participants attending the programme and a number of physical, emotional, and social benefits were reported: sense of companionship and camaraderie, enjoyed the programme, loosening up, friendly people, more aware of health and body movements and movements more fluid, beneficial to exercise at different levels. Participants also identified: improved quality of life, body movements feel looser and not as stiff, interesting to learn, challenging, walking better, contentment and made good friends, better communication, enjoyment of exercise, inspiration. Participants have reported that the classes have impacted on their quality of life by helping to strengthen themselves physically and psychologically, kept them busy and challenged and their general health has improved. They reported attending classes as some participants reported that they gained a sense of feeling like they are 'all in it together', liked the routine and familiar faces, determined to feel better and the class helped them to do this, pleasant and fun, commitment and seeing other people improving.

2. Impact of Music and Singing

2.1 Physical Health and Wellbeing

2.1.1 Respiratory Function

One study examined the effects of singing on respiratory function and showed significant improvements. Specifically, Fu et al. (2018) examined the effects of a 12-week group singing programme on lung function and respiratory muscle strength. Findings showed that participation in the singing programme revealed significant enhancements in respiratory muscle strength, maximum inspiratory ($p < 0.001$) and expiratory pressure ($p < 0.001$). These changes, however, did not reach recommended clinical concentrations. There were also significant changes observed in in-session oxygen saturation levels ($p = 0.03$). However, no changes were detected in forced expiratory volume ($p > 0.05$).

2.1.2 Motor Performance

Overall, one study examined the effects of music making on motor ability and showed significant improvements. Seinfeld et al. (2013) examined the effects of piano musical training on motor ability in 14 older adults who participated in a 4-month piano training programme and who were compared with a control group. Motor ability was measured through the Finger Tapping Test (FTT), the Grooved Pegboard Test and the Block Design Test which is a component of the WAIS-III test. Significant improvements in manual dexterity were observed from baseline to post intervention. A significant interaction by condition over time was observed in the right hand ($\eta^2 p = 0.43$, $p < 0.001$), and left hand in the finger tapping tasks ($\eta^2 p = 0.59$, $p < 0.001$). Furthermore, performance in the Grooved Pegboard and Block Design tasks observed no significant changes.

2.1.3 Sleep Quality

One study examined the effects of singing on sleep quality and demonstrated some promising improvements, however, no significant improvements were observed in sleep quality. In their RCT, Yap et al. (2017) found that participation in rhythm centred music making resulted in increases in sleep quality scores over time, however, these gains were non-significant from pre intervention to follow-up. Participation in rhythm centred music making resulted in a 22.4% increase in the odds of gains in sleep quality scores when compared to control group participants over time, however, again these gains were non-significant from pre intervention to follow-up.

2.2. Psychological Health and Wellbeing

2.2.1 Cognitive Function

Overall, four studies examined the effects of music and singing on cognitive function. Three of these studies showed significant improvements in cognitive function in older adults who participated in a choir (Fu et al., 2018; Sun et al., 2013) or in music training (Seinfeld et al., 2013).

Two studies demonstrated significant improvements in some aspects of cognitive function in older adults participating in a group choir. Fu et al. (2018) examined the effects of a 12-

week group choral singing programme on cognitive domains in 42 older adults in a quasi-experimental design. Significant improvements were observed in dancers over time, from baseline to follow up testing. In particular, improvements were detected in 'phonological' ($p < 0.001$) and 'animal' ($p = 0.004$) semantic verbal fluency tasks. Performance had also improved on immediate word recall tasks ($p < 0.001$). However, whilst observing some indication toward trend level change, no statistically significant differences were observed over time for the delayed word recall test, psychomotor speed and executive function as measured by the trail making tests ($p > 0.05$).

In a case-controlled design, significant improvements were observed in a singing group. Sun et al. (2013) examined executive function in a 15-month comparator intervention in 720 older adults. Participants attended either musical instrument playing group, a singing group, a dance group, a Tai Chi group, or a control group who engaged in education classes. Results found that participants in choral singing groups showed significant differences in executive function when compared with the control group. Participants who engaged in the singing groups ($d = 0.50$, $p = 0.001$) and Tai Chi ($d = 0.57$, $p = 0.001$) demonstrated having the greatest executive function scores amongst intervention and control comparators.

With respect to music training, Seinfeld et al. (2013) compared the effects of a 4-month daily piano training intervention with an age-matched control group (other leisure activities) on cognition in 29 older adults. Results found significant improvements in divided attention, inhibitory control, and executive function scores, which were observed in performance on Stroop scores in the piano training group. Participants increased their accuracy in the number of words and corresponding colours detected after participating in the piano training intervention (SC: $\eta^2 p = 0.16$, $p = 0.027$; SCW: $\eta^2 p = 0.54$, $p = 0.042$). In contrast, the control group did not demonstrate corresponding changes over time. A positive trend was found on performance of visual scanning scores, in comparison with the control group; however, this was not significant.

However, in contrast, one RCT study failed to demonstrate a significant change in cognitive performance in a choir singing group (Johnson et al., 2018). Johnson et al. (2018) examined the effects of choir singing through the 'Community of Voices' intervention in a cluster randomised design (12 older adult centres). Participants were randomly assigned into two groups, a choir intervention group or a wait list control group who commenced participation in the choir six months later ($n = 390$). The results found no significant interactions were detected for cognitive outcomes such as memory and executive functioning by group or time differences at the end of the six-month intervention ($p > 0.05$).

2.2.2 General Wellbeing, Quality of Life and Self-esteem

Overall, twelve studies (eleven distinct populations) investigated the effects of music and singing on well-being, quality of life and self-esteem. Nine of these studies showed significant improvements in either, wellbeing (Creech et al., 2013; Perkins et al., 2014; Sun et al., 2013; Teater et al., 2014), quality of life (Coulton et al., 2015; Seinfeld et al., 2013; Johnson et al., 2013; Hallam et al., 2014, 2016) or self-esteem (Bugos et al., 2016) in older adults.

