

# BMJ Open

## Do community-based singing interventions have an impact on people living with dementia and their carers? A mixed-methods study protocol

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2023-076168.R2
Article Type:	Protocol
Date Submitted by the Author:	23-Oct-2023
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<b>Primary Subject Heading</b>:	Sociology
Secondary Subject Heading:	Mental health, Sociology, Public health
Keywords:	Dementia < NEUROLOGY, Aging, MENTAL HEALTH

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# Do community-based singing interventions have an impact on people living with dementia and their carers? A mixed-methods study protocol

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Word count: 5088

## Abstract

**Introduction:** Psychosocial interventions have been shown to improve mood, relieve stress and improve quality of life for people living with dementia (PwD). To date, most evaluations of singing interventions have focused on the benefits for PwD and not their carers. This research aims to evaluate the benefits of dementia singing groups for both PwD and their carers.

**Methods and analysis:** This 2-year project will observe the impact of two different singing intervention services, one combining singing alongside dance and another that includes a

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3 sociable lunch. This project will aim to recruit a total of n=150 PwD and n=150 carers across  
4 the two singing interventions. Using a mixed-methods approach, the influence of both  
5 services will be analysed via the following outcome measures: quality of life,  
6 neuropsychiatric symptoms, social isolation, loneliness, cognition, carer burden and  
7 depressive symptoms in PwD and their carers using a pre/post study design. Regression  
8 models will be used to analyse the data with time (pre/post) as the exposure variable. Semi-  
9 structured interviews will be conducted with a subset of people (n=40) to further investigate  
10 the impact of singing services with a specific focus on the acceptability of the interventions,  
11 barriers to access and prolonged engagement and potential for remote delivery. Interview  
12 data will be analysed using Braun & Clarke's reflexive thematic analysis, and public advisors  
13 will assist with coding the transcripts. A social return on investment analysis will be  
14 conducted to determine the social impact of the services.

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25 **Ethics and dissemination:** This project has received ethical approval from the University of  
26 Liverpool's Ethics Committee (App ref: 12374) and Lancaster University's Ethics Committee  
27 (App ref: 3442). All participants will provide informed consent to participate. Results will be  
28 presented at national and international conferences, published in scientific journals and  
29 publicly disseminated to key stakeholders.

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35 **Keywords:** Dementia, singing intervention, music, dance, non-pharmacological  
36 interventions, support services

### 37 38 39 40 41 **Strengths and limitations of this study**

- 42 • This study will assess the impact of two differing and unique singing interventions for  
43 people living with dementia (PwD) and their carers using a mixed methods approach  
44 and examine barriers and facilitators to assessing singing support services.
  - 45 • A social return on investment analysis will be conducted to determine the social  
46 return for each singing support service.
  - 47 • An important limitation of the study is that it does not include an independent control  
48 group.
  - 49 • The inability to follow up after the 12-week intervention period means that the long-  
50 term effects of the interventions cannot be determined in this study.
  - 51 • As participants cannot be blinded, self-report measures may include an element of  
52 bias in the responses.
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## INTRODUCTION

Dementia currently affects more than 55 million people worldwide [1]. Dementia has detrimental effects on cognitive functioning [2] and often leads to behavioural and psychological changes, including aggression, anxiety, hallucinations and culturally inappropriate behaviours [3-5]. Dementia has profound effects on people's quality of life and ability to perform everyday tasks [6-8]. Pharmacological interventions can aid in the management of cognitive symptoms for PwD [9]. However, the benefits are often short-lived and are limited for behavioural symptoms such as anxiety, agitation and depressive symptoms [10]. Pharmacological approaches to manage behavioural symptoms in PwD include antipsychotics, anxiolytics, hypnotics and antidepressant medications [11]. There are often negative side effects associated with using these medications including increased occurrence of strokes [12] and mortality [13,14]. Research has also suggested that antipsychotics may worsen quality of life and cognition [15-17]. The negative side effects of pharmacological interventions highlight's the need for non-pharmacological interventions to reduce and help manage behavioural symptoms of dementia [18].

As a result, there is a strong need for non-pharmacological interventions such as music therapy which has demonstrated strong benefits for PwD [19,20]. Music therapies have been shown to improve mood, regulate emotion and relieve stress in older adults [21] and in PwD [22-24]. Music therapy as a whole consists of many components and applications and one specific and promising form of music therapy is singing interventions. The act of singing combines language, music and instinctive human behaviour to enhance neurological stimulation [25]. Research has linked singing to improved memory performance [26] and increased cognitive functioning as it utilises and engages brain pathways other than in plain speech, which is beneficial for people with advanced stages of dementia [27,28]. Group singing interventions may also help to improve social interactions between PwD, promoting relaxation and reducing levels of agitation [29,30]. Singing interventions in particular have demonstrated value and effectiveness within the realm of music therapies.

It should be noted that there is mixed evidence within the literature with a systematic review of music therapy for PwD finding that music listening had a greater effect on PwD compared with singing interventions [19]. However, in recent years, research has focused on specific aspects of music therapy which result in the best outcomes for PwD [31-33]. A systematic review of multiple variations of music therapy (ranging from passive music

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3 listening to active singing sessions) for PwD in residential care identified singing as an  
4 important aspect for change and improvements in mood and reductions in behavioural  
5 disturbances [34]. Further evidence from a randomised control trial suggests that singing  
6 interventions which actively engage participants may have greater effects on mood and  
7 quality of life when compared with passive music therapy [31,35]. These studies indicate that  
8 singing and active engagement in music sessions may be a key component for significant  
9 improvements in PwD. This variation in findings may be due to variations in dementia  
10 severity with some studies suggesting that passive music therapy may be more beneficial in  
11 more advanced stages of dementia and more active music therapy involving singing more  
12 beneficial in the early to moderate stages [36].

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14 PwD can often experience a decrease in physical activity levels post-diagnosis which  
15 can lead to adverse effects on physical health such as reductions in strength, balance, mobility  
16 and increased risk of physical frailty. Increased physical activity has been associated with  
17 positive cognitive and physical outcomes in PwD [37] and a reduction in symptom  
18 progression. Review evidence has found that multidomain interventions may be more  
19 beneficial for PwD [38]. Research examining dancing sessions in PwD has found that  
20 dancing can increase playfulness and sociability in PwD [39], improve levels of agitation and  
21 cognitive function [40] and also improve physical performance such as balance and walking  
22 speed [41]. Interventions that combine physical aspects alongside cognitive stimulation may  
23 lead to increased benefits and a wider range of positive outcomes. Research has not examined  
24 the effects of combining both singing and dancing.

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26 Research has found that people with limited social networks and reduced social  
27 engagement may be more at risk of developing dementia compared to those with wider and  
28 richer social networks [42]. It is thought that social activity and engagement may be a  
29 protective factor against cognitive decline by increasing cognitive reserve to better maintain  
30 cognitive functioning and performance [42]. To our knowledge, no evaluations have  
31 examined the benefits of singing interventions combined with an eating-together element  
32 which provides a sociable experience alongside the singing session. Existing literature often  
33 focuses on the singing element of these interventions [43], however, there are many social  
34 aspects of the sessions which lead to the benefits for PwD and their carers [44,45] that have  
35 previously been overlooked. The current project will investigate the impacts of two  
36 established charity-based services provided by The Brain Charity and the Lyrics and Lunch  
37 Charity for PwD and their carers.

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3 Most PwD live at home where they are often cared for and supported by their friends  
4 and family [46]. Family carers are a strong factor leading to more positive outcomes for PwD  
5 and can reduce or delay the need for residential care [47]. It can be hugely rewarding and  
6 fulfilling caring for a family member living with dementia [48], however, it can also be  
7 challenging and have negative impacts on the carers' mental and physical health and quality  
8 of life [47]. Due to this, interventions such as music therapy have been developed to promote  
9 well-being among unpaid carers [49]. Singing interventions have been found to improve the  
10 relationship between PwD and their carers in addition to easing carer burden when attended  
11 together [50]. The challenges of dementia are often not limited to the PwD, with relatives,  
12 carers and friends often profoundly impacted [51]. Therefore, there is a need for services to  
13 offer support not only for PwD but also for their carers [52,53].