2.2.3 Wellbeing

Wellbeing outcomes were ascertained in four studies. Using the same three UK community music programmes to investigate an active music making intervention as Hallam et

al. (2016) below, Creech et al. (2013) examined the effects of an active music making intervention (playing instruments, writing songs, and singing) on subjective wellbeing in 389 older adults, over 9-months, using a mixed methods approach. Participants attended one of three UK community music programmes (The Sage Gateshead, the Connect Programme of the Guildhall School of Music and Drama; and the Westminster Adult Education Service) or were in a control group who took part in other class activities which did not involve music. The quantitative component examined subjective wellbeing using the CASP-12 and the Basic Needs Satisfaction Scale. Results found statistically significant higher scores in the sub-scales of control ($F = 25.3$ (1,415), $p = .0001$) and pleasure ($F = 15.73$ (1,420), $p = .0001$), in music making participants compared with a non-music comparator group. No significant differences were observed on the CASP sub-scales of autonomy or self-realisation ($p > .05$). With regards to basic needs, music participants scored significantly higher in relatedness ($F = 9.82$ (1,388), $p = .002$) and total basic needs ($F = 6.79$ (1,361), $p = .01$), compared with controls. Factor analysis results showed that these scores were significantly positive on sense of purpose, control and autonomy and social affirmation factor domains in the music group, compared with the control group.

Perkins and Williamon (2014) compared the effects of a 10-week music learning programme on wellbeing in 98 older adults (in either a music learning group with lower SES, a music learning group with higher SES and a comparison group with higher SES who did not take part in any music learning) using a quasi-experimental design with a mixed methods study. After 10 weeks, significant improvements on wellbeing and overall health promoting behaviours were found for all groups over time (Short-WEMWBS, $p < 0.01$). Whilst no significant interactions between group and time were found on wellbeing scores, a significant association was observed between time and group on two of the health promoting domains, namely 'physical activity' ($F(2,95) = 3.51$, $p < 0.05$), and 'spiritual growth' ($F(2,95) = 3.91$, $p < 0.05$). The results suggest that although performance of mean scores for all the groups increased over time, the level of increase was higher for participants who had been learning music with a higher socio-economic status.

Sun et al. (2013) examined the effects of a 15-month comparator intervention (either musical instrument playing group, a singing group, a dance group, a Tai Chi group, or a control group who engaged in education classes) on resilience in 720 older adults in a case-controlled design. Results found that participants in the dancing, choral singing groups and musical instrument groups showed significant differences in resilience when compared with the control group. Small effect sizes were observed for resilience scores in participants who engaged in the singing group ($d = 0.22$), dance group ($d = 0.23$), music instrument ($d = 0.15$) was observed. Tai Chi revealed a medium effect ($d = 0.41$). Participants who engaged in the singing, Tai Chi groups, dancing groups and musical instrument playing groups exhibited higher levels of health-related quality of life, which included 'psychological and physical health, spiritual meaning, social skills, and self-esteem', when compared with the control group.

Additionally, in an uncontrolled pre-to-post-test design, Teater and Baldwin (2014) examined the effects of a 3-month singing community arts programme, 'the Golden Oldies' (60mins per week) in 120 older adults (mean age=74 years; 82.5% female) in a mixed methods study. Quantitative results found a statistically significant increase in overall health mean scores over time ($t(115) = -4.96$, $p < 0.001$), as a result of participating in a 3-month singing programme.

2.2.4 Quality of Life

Quality of life outcomes were identified in two group singing studies. Coulton et al. (2015) carried out a pilot randomised control trial to examine the effects of a group singing intervention quality of life. 258 older adults were randomised into either a group singing programme or a control group which carried out activities as usual. Participants in the group singing intervention group took part in weekly singing sessions (90mins) over a 14-week period which was facilitated by experienced music practitioners. Findings showed group singing can improve mental health related quality of life. Group singing participants showed improvements in mental health related quality of life, the mean differences between the group singing and control group was significant at both three months ($p < 0.01$) and at a six-month follow-up ($p < 0.05$). However, no significant differences were found between the groups for the physical factor of health-related quality of life at the six-month follow up.

Johnson (2013) also examined the effects of a community choir singing on quality of life in a cross-sectional study in 117 older adults. Significant associations were observed between the benefits of choral singing and across three quality of life domains including psychological, social relationships and environmental but not for the physical component. These relationships remained when analyses were adjusted for age and symptoms of depression. Participants who reported benefits of group choral singing had greater levels of quality of life across several components.

Two studies examined the impact of music making on quality-of-life outcomes. In the study by Seinfeld et al. (2013), the effects of a 4-month piano musical training intervention were examined on quality of life in 14 older adults in a quasi-experiment. Results found that participation in piano lessons improved both psychological and physical quality of life. A significant group by condition interaction was found for the physical health component of quality of life ($\eta^2 p = 0.20$, $p = 0.015$) and in the psychological health component ($\eta^2 p = 0.151$, $p = 0.045$). Participants in the piano group improved in their performance over time in comparison to control group participants whose scores decreased or stayed the same over time. No significant effects were observed for social and environmental health quality of life domains. In addition, Hallam et al. (2014, 2016) examined the impact of an active music making intervention using a mixed methods approach. Results showed significant positive improvements in quality-of-life scores were consistently observed amongst music participants. Specifically, with regards to a sense of purpose with a positive outlook on life ($F = 12.39$ (1,340), $p = .0001$, effect size = .19), autonomy and control ($F = 7.423$ (1,340), $p = .007$, effect size = .15) and social affirmation ($F = 4.19$ (1,340), $p = 0.041$, effect size = .11), compared with participants in the control group who did not participate in music making activities. These benefits persisted into later life, for those participants aged over 75 years ($p < .05$).

However, in contrast to the studies detailed above, two studies demonstrated some promising observations in improvements in quality of life but failed to demonstrate a significant change in a music making programme and a singing group (Yap et al., 2017; Fu et al., 2018). In an RCT with a cross over design, Yap et al. (2017) examined the effects of a 10-week rhythm centred music making intervention on quality of life in 31 older adults (mean age = 74.65 years). Group A participated in a 10-week music making intervention, whilst group B served as a control group in the first stage of the intervention. This changed in the second stage of the intervention as group B then participated in the music making intervention, whilst group A served as the control comparator. Results identified that participation in rhythm centred music making resulted in a non-significant 37% increase

in odds of enhancements in quality-of-life scores when compared to controls who did not engage in music making. Furthermore, Fu et al. (2018) examined the effects of a 12-week group singing programme on quality of life in a quasi-experimental study. They found that although a minor positive change was observed from participation in the programme on quality of life, these results were not significant ($p > .05$).