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22 Multiple barriers may prevent PwD from accessing and continuing to engage with an  
23 intervention such as cost of travel, increased reliance on paid and unpaid carers and cost of  
24 service and care [54,55]. Studies to date have not examined the potential barriers to accessing  
25 singing intervention services and specifically how these may differ based on socioeconomic  
26 position and geographical location. Accessing services after a diagnosis can be difficult [56]  
27 so understanding the benefits of a specific form of support and potential barriers to accessing  
28 these services is important. The current study examines barriers and facilitators for accessing  
29 and continuing to engage with singing intervention services and the organisations that  
30 provide these services.

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37 Remote delivery of singing intervention services may be a solution to some barriers to  
38 attending singing interventions such as travel or reliance on carers. During the COVID-19  
39 pandemic, multiple dementia support groups were moved online and demonstrated the  
40 potential for singing interventions to be delivered remotely [57,58]. However, the feasibility,  
41 acceptability and whether remote delivery yields similar benefits as in-person groups has  
42 been questioned [57]. For people living with advanced stages of dementia barriers may  
43 prevent them from attending in-person groups and in these cases, remote delivery may be a  
44 method to improve access and reach of these services.

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51 It is important to quantify the value of interventions, not just in economic terms, but  
52 also in terms of social value. Social Return on Investment (SROI) is a method of cost-benefit  
53 analysis that assigns monetary values to social outcomes that usually would not be accounted  
54 for in standard financial evaluations. SROI analysis can be used to determine an  
55 intervention's social value in relation to financial investment [59]. SROI analysis can be a  
56 useful tool for examining interventions and to inform policy-making relating to social support

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3 investments [60,61]. In the current project, the SROI will be examined for both support  
4 services.  
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6 This 2-year project aims to examine the benefits of established charity-provided  
7 dementia singing groups for both people living with dementia and their unpaid carers using  
8 both quantitative and qualitative methods. For this, the following interlinked research  
9 questions will be addressed: (1) "Do singing interventions combined with a social lunch have  
10 an impact on well-being in PwD and their carers?"; (2) "Do singing and dancing intervention  
11 services have an impact on well-being in PwD and their carers?"; (3) "What barriers are  
12 encountered when accessing singing intervention services and what prevents continued  
13 engagement?"; (4) "Could remote delivery of singing interventions improve access and what  
14 barriers may there be with remote delivery of singing interventions?"; (5) "What is the social  
15 return on investment of the singing support services examined in this project?".  
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## 25 **METHODS AND ANALYSIS**

### 26 **Study overview**

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28 This mixed-methods study consists of four interlinked work packages (WPs) examining the  
29 influence of singing services provided by two registered third-sector organisations, Lyrics  
30 and Lunch and The Brain Charity. The barriers that people encounter when accessing and  
31 staying engaged with singing interventions will be examined and whether these  
32 disproportionately affect people based on sociodemographic factors specifically SEP and  
33 location (urban vs rural location). The potential of remote delivery of singing services to help  
34 improve wider access will also be assessed. To do this, semi-structured interviews will be  
35 conducted with key stakeholders including PwD, unpaid carers, service providers (music  
36 therapists, workshop coordinators) and local facilitators (paid carers, care home managers).  
37 From this data, recommendations for future delivery of singing support services will be  
38 developed with a focus on improving access and continued engagement. A SROI will be  
39 conducted to examine the social impact of both support services. A systematic review is also  
40 being conducted on community-based singing interventions for people living with dementia  
41 and whether they improve mood and quality of life to further inform the work (Prospero ID:  
42 CRD42023395907).  
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### 57 **Two singing (and dancing) interventions**

### ***Intervention 1: Lyrics and Lunch***

Lyrics and Lunch is a charity based in Lancaster with the aim to serve people with dementia and their carers by providing a singing group and a nourishing lunch in a sociable community environment. The sessions take place weekly or biweekly and last approximately 2 hours with the first hour consisting of a sociable lunch followed by an hour of group singing. For the singing session, attendees will be provided with a book with the lyrics to each song. Each session will start with the group singing an original song that allows each person to introduce themselves. The session leader will play the piano or guitar and facilitate the group to sing along. Familiar and well-known songs will be sung throughout the sessions such as "Happy Together" by The Turtles. Around halfway through the sessions, percussion instruments will be given out and used to accompany the around 2-3 songs. The session will often include rounds in which people will be split into smaller groups and each group will sing the same melody in tandem. Lyrics and Lunch is a non-denominational Church-based organisation and a short optional reflective spiritual component is included at the end, but the sessions are open to people with any religion or none. The service is open to PwD living within the community and their carers.

### ***Intervention 2: The Brain Charity's Singing and Dancing Groups***

The Brain Charity is based in Liverpool, and it supports people with neurological conditions. The charity runs singing (Music Makes Us Sing) and dancing (Music Makes Us Dance) sessions in both community and residential care home settings for PwD and their carers. The singing sessions last approximately one hour and involve engaging in communal singing of familiar songs such as "My Bonnie" by The Beatles led by two session leaders. Lyrics are presented on a TV screen and attendees are positioned in a semi-circle in view of the screen. The singing sessions have been designed alongside speech and language therapists and focus on speech, language and breathing exercises to improve speech, pitch and rhythm such as call and response and clapping rhythm exercises. Attendees are encouraged to sing and dance along to the songs by session facilitators. The dance sessions last approximately one hour and involve physically engaging chair-based dance moves designed alongside a physical therapist and also incorporates group singing. The sessions are run by two session facilitators who before each song will demonstrate simple dance routines to familiar songs such as "Hit the Road Jack" by Ray Charles. During the songs, session facilitators will give cues to the next dance moves so attendees can follow the dance routines. Props will be used throughout the



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3 sessions such as scarves, percussion instruments and balloons. The sessions are run weekly in  
4 12-week blocks and follow a consistent format each week using similar songs and dance  
5 routines so attendees can become familiar with them.  
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### 10 **Recruitment and sample size**

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12 For intervention 1 (Lyrics and Lunch): PwD and carers who have accessed the Lyrics and  
13 Lunch groups or who are beginning to attend will be invited to participate. A power analysis  
14 was conducted using G\*Power software version 3.1.9.7. For the analysis, the power level was  
15 set at .80 with an error of .05 [62]. The effect size (0.44) was based on a mean effect size  
16 taken across eight studies examining active music therapy and reported in Vasionyté et al [63]  
17 and based on the primary outcome measure of mood and depressive symptoms. Results  
18 revealed a minimum sample size of N=55 is necessary to achieve a power of .80 at an alpha  
19 of .05. Therefore, to account for participant dropout and retention rates, the project will aim  
20 to recruit around n=75 PwD and n=75 of their carers from the Lyrics and Lunch groups.  
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24 For intervention 2 (The Brain Charity): PwD and carers who have expressed interest  
25 in accessing the Brain Charity's singing and dancing groups will be recruited before attending  
26 the groups. Separate samples will be collected for the singing intervention group and the  
27 dancing intervention group. Participants will be recruited from multiple singing and dancing  
28 intervention groups across the Liverpool area. These groups will include PwD living within  
29 the community and people living in residential care homes. The singing groups and dancing  
30 groups will be run by the same session facilitators.  
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34 The power analysis remained consistent with intervention 1 and revealed a  
35 minimum sample size of N= 55 is necessary to achieve a power of .80 at an alpha of .05.  
36 Therefore, across both intervention groups a total sample size of N=300 will be recruited to  
37 account for participant drop out. This will consist of n=150 PwD (n=75 from the singing  
38 group and n=75 from the dancing group) and n=150 of their carers (n=75 from the singing  
39 group and n=75 from the dancing group). Data collection for the study commenced on the  
40 25<sup>th</sup> of May 2023.  
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### 54 **Work Package I – Understanding the impacts of the Lyrics and Lunch support service** 55 **on people with dementia and their carers**