2.2.5 Self-efficacy

Furthermore, Bugos et al. (2016) examined the effects of piano training on general self-efficacy and musical efficacy in 17 older adults in an uncontrolled pre-to-post-test design. Results found that participation in the intense piano training significantly improved musical self-efficacy over time ($d = .79$, $p < .001$). However, no significant changes were observed in general self-efficacy scores ($p = .25$) over duration of the programme. The authors suggest that this is a short-term programme, which may affect the results; a longer timeframe might be more beneficial to see sufficient gains.

2.2.6 Psychological Distress – Depression, Anxiety, and Mood

Overall, seven studies examined the effects of music and singing on depression, anxiety, and mood. Four of these studies showed significant improvements in depression (Coulton et al., 2015; Seinfeld et al. 2013; Sun et al. 2013), anxiety (Coulton et al., 2015), and mood (Johnson et al., 2018; Seinfeld et al., 2013) in older adults.

In an RCT, Coulton et al. (2015) examined the effects of a group singing intervention on anxiety and depression. The results revealed significant differences were found between the groups for anxiety ($p < 0.01$) and depression ($p < 0.01$) after three months. However, no significant differences were found between the groups for anxiety ($p = 0.13$) or depression ($p = 0.14$) at the six-month follow up.

Johnson et al. (2018) examined the effects of a community choir singing intervention on interest in life (affect) in a cluster RCT. Participants were randomised into two groups, a choir intervention group and a wait list control group which started six months later ($n = 390$). Singing group participations experienced significantly greater improvements in affect with a greater interest in life reported ($p = .008$), and an effect size of 0.39 observed, in comparison with the control group, over 6 months.

Seinfeld et al. (2013), compared the effects of a 4-month piano musical training intervention on depression and mood in 14 older adults in a quasi-experimental study. Results found that symptoms of depression reduced for both the piano group ($MD = 3.23$) and the control group (who took part in other forms of leisure activities) ($MD = 1.56$) over the duration of the programme. A significant main interaction for condition was found in depression scores, ($\eta^2 p = 0.21$, $p = 0.012$) and a significant group by condition effect was observed for performance on the fatigue component ($\eta^2 p = 0.20$, $p = 0.015$) and in positive mood total scores ($\eta^2 p = 0.16$, $p = 0.036$) on the POMS measure. Symptoms of fatigue and psychological distress (total score) declined over time in the piano group ($MD = 6.37$). In contrast, the control group observed contrary results which suggested that fatigue ($MD = 2.62$) and psychological distress symptoms ($MD = 1.06$) increased over time.

Sun et al. (2013) examined the effects of a 15-month comparator intervention on psychological distress and depression in 720 older adults in a case-controlled design. Results found that participants in dancing and choral singing groups showed significant differences in incidence of depression when compared with the control group ($p < .05$).

The results showed that the control group displayed larger incidence rates of depression of around 10%, compared with the music, singing and dance groups which displayed incidence rates of depression ranging from 2-7.5%.

However, in contrast to the studies detailed above, two studies demonstrated some promising observations in improvements in depression scores (Yap et al., 2017) and in physiological stress reaction but failed to demonstrate a significant change in music making programmes (Bugos et al., 2016). Yap et al. (2017) carried out a randomised control trial with a crossover design on the effects of a 10-week rhythm centred music making intervention on depression in 31 older adults. Results found that participation in rhythm centred music making resulted in non-significant decrease in depression scores by 0.479 over the 6-months period and elicited 55.3% non-significant odds of enhancements to depression scores in comparison with control group participants. Bugos et al. (2016) examined the effects of piano training on assessing a physiological stress reaction in 17 older adults. Results found no significant changes were observed on physiological stress as indicated by cortisol levels ($F(2,26)=.04$, $p=.94$) in participants attending intense piano training over duration of the 4-weeks programme.

One study identified an unfavourable result and identified a worsening in depression scores for one group. Davidson et al. (2014) examined depression scores in an 8-week singing programme and results showed that incidentally, mean depression scores saw a reduction over the duration of the intervention for the 'Silver Chain' group in receipt of home help, from a mean of 1.9 to 2.8 ($p=0.05$). However, whilst the results were statistically significant, the authors suggest that the increased score would not be deemed as being clinically meaningful as the scores remain within the normal range. A person would be considered as possibly being depressed with a score above 4. No corresponding differences were noted in the community group.

2.2.7 Loneliness and Social Networks

Overall, three studies examined the effects of music and singing on loneliness and social networks. One study showed significant improvements in loneliness (Johnson et al., 2018) in older adults.

2.2.7.1 Loneliness

Johnson et al. (2018) examined the effects of a group community choir singing intervention on loneliness in a cluster randomised into two groups, a choir intervention group and a wait list control group which started six months later ($n=390$). Singing group participants experienced significantly greater decreases in loneliness ($p=0.02$, effect size 0.34) and interest in life ($p=.008$) with an effect size of 0.39, in comparison with the control group, over 6 months. This suggests that the choir group showed decreases in loneliness over the six-month period, compared with the comparator group who showed no changes.

However, in contrast to the Johnson et al.'s (2018) study, one study demonstrated some promising observations in improvements in loneliness scores but failed to demonstrate a significant change in a singing programme (Davidson et al., 2014). In addition, one study did not demonstrate any significant differences in social engagement scores in a music making programme (Yap et al., 2017). Davidson et al. (2014) examined the effects of an 8-week singing programme on loneliness in 36 older adults who either lived independently within a Silver Chain community and who received home help and assistance with domestic tasks or older adults who lived within the community. No statistically significant differences were

observed between the Silver Chain group and the community group on loneliness scores (UCLA) ($p > .05$). Results showed that there were no changes in loneliness scores over time.