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57 WP1 will address the first research question by assessing the impact of a singing intervention  
58 service that includes a sociable lunch aspect on PwD and their carers. This study will use  
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quantitative methods to examine the impact of attending the singing service on cognition, social isolation, loneliness, quality of life, neuropsychiatric symptoms such as agitation or other responsive behaviours, mood (depression/anxiety) and carer burden. Additionally, the core outcome set of 13 outcomes of interventions valued by people living at home with dementia, developed directly with PwD, informal and professional carers [64] will be used. The 13 outcomes were classified into 4 domains including friendly neighbourhood and home, independence, self-managing dementia symptoms and quality of life and will be examined using a bespoke quantitative measure, an 18-item measure adapted from the Adults Social Care Outcome assessment [65], the engagement and independence in dementia questionnaire [66] and Older Americans' Resources and Services Instrumental Activities of Daily Living assessment [67]. Outcome measures will be examined when the sessions are running (ON session) and compared to periods when the session is not running such as summer holidays and Christmas breaks (OFF session) (Table 1). Participants will be required to have attended the Lyrics and Lunch sessions for a minimum period of 4 weeks before the ON session assessment. OFF-session assessments will be completed after the sessions have not been attended for a minimum of 4 weeks. The Lyrics and Lunch sessions run weekly or biweekly.

**Table 1.** Assessments to be completed by PwD and their carers

<b>Assessment period</b>	<b>time</b>	<b>Assessment completed by person living with dementia</b>	<b>Assessment completed by unpaid carer</b>
<b>ON (Participant attended service for a minimum of 4 weeks)</b>	<b>session has</b>	QIDS-SR, ACE, DemQOL, DSSI-10	QIDS-SR, DSSI-10, NPI-Q, DemQOL-Proxy, Zarit burden questionnaire
<b>OFF (Participant has not attended a session for a minimum of 4 weeks)</b>	<b>session has not</b>	QIDS-SR, ACE, DemQOL, DSSI-10	QIDS-SR, DSSI-10, NPI-Q, DemQOL-Proxy, Zarit burden questionnaire

### *Measures*

Standard outcome measures that will be assessed in PwD and their carers will include cognition assessed using a shortened version of the Addenbrooke's cognitive examination

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3 (ACE-III) [68] where participant's verbal fluency and attention will be assessed, quality of  
4 life assessed using the dementia quality of life measure (DemQOL and DemQOL-Proxy)  
5 [69], social Isolation assessed using the Duke Social Support Index (DSSI-10) [70],  
6 loneliness assessed using Three-item loneliness UCLA Measure [71], mood and depressive  
7 symptoms assessed using the Quick Inventory of Depressive Symptomatology (QIDS-SR)  
8 [72], neuropsychiatric symptoms assessed using Neuropsychiatric Inventory Questionnaire  
9 (NPI-Q) completed by carers [73] and carer burden assessed using the Zarit burden  
10 questionnaire[74].

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17 Demographic information will be collected from participants at the first assessment  
18 including age, gender, ethnicity, highest education level (an indicator of SEP), number of  
19 years in formal education (an indicator of SEP), years since diagnosis and years since  
20 symptom onset. Participant attendance will be recorded to determine adherence to the  
21 intervention. The Global Deterioration Scale for Assessment of Primary Degenerative  
22 Dementia will be completed by carers to determine dementia severity [75].

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29 It is hypothesised that attendance to singing interventions will increase quality of life  
30 and mood and reduce depressive and neuropsychiatric symptoms in PwD and their carers.  
31 Social isolation can be prominent in PwD and attending the singing intervention may reduce  
32 feelings of social isolation. Due to this, it is hypothesised that attending the singing  
33 intervention will result in reduced self-reported feelings of social isolation and loneliness in  
34 both PwD and their carers. It is hypothesised that both PwD and their carers will show  
35 improvements in the core outcome measures during the times that they are attending the  
36 singing intervention compared to the period when they are not attending the sessions.