2.2.7.2 Social Networks

With regards to social networking, Yap et al. (2017) carried out a randomised control trial with a crossover design examining 6-month rhythm centred music making training in 57 older adults. Participation in rhythm centred music making resulted in increases in social network scores over time, however, these gains were non-significant from pre intervention to follow-up. Participation in rhythm centred music making resulted in decreases of 14.5% increase in the odds of gains in social network scores when compared to control group participants over time, however, these gains were non-significant from pre intervention to follow-up.

2.3 Qualitative Findings

The findings from the quantitative studies are echoed in the 16 qualitative and mixed method studies which report wellbeing outcomes as a result of participation in music and singing programmes for older adults. In a mixed methods study, Creech et al. (2014) used open ended questions to investigate singing and playing musical instruments in 398 older adults. This qualitative research formed part of the larger mixed methods study reported above (Creech et al., 2013). A number of themes emerged that depicted participants' advancement of their self-concept through being a musician, being involved in music has provided new life opportunities and they have been able to redefine their lost musical selves and rediscover themselves through reminiscing about their past music experiences. The data revealed that this provides a sense of purpose in the majority of participants' lives, particularly in terms of providing structure and routines, whilst working toward new goals and acquiring new skills. Music was very valuable and helped participants to develop themselves and provided a continuous sense of autonomy and control in their lives, having the freedom to explore, express themselves and be creative. Musical performances provided opportunities to receive social affirmation and validation.

Perkins and Williamon (2014) measured the effects of a 10-week musical instrument learning programme on wellbeing in 98 older adults using a mixed methods design. 21 participants (mean age=64.38 years) took part in further qualitative interviews which highlighted how music learning impacted on subjective wellbeing. Six themes were identified. Results highlighted how learning to play musical instruments can enhance participants' experiences of pleasure and happiness and their social interactions as it gave them an opportunity to meet new people, socialise and learn from each other. The third theme depicted how engaging with music had facilitated and "enhanced engagement in day-to-day life" and created spaces to play in and new interests found. The fourth theme centred around participants' love of music and their fulfilment of musical ambition, whilst the fifth theme captured participants' ability to make music. Finally, participants reported that they gained self-satisfaction through their progression in music. The programme provided them with a supportive environment which helped them to progress and meet their goals.

In a descriptive analysis of an end of a choral programme survey, participants indicated that they had gained elevated levels of enjoyment, learned diaphragmatic breathing techniques, and felt healthier and happier as a result of participating in the programme (Fu et al., 2018).

Skingley, Martin and Clift (2016) examined the impact of a 14-week singing programme on wellbeing in a qualitative study housed within a RCT. Written comments of participants' experiences over three assessment points within the singing programme were analysed in addition to a subsample in which 19 participants took part in qualitative semi-structured interviews. Results suggested that participation in the singing groups resulted in particular and cumulative benefits to physical, psychological, social and community wellbeing. The researchers suggested that these benefits tended to dwindle after the programme had ended. Specifically, participants found it an enjoyable experience, feel healthier and that their general health and fitness had improved or remained good during the course of the programme. The majority of participants indicated that they had "gained a sense of wellbeing, improved self-confidence, and greater confidence in singing, as well as cognitive stimulation and memory improvement" as a result of participation in the singing programme. Many also highlighted the impacts of the programme on their social wellbeing such as meeting like-minded people and making new friends, gaining "peer support", "getting to know their local community", as well as the programme helping to counteract loneliness.

With regards to physical health and wellbeing, participants believed that they had gained better respiratory function, stamina, improved posture, and voice projection as well as the ability to cope with aches and pains. Furthermore, some motivational factors were considered in reasons for attending the programme. Participants gave several reasons such as their love for music and singing, the anticipated health benefits, engaging in a social activity, with many nearing, or in, retirement. Participants also described good facilitators, well administered, convenient times and accessible venues, spacious and light environments, choice of songs as reasons for highlighting a good programme or continuing participation. Some barriers to participation included inadequate times, heating, noise, lack of daylight and old song material. The majority of participants expressed disappointment with the project ending.

Southcott and Sicong (2018) examined the impact of singing lessons on older adults' health and wellbeing in a qualitative study. To gauge real life experiences and attitudes, 13 participants partook in semi-structured interviews. Five themes emerged. The first detailed that emotional wellbeing was the most significant impact reported by participants highlighting that, as a result of taking part in the singing lessons, they have gained enjoyment, confidence, a sense of purpose, experienced a transformation and it helped to overcome loneliness. The second theme depicted physical wellbeing, whereby participants reported that singing helped alleviate pains and illnesses, promoted body movement, and improved respiratory function. The third theme identified participants' beliefs that it improves their mental wellbeing and promotes cognitive function and learning new things which can enhance quality of life. In contrast, two participants felt that it was more important to have fun, rather than learn new things, as this was not a desire for them personally. Finally, musical preferences were important to participants and discussed by many who shared similar experiences, often evoking memories and nostalgia. Sharing their music with others was well received and often presented personal validation.

Baker and Ballantyne (2013) examined the effects of group song writing and performing in older adults living within retirement villages using a qualitative study. Eight participants engaged in five group song writing programmes over a 3-week period. They participated in focus groups and written questionnaires and reported that engagement in the programme enhanced their enjoyment and pleasure (The Pleasant Life), positively affected their emotions, improved their confidence, self-esteem, and wellbeing. Participation in the song

writing and performing group also enabled participants to develop a sense of mastery, accomplishment, meaning and to participate in the creation and performance of their own songs (The Engaged Life). Participants developed a sense of belonging, with enhanced social interactions, connections amongst the group members as well as with others in the wider community (The Meaningful Life).

Davidson (2014) evaluated the effects of an 8-week group singing programme on older people's wellbeing in a mixed methods study. In the qualitative component of the study, participants took part in written questionnaires and semi-structured interviews. In contrary to null findings reported in their quantitative analysis, the qualitative findings suggest evidential positive impacts from participation in the singing intervention, with participants reporting positive experiences and outcomes. The majority of participants reported positive experiences in relation to the singing programme both during and after participation. Participants recounted developing singing skills and their knowledge in music as well as gaining self-confidence in their performing skills, reduced stress and improved mood and happiness. Social outcomes encompassed becoming a member of a group, unity with others, sense of belonging and acquiring emotional experiences. However, quantitatively only 45% of participants reported that they had made social contacts and 31% felt they had developed artistic expression. In follow-up interviews, participants reported that the singing experience had made a marked difference to their lives.

Ellis et al. (2018) examined the effects of a U3A group Ukulele class on wellbeing and resilience in 21 older adults in a mixed methods study. Participants reported on their general wellbeing, physical abilities relevant for being able to play the ukulele, motivations, and musical preferences, in an initial survey and again, at a follow up focus group. Descriptive results reported generally fairly positive feelings about themselves, however, there was little evidential change reported at follow-up as participants scored highly at the outset. Qualitative focus groups reported musical tastes that were varied, and participants had shown a willingness to learn. Some participants reported being able to distinguish particular sounds, recognise chord changes and improved singing. Social outcomes such as liking the company, it being fun to be part of a group, sharing ideas and having the support of others were also noted.

Joseph and Southcott (2015) examined community choral singing on social outcomes in qualitative interviews as part of a wider study with members of the U3A choir. Two themes emerged from the data. The first theme was musical engagement, where participants highlighted the value of childhood musical experiences, finding security within shared music making, music engagement as a lifetime interest and expanding musical horizons. The second theme was social connections, where participants reported the benefits of choral singing on being able to engage in regular shared activities, making new friendships, socialising, companionship, overcoming isolation, a sense of belonging and feelings of acceptance. Southcott and Joseph (2015) examined community choral singing (La Voce Della Luna) on social outcomes in a qualitative study which is part of the larger wellbeing research project from the wellbeing and ageing study in Victoria, Melbourne. Two themes emerged through the focus groups and semi-structured interviews, consisting of social connections, and tackling isolation as well as music making and social justice.

Joseph and Southcott (2018) examined community choral singing groups on social outcomes in 22 older adults across five choirs (U3A, Bosnian Behar Choir, Coro Furlan, Skylarkers and La Voce Della) in a qualitative study. Interview and focus group analysis revealed three key themes emerging from the data, detailing that participation in choral

singing enhances social connections, helps to combat social isolation, cultural experiences and offers a sense of belonging. The second theme highlighted that the choral singing groups provided a sense of wellbeing, in terms of physical, cognitive and emotional wellbeing and transformative experiences. The third theme centred around musical engagement which incorporated previous musical experiences, increasing confidence and music learning. The researchers report that engagement in community choral singing provides opportunities for positive ageing, offering a sense of fulfilment, resilience, social cohesion, and community engagement.

Lamont et al. (2018) examined the effects of a community choir in older adults in a qualitative study, at the start and end of a 4-year period. Participants engaged in interviews and focus group and a World Café discussion. Choir group members highlighted the benefits of participation and detailed the importance of developing social relationships within a supportive community. Musical achievement was essential to the ongoing development of the choir. Five key themes emerged including personal investment and reward which reflected participants' high levels of commitment, hard work, pleasure, enjoyment, and accomplishments which produced positive emotions. The second theme detailed the sense of an inclusive community where participants felt that they had co-operation and support. The third theme denoted that the choir had continuously been evolving over time, but its essence and identity remained essentially untouched. Many reported their achievements, progress, and accomplishments over time. The fourth theme set out the desire of participants to connect and link with others. The final theme denoted the leadership and organisation abilities of the choir and the important roles that members played. The researchers highlight that sustainability is a major concern, with members having to take on responsibility for finances and provide their own financial resources. Keeping costs low and fundraising opportunities were seen as crucial for sustained success.

Lee et al. (2016) examined the effects of regular community group singers in a qualitative study on motivating factors in 64 older adults (aged 55-95 years). Focus groups were conducted with members of three community singing groups. Themes revealed reasons for the motivating factors of why singers continued their participation, this included: the importance of singing in their lives; enjoyment, and pleasure of singing without the pressure; the challenge and achievement gained from singing; singing provided spiritual and uplifting emotions; feeling strong and overcoming challenges and hardships, particularly in age and disease; good leadership; fellowship with others and being involved in the singing community group which has provided them with a purpose and meaning.

Teater and Baldwin (2014) conducted interviews with 120 older adults who participated in the Golden Oldies singing arts programme. Qualitative evidence from the study suggests that the Golden Oldies singing art programme has reduced social isolation and increased social contact through breaking down barriers and making new friends or reconnecting with past friends. It is seen as a therapeutic source as participation helped to overcome difficulties and participants felt they had gained a new lease of life. Findings indicate the programme helped to improve physical and emotional health.

Soderman and Westvall (2017) examined the effects of a music making and musical activities group on the wellbeing of older adults in a qualitative study. Participants aged 50-65 years took part in semi-structured interviews and field notes were analysed. Through playing music, participants expressed that singing and music have provided health benefits. Participants suggest that music has helped to contribute to an increased quality

of life, good for memory function, they have developed a sense of purpose, empowerment, and autonomy. It has also helped to develop their music making skills and creativity.

Hallam and Creech (2016) examined whether active music making can promote health and wellbeing in older adults in a mixed methods study. Within the qualitative component, a sample of participants from the three-community music making sites completed in-depth interviews and focus groups with the facilitators of the programmes. The qualitative analysis revealed cognitive benefits demonstrating the acquisition of new skills, providing challenge, a sense of achievement and improvements in concentration and memory among participants. The second theme denoted the health benefits acquired such as increased vitality, improved mental health and mobility and participants reported that they felt rejuvenated. The final theme reported a number of emotional benefits as a result of participation in the music making group, namely, feeling protected from stress and depression, acquiring support following a bereavement and it provided a sense of purpose, positive feelings, confidence and offered opportunities for creativity.