### 37 38 39 40 41 42 43 44 **Data analysis**

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47 To examine whether there were changes in outcome variables during on and off periods and  
48 to assess whether singing intervention support services are associated with changes in  
49 mood/depressive symptoms, quality of life, cognition and social isolation in people living  
50 with dementia and their carers, linear regression models will be used with time (on vs off) as  
51 the exposure variable. For the model examining outcomes in people living with dementia,  
52 outcome variables will be the QIDS-SR score, ACE-III score, DemQOL score, DSSI-10  
53 score, NPI-Q score and Core outcome set score. Covariates will include participant age, years  
54 since diagnosis, years since symptom onset and number of sessions attended. A separate  
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3 model will examine outcome measures in dementia carers, outcome measures will be DSSI-  
4 10 score, QIDS-SR score and carer burden.  
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## 10 **Work Package II – Understanding the impacts of singing and dancing support service** 11 **conducted by The Brain Charity on people with dementia and their carers** 12

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14 WP2 will address the second research question and the impacts of attending either a 12-week  
15 singing intervention or a 12-week dancing intervention that also involves some singing for  
16 PwD and their carers. Participants will only attend one intervention service (either the singing  
17 or the dancing intervention). The benefits of dementia singing and dancing groups for both  
18 PwD and their unpaid carers, both community-residing and those living in care homes  
19 (conducted within the care home), will be examined using a mixed-methods approach. The  
20 project will assess the influence of the services on cognition, mood, social isolation,  
21 loneliness, carer burden and neuropsychiatric symptoms.  
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### 29 ***Measures*** 30

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32 The following outcome measures will be used: DemQol, DemQol-Proxy, QIDS-SR, ACE-III  
33 (shortened version assessing verbal fluency and attention only), NPI-Q, DSSI-10, and Zarit  
34 burden questionnaire (Figure 1). Outcome measures will be examined at baseline (before the  
35 start of the 12-week block of sessions) and then one week after the final session, thus  
36 providing pre and post-intervention measures. The QIDS-SR will be completed every four  
37 weeks during the 12 weeks to examine more subtle changes in mood and depressive  
38 symptoms over the 12 weeks (Figure 1). The dance elements included in the dancing sessions  
39 may have impacts on the physical health and frailty of PwD attending the sessions. Due to  
40 this, The Physical Frailty Phenotype [76] measure of physical frailty will be included for the  
41 dancing group that will assess weight loss, grip strength, exhaustion, gait speed and physical  
42 activity. The Physical Frailty Phenotype will be completed pre and post-intervention.  
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51 Similar to WP1, participant attendance will be recorded to determine adherence to the  
52 intervention. Demographic information will be collected at baseline, including age, gender,  
53 ethnicity, highest education level (an indicator of SEP), number of years in formal education  
54 (an indicator of SEP), years since diagnosis and years since symptom onset. The Global  
55 Deterioration Scale for Assessment of Primary Degenerative Dementia will be completed by  
56 carers to determine dementia severity [75].  
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### ***Data analysis***

Consistent with WP1, we will examine whether there were changes in outcome variables pre vs. post-intervention and assess whether singing and dancing interventions are associated with changes in mood/depressive symptoms, quality of life, cognition and social isolation in people living with dementia and their carers. Linear regression models will be used with time (pre/post) and intervention type (singing or dancing intervention) as the exposure variables. The outcome variables will be QIDS-SR score, ACE-III score, DemQOL score, DSSI-10 score, Zarit burden score, NPI-Q score, sit-to-stand assessment score and gait assessment score. Covariates will include participant age, years since diagnosis, years since symptom onset, ACE score (dementia severity), number of sessions attended and participant residence (community-dwelling or care home). Separate models will be conducted to examine the singing and dancing service's effect on people living with dementia and then their carers and for each of the outcome measures.

### **Work Package III – Understanding the acceptability, remote delivery and barriers to accessing and continued engagement with singing interventions**

WP3 will address research questions 3 and 4 and will examine barriers to accessing and continued engagement with singing interventions and how these factors may differ based on SEP and location (urban vs rural location). Accessibility barriers are likely to vary across these areas and depend on people's SEP and should be examined and acknowledged when rolling out intervention programmes on a wider scale.

A series of semi-structured follow-up interviews will be conducted with a subset of PwD, unpaid carers, service providers (music therapists, workshop coordinators) and local facilitators (paid carers, care home managers). The topic guide(s) will be coproduced with the teams and four public advisers consisting of a person living with dementia, a paid carer, an unpaid carer and a music teacher (JM) who runs the sessions.