The effects of choral singing on health benefits were reported in a qualitative study. Fu et al. (2015) examined the effects of choral singing programmes through focus groups. Participants consisted of both residents (n=28) and staff (n=6) who were engaged in the programme. Themes identified overall perceived health benefits that were associated with group singing. These included brain health (reminisce and remember wonderful memories and promotes cognition to remember words), psychosocial health (such as promoting social interaction, encouraging engagements and singing being good for depression and mental illness) and also supports lung health (using the muscles aptly helps the respiratory system, and promotes the use of lungs). In addition to identifying health benefits, the residents and staff also gave their views on the workings of the programme. Residents reported that they preferred to join a singing group that had an informal leisure structure and in a locale that was close to where residents lived. A schedule of 30 to 60min sessions in the afternoon, once a week was the most favoured. The residents also reported that song choice, live musical instrument accompaniments, leadership, and knowledgeable professionals and a comfortable environment were all important to enable a positive singing experience. Programme staff discussed a number of indicators for a successful programme, these comprised effective partnerships with residents and inclusion within planning, being knowledgeable about community needs, adequate and clear advertising, providing a foods and drinks service, appropriate scheduling and duration, effective leadership and a well-run programme, consistency, and an adequate budget.

With regard to physical health, Skingley et al. (2016) found that participation in a 14-week singing programme led to "better respiratory function, more stamina, ability to cope with aches and pains and improved posture". Ellis et al. (2018) found that participants reported participation in the programme had helped to increase some physical aspects of their health such as dexterity and flexibility. However, some found that arthritic fingers can be a hindrance in participation.

3. Impact of Visual and Creative Arts

3.1 Physical Wellbeing

With regards to physical wellbeing, one study (Phinney et al., 2014) found a statistically significant reduction in chronic pain, showing a medium effect size ($d=0.52$, $p<.05$) and an increase in perceived physical health status over time ($d=0.41$).

In addition, Pearce and Lillyman (2015) examined the effects of four creative arts programmes in 52 older adults within a cross-sectional study. Descriptive analysis reported that participants described positive responses of how the programmes made an impact. Most participants said that they had improved social interactions, feelings of being less isolated, formation of new relationships and improvements to wellbeing. The most recurrent benefits recognized were improvements in movement ability, mobility, and balance. These results were supported by qualitative results.

3.1.1 Daily Living Activities

Overall, one study assessed the relationship between participation in visual arts and activities of daily living in healthy older adults (Phinney et al., 2014). No statistically significant improvements were found in daily living activities in healthy older adults as a result of taking part in visual art group activities, with average scores indicating that individuals were independently able to carry out daily activities (Phinney et al., 2014).

3.1.1.1 Older Adults living with Dementia

In addition, one study found significant improvements in activities of daily living in older adults living with dementia (Camic et al., 2014). Camic et al. (2014) examined the effects of an 8-week art making and art viewing programme based in an art gallery in older people living with dementia and their carers, in a mixed methods study. 26 participants completed the 'Meet me at MoMa' dementia programme by attending a 2hr arts session once a week (1-hour viewing and then 1-hour art making), across two sites (Dulwich Picture Gallery and the Nottingham Contemporary). Activities of daily living were assessed using the BADLS which was evaluated by a carer. Results showed that statistically significant differences were found in activities of daily living scores over time ($p<.05$).

3.2 Psychological Wellbeing

3.2.1 General Wellbeing and Quality of Life

Overall, one study assessed the relationship between participation in visual arts and wellbeing in older adults. Phinney et al. (2014) assessed the relationship between participation in visual arts and wellbeing in older adults in a 3-year community art making programme with 24 older adults (mean age=74 years; 80% female) in a mixed methods study. Four groups of older adults participated in weekly visual art sessions or performance arts. Surveys were collected before and after participation in the arts programme. They found statistically significant improvements in perceived health, the reduction of pain, increased perceived social connectedness (sense of community) and reduced care burden in older adults who took part in visual arts group activities. When examining social wellbeing, participants showed a statistically significant improvement of their sense of community over time, with a large effect size identified ($d=0.17$, $p<.05$). In terms of

emotional wellbeing, although some indicators approached significance, no significant changes were observed over time for any of the emotional wellbeing indicators measured. Results suggest that older adults experienced improved perceived overall health, improved experience of pain, and a sense of community.

3.2.1.1 Older Adults living with Dementia

Quantitative research also identified the impact of visual arts on the wellbeing of other adult populations living with health conditions or diseases. Two studies examined general wellbeing in older adults living with dementia (Gross et al., 2015; Windle et al., 2018). Both studies found statistically significant improvements in wellbeing scores in older adults living with dementia who took part in visual arts group activities (Gross et al., 2015; Windle et al., 2018).

Gross et al. (2015) examined the effects of a 12-week art class programme 'The Alzheimer's Association's Memories in the Making' on wellbeing in 76 older adults living with middle to late-stage dementia who were residents of long-term care accommodation. Participants completed a 60min class per week which involved creating watercolour paintings. Observational proxy assessments were carried out on seven domains of wellbeing using the Greater Cincinnati Chapter Wellbeing Observational Tool, by interns (within sessions) and care staff (outside of sessions). These evaluations were conducted at the start, middle and conclusion of the 12-week programme. Interns reported significant improvements over time across the duration of the programme on the five wellbeing areas, namely interest ($p < 0.001$), sustained attention ($p = 0.002$), pleasure (< 0.001), self-esteem ($p = 0.002$) and normalcy (< 0.001). In contrast, staff evaluations found no changes in wellbeing over the duration of the programme. It should be noted that analysis of the wellbeing tool identified weaknesses in inter-rater reliability and observed two uncorrelated factors, not seven as suggested, namely 'wellbeing and ill-being'. The quantitative findings are open to interpretation; however, narrative accounts give some indication of benefits, albeit transient.

Windle (2018) examined the effects of a 12-week visual art programme through a mixed-methods longitudinal design in 125 older adults living with mild to severe dementia. Participants across three sites engaged in art making activities using mediums such as water colour paints, pastels, drawing, collage, clay modelling and print making. Wellbeing was assessed using the Greater Cincinnati Chapter Well-being Observation tool. Quality of life which was measured via the Dementia Quality of Life instrument (DEMQOL) and was assessed via self-report or by proxy through a family carer or staff using the proxy version (DEMQOL-Proxy). The Holden Communication Scale was also employed to assess communication skills and social behaviours. Participants who attended the arts programme saw significantly improved scores on a number of areas of wellbeing such as interest ($p < 0.001$), attention ($p = 0.03$), pleasure ($p = 0.02$), self-esteem ($p = 0.009$), decreased negative affect ($p = 0.004$), and sadness ($p = 0.02$) over the duration of the programme. No changes over time were observed for normalcy ($p = 0.51$) and disengagement ($p = 0.45$) scores. Proxy assessments of quality of life showed a significant improvement over three months, however no significant changes were reported by participants living with dementia. Furthermore, performance on the communication and social behaviour scale showed significant increases between baseline and the six-month follow-up, suggesting a deterioration in communication and social behaviour in those living with dementia and who were residing on a hospital ward. This was not the case for those living in the community or a care home.

3.2.2 Quality of Life

3.2.2.1 Older Adults living with Dementia

Overall, two studies examined the association between visual arts and quality of life in older adults living with dementia (Camic et al., 2014; Windle et al., 2018). Both studies both found statistically significant improvements in quality-of-life scores in older adults who took part in visual arts group activities whilst no studies observed null findings.

Camic et al. (2014) examined the effects of an 8-week art making and art viewing programme based in an art gallery in older people living with dementia and their carers, in a mixed methods study. 26 participants completed the 'Meet me at MoMa' dementia programme by attending a 2hr arts session once a week (1-hour viewing and then 1-hour art making), across two sites (Dulwich Picture Gallery and the Nottingham Contemporary). Health-related quality of life was measured utilising the Dementia Quality of Life (DEMQL-4) questionnaire. Results showed that statistically significant differences were found in quality-of-life scores over time ($p < .05$).

3.2.3 Loneliness

Overall, one study explored the association between visual arts and feelings of loneliness in older adults (Richmond-Cullen, 2018). This study found statistically significant improvements in loneliness in older adults who took part in visual arts group activities. Whilst no studies observed null findings. Richmond-Cullen (2018) examined the effects of a 10-week 'arts in residence' programme on loneliness in 78 older adults. Participants engaged in arts programmes which were located across 14 different sites. Loneliness was measured using the Revised UCLA loneliness scale. Results observed a significant correlation between self-reporting of decreased feelings of loneliness ($t = 2.160$, $p < 0.05$) as a result of participation within the arts programme. Participants reported loneliness decreased by 1.38 points over time (mean diff, pre=39.61 and post=38.23 test).

3.3. Qualitative Findings

These findings are echoed in seven mixed methods and qualitative studies which have reported wellbeing outcomes of visual arts programmes for healthy older adults (Phinney et al., 2014; Stickley et al., 2016; Rose et al., 2016; MacLeod et al., 2016) and older adults living with a health condition or disease (Cantu et al., 2018; Camic et al., 2014; Windle et al., 2018).

In a mixed methods study, Phinney et al. (2014) identified six key themes from the qualitative focus groups employed with 51 older adults. Firstly, participants felt that the arts programme provided structure to their lives, providing discipline to conquer barriers, and a commitment to take care of themselves. Secondly, participants felt that the arts programme helped them to cope with the emotional and mental challenges they encountered, a chance to unburden and provided a welcomed diversion from the displeasures of daily life. In addition, a third theme noted that participants believed that the arts programme created opportunities that encouraged them to work hard and required effort. This made them feel challenged which in turn boosted their confidence and self-esteem. The fourth theme identified how the arts programme helped bring out their creativity and artistic side, enabled self-expression and created personal transformation. The fifth theme highlighted how being engaged in the arts programme helped to promote social involvement, created strong social links, and gave a sense of cohesion and belonging.

through connecting and working together. Finally, participants felt that they were making a contribution, and their membership to the arts programme was valued.

Stickley et al. (2016) examined the effects of a community arts programme in 119 older adults within a qualitative study. Focus groups were employed. Findings showed that participants felt a sense of pride and achievement in producing a finished art product. They valued the opportunities provided and felt that engagement in the arts programme encouraged them to look forward to the future and inspired them to consider what could be achieved. Furthermore, participants identified many benefits such as enjoyment, confidence, creative expression, learning new skills and social aspects.

Rose and Lonsdale (2016) examined the effects of a painting programme on wellbeing in 23 older adults through a qualitative study. Data was collected through a group discussion and individual interviews. Results showed a number of high-level themes emerged. Participants reported improved self-value, feeling satisfied at producing their own work, being able to complete the challenge, increased interactions with others, feelings of being safe, having a common purpose, discussing emotions, feeling connected, exploring a sense of identity and gaining validation, as a result of participation in the painting programme.

MacLeod et al. (2016) examined the effects of an expressive arts 'visible voices' programme in a qualitative study. 8 older adults were matched with 8 older volunteers in creating their art pieces over a 10-week period taking place via home visits. Five themes emerged based on both participant and volunteer depictions. The first theme highlighted the appreciation of the relationships established between the volunteers and participants. The second theme depicted how participants personally developed and gained new abilities over the course of creating their art works, transitioning from anxiousness to a sense of pride at the final pieces. The third focused on the created meanings that reflected their personal expressions and sense of meaning giving them a sense of fulfilment. The fourth illustrated the aesthetic and self-appreciation of their finished art pieces, and finally, the last theme demonstrated the extension of thought beyond the programme.

Three qualitative studies examined the impact of visual arts programmes on wellbeing in older adults living with dementia. Cantu et al. (2018) examined the impact of a 12-week community art making intervention on the wellbeing of 138 older adults. 138 participants filled out open-ended pre- and post-class questionnaires and a further 162 participants formed biographical narratives on their experiences. Participants attended community-based art medium classes which included art forms such as painting, drawing, mixed media, and creative writing, as part of the 'GO! Arts' programme. Participants ascribed improvements in psychosocial and mental health and social relations to their participation in the creative arts programme. The challenge to create artwork led participants to enhance their cognitive abilities, learn new things, focus on tasks and be creative. They reported perceiving the world in new-found ways or having acquired a new set of skills and being transformative- a new appreciation for the world and its beauty. Furthermore, participants felt that this improved their mental and social wellbeing as they have developed self-awareness, have more autonomy, greater control, feel happier and have increased social engagements. Moreover, participants perceived that the programme helped to lower blood pressure as they felt more relaxed and more free of stress.