The first aim will focus on barriers to access and continued engagement with the intervention service. To address this, a subset of 20 people will be recruited (approx. 10 PwD and 10 unpaid carers) from both interventions, resulting in a total of 40 interviews. This initial sample size determination was guided by information power methods [77]. These interviews will focus on the following topics: acceptability of the services, impacts of the

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3 service on mood and overall quality of life and accessibility including barriers to access and  
4 continued engagement.  
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7 Our second aim is to examine the potential of services to be adapted for remote  
8 delivery and potential barriers. When discussing remote access, adaptations made to the  
9 services when COVID-19 restrictions were in place will be discussed and how successful  
10 these remote access adaptations were. To address this, approximately 20 people will be  
11 recruited: 10 service providers (music therapists, workshop coordinators) and 10 local  
12 facilitators (paid carers, care home managers). These interviews will focus on the following  
13 topics: impacts of the service on PwD and their carers, and barriers to remote delivery of  
14 singing. Again, this initial sample size determination was guided by information power  
15 methods [77]. Preliminary analysis will be used to determine the power of the analysis during  
16 the data collection phase to determine if the sample size calculation is correct. After the first  
17 three interviews, a first review of the data will be conducted, and first suggestions of relevant  
18 theory/themes will be made. This assessment will be considered again before closing data  
19 collection. Data will be analysed using Braun & Clarke's reflexive thematic analysis [78],  
20 and public advisors will assist with coding the transcripts.  
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#### 34 **Work Package IV – Examination of the social impact of singing interventions**

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36 WP4 will address research question 5 and the social impact of singing interventions  
37 examined by conducting an evaluative social return on investment (SROI) analysis on both  
38 services. Using standardised methods and following the seven principles a SROI will be  
39 conducted [79]. Separate SROI analyses will be conducted for the Lyrics and Lunch Charity  
40 and The Brain Charity. The methods and procedure employed for both analyses will remain  
41 consistent. An impact map will be created to calculate the social value generated by the  
42 intervention service which involves six stages [80]. Stage 1 will identify key stakeholders and  
43 people likely to be impacted by the services such as PwD, relatives, unpaid and paid carers,  
44 Lyrics and Lunch and The Brain Charity. Stage 2 will use quantitative data collected for WPs  
45 I and II on the effects of the intervention on quality of life, mood, carer burden, depressive  
46 symptoms and agitation levels and will map identified outcomes creating an impact map.  
47 This stage will identify what changes occurred and for whom. Stage 3 will provide a  
48 monetised value to each of the outcomes including those that do not have a price attached to  
49 them such as changes in quality of life. For outcome measures that do not have a clear  
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3 monetary value, established SROI value banks such as Social Value UK will be used to  
4 identify suitable financial proxies [81]. Stage 4 will establish impact by accounting for  
5 attribution, deadweight, displacement and drop-off. These adjustments are made to ensure  
6 that social value is not overclaimed [79]. Percentage values will be determined for attribution  
7 which considers changes or outcomes declared in the analysis that may not be due to just the  
8 singing intervention but may be due to other support services. A percentage value for the  
9 deadweight will be determined which considers how much change in the outcome values  
10 would have happened regardless of the singing intervention programme. Deadweight will be  
11 calculated as a 10% reduction in overall value for every resource the participant identifies as  
12 an alternative to the singing support service, for example if participants attend other support  
13 groups. Stage 5 will calculate the SROI benefits by adding up and subtracting any negatives  
14 (attribution, distribution, drop-off and deadweight), and this will be compared to the  
15 investment cost of the service. This calculation will provide us with a SROI ratio which  
16 demonstrates the social value of the service in relation to the cost invested, for example, an  
17 SROI ratio of £3.50: £1 means that for every pound invested, there is £3.50 of social value  
18 created. Stage 6 will disseminate the findings with key stakeholders and recommendations  
19 created for future delivery of the service.  
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### 33 **Patient and public involvement**

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35 This project has been developed and conceptualised alongside members of the public and key  
36 stakeholders. Our formal project team includes four public advisors including a person living  
37 with dementia (SM), two carers (one paid (SP) and one unpaid (HB)) and a music teacher  
38 (JM) who runs the singing sessions. All public advisors have previous experience and  
39 involvement with the singing sessions provided by The Brain Charity or the Lyrics and  
40 Lunch Charity. Public advisors contribute to all aspects of this research project, from  
41 designing study documents and advising on outcome measures to the interpretation of  
42 findings and dissemination of the research. Public advisors are reimbursed for the time they  
43 contribute to the project.  
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### 53 **ETHICS AND DISSEMINATION**