Camic et al. (2014) examined the effects of an 8-week art making and art viewing programme based in an art gallery in older people living with dementia and their carers, in a mixed methods study. 26 participants completed the 'Meet me at MoMa' dementia

programme by attending a 2hr arts session once a week (1-hour viewing and then 1-hour art making), across two sites (Dulwich Picture Gallery and the Nottingham Contemporary). In the qualitative component of the study, participants (both people with dementia and their carers) completed semi-structured interviews at the end of the programme. Results found three main themes emerged. The first theme identified the social impact of the group and the impact of the intervention on the caring relationships between the dyads being able to spend time together in arts activities. The second theme highlighted the impact of the programme on increasing cognitive capabilities through engagement, demonstrated new learning and enhancements in memory function. The final theme underscored the impact of the art gallery setting as being empowering and supporting social inclusion, where participants felt valued and enjoyed making and viewing the art.

In the qualitative aspect of their study, Windle et al. (2018) reported that although quantitative results found that quality of life scores had not significantly improved over time, qualitative reports described how the arts programme had provided a stimulating experience for people living with dementia. Five themes depicted participants' experiences of participation in the programme and highlighted its importance for social connectedness, wellbeing, stimulating experiences and challenge, enjoyment and pleasure, and feelings of inner strength.

4. Impact of Drama and Theatre

4.1 Physical Health and Wellbeing

There were no studies identified which assessed the impact of drama and theatre on the physical health and wellbeing of older adults.

4.2 Psychological Health and Wellbeing

Three studies examined the impact of drama and theatre on the psychological health and wellbeing of older adults. One study showed a positive finding for improvements in emotional wellbeing (Chung et al., 2018). However, no changes were found for cognitive functioning, health-related quality of life (Chung et al., 2018) or for empathy, mood, anxiety, and depression (Moore et al., 2017).

In particular, Chung et al. (2018) examined the effects of a 6-week 'Playback' theatre intervention (1.5hrs per week) on cognitive functioning, wellbeing, and quality of life in 18 older adults (mean age=64.2 years) in a single group, pre-post intervention study design. A number of cognitive function outcome measures were assessed, namely executive function (Trail Making Test, TMT-B), Episodic memory (Logical Memory test), working memory (Digit span (forward and backward), Speed of processing (Trail Making Test, TMT-A and symbol search). Wellbeing was also assessed using the Scale of Positive and Negative Experience (SPANE) and the Euro-Qol (EQ-5D). Quantitative results found significant improvements in emotional wellbeing after participation in the Playback Theatre sessions ($t(16) = 3.48$; $p=0.003$). However, no significant differences in participant cognitive function or health related quality of life were observed over time ($p>0.05$). Some facets of cognitive functioning improved marginally (logical memory), but these were not statistically significant. However, some limitations of this study were that the sample size was small, and the absence of a control group makes conclusive claims harder to establish.

In a mixed methods study, no changes were found for empathy and compassion or mood symptoms within drama workshops (participation) when compared with a 'backstage pass' group (viewing). Moore et al. (2017) examined empathy, compassion, mood, anxiety, self-confidence, and self-esteem in a 6-week theatre-based drama 'Empatheatre' programme in a mixed methods study through a pilot randomised control trial and focus groups with 26 older adults (mean age=77; 90% female). Two group conditions, participants attended either a drama workshop engaging in drama exercises and performance of sections of a play or a within 'backstage pass' condition which involved listening to and asking questions of theatre experts (90mins per week). Empathy was assessed using the Toronto Empathy Questionnaire (TEQ) and the computerised Multifaceted Empathy Test (MET). Compassion was measured using the Santa Clara Brief Compassion Scale (SCBCS). Mood was assessed via the Geriatric Depression Scale Short form to measure symptoms of depression. Anxiety was assessed via the Beck Anxiety Inventory (BAI). Engagement and emotions were also assessed via a brief rating form after participation in the weekly classes. In addition, willingness to engage in empathetic and compassionate behaviours were assessed via a charity and volunteer task.

Results indicated that no significant groups by time interaction effects were found regarding empathy, in either the Toronto Empathy questionnaire ($F=1.5$, $p=0.24$, $d=0.90$),

the Multifaceted Empathy Test (cognitive: $F = 1.83$, $p = 0.20$, $d = 1.10$ and affective: $F=0.02$; $p = 0.89$, $d=0.01$) or in compassion scores on the Santa Clara Brief Scale ($F=0.04$, $p=0.84$, $d = 0.02$). In addition, the results found no significant interaction effects for depression ($F=0.53$, $p=0.48$, $d=0.03$) or anxiety scores ($F=0.06$, $p=0.82$, $d=0.04$). Time interactions were also not significant for all variables and the effect sizes reported were low which suggested no changes had occurred from baseline to post testing for either the backstage pass group or the drama workshop group.

In comparison to the backstage pass group, the weekly ratings of the drama workshop group showed increased anxiety and reduced feelings of happiness. However, the drama workshop group displayed "higher self-ratings of positive changes in "self-esteem, confidence, and happiness" compared with the backstage pass group after participation in the programme. It is worth noting that there were challenges in small sample sizes, participants were mostly female and there was inconsistent attendance in some of the classes.

No quantitative studies examined physical health and wellbeing of older adults in relation to participation in drama and theatre.

4.3 Qualitative Findings

In the qualitative component of the pre-post intervention, Chung et al. (2018) found that the results showed participant benefits of the Playback Theatre on their positive social relationships, positive emotions, and positive self-concept in learning new skills and techniques. Furthermore, Sextou and Smith (2015) examined the effects of an applied drama theatre class in a qualitative study. The results highlighted that being involved in recreational drama sessions in the community can offer enjoyment for older adults and provide benefits such as improved mood through social interactions, the forging of friendships and growth of relationships, a sense of belonging and connectedness to a community. Levels of attendance and commitment to the theatre sessions can be influenced by a number of factors including experience, whether they like the tasks and relationships with others within the theatre group.





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