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55 This project has received ethical approval from the University of Liverpool's Ethics  
56 Committee (App ref: 12374) and Lancaster University's Ethics Committee (App ref: 3442).  
57 All methods will be conducted in accordance with the relevant guidelines and regulations and  
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3 all participants will provide informed consent to participate. Findings from this project will  
4 be presented at national and international conferences and published in scientific journals.  
5 Findings will be publicly disseminated to key stakeholders and within the community and the  
6 organisations included in this study will use the outcomes of the research for their own  
7 continuous improvement strategies.  
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## 13 **DISCUSSION**

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15 Using a mixed-methods design, this project seeks to explore the influence of two established  
16 singing intervention services for PwD and their carers. The study aims to collect a large  
17 sample of key stakeholders to assess the influence of attending singing support services on  
18 well-being and quality of life through a combination of quantitative and qualitative methods.  
19 The findings from this research will highlight the impact of singing support services for PwD  
20 and their carers and will allow the SROI of such services to be evaluated. The project will  
21 examine the barriers that people encounter when accessing and continuing to engage with  
22 singing interventions and whether these barriers disproportionately affect people from lower  
23 SEP. It can be challenging to access support services after a diagnosis of dementia [56] and  
24 exploring ways to make services more widely and easily accessible is important. Methods to  
25 reduce potential barriers to access such as travel, increased reliance on carers and availability  
26 of services will be explored alongside the potential for remote delivery of singing services to  
27 improve and expand access.  
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37 A limitation of this study that should be noted is the lack of an independent control  
38 group. This study is therefore unable to robustly examine the impact of each intervention.  
39 However, it will provide important information on the acceptability and potential impact of  
40 the support service for PwD and their carers and barriers to access or engagement. This  
41 study will provide an important knowledge base for future studies and provide evidence of  
42 whether larger randomised control trials are warranted. A further limitation is that as  
43 participants cannot be blinded, self-report measures may include an element of bias in the  
44 responses. Additionally, this study is unable to determine the long-term effects of the  
45 interventions and cannot determine whether any effects of the intervention persist or diminish  
46 after the 12-week intervention. Future research should include further follow-up assessments  
47 post-intervention to determine long-term effects.  
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56 If the results from the current study suggest that singing support services have a  
57 positive impact on PwD and their carers, then support services could be scaled up and applied  
58 to other regions and settings to improve access to beneficial support services. Examining the  
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3 SROI will provide insight into the cost-effectiveness of the support services and if they will  
4 be suitable to apply in lower-income areas and regions both nationally and internationally.  
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6 The findings from this project will be used to develop recommendations for future delivery of  
7 singing intervention services.  
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## 10 11 12 **Abbreviation list**

13 PwD	People living with dementia
14 WP	Work package
15 SEP	Socioeconomic Position
16 DemQOL	Dementia quality of life measure
17 ACE-III	Addenbrooke's cognitive examination
18 DSSI-10	Duke Social Support Index
19 QIDS-SR	Quick Inventory of Depressive Symptomatology
20 NPI-Q	Neuropsychiatric Inventory Questionnaire
21 SROI	Social return on investment

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27 **Competing interests:** Carol Holland, Jeanette Main and Steve Pendrill are trustees of the  
28 Lyrics and Lunch Charity. All other authors declare no conflict of interest.  
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33 **Consent for publication:** N/A.  
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37 **Funding:** National Institute for Health and Care Research Applied Research Collaboration  
38 North West Coast (ARC NWC) (Award/Grant no: NA) and The Alzheimer's Society  
39 (Award/Grant no: NA).  
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43 **Contributors:** Conceptualisation and methodology design contributions and project  
44 administration contributions were made by all authors (MP, KH, KW, FA, HB, CH, HB, JM,  
45 SM, SP, CG). The original draft preparation contributions were made by MP. MP, KH, KW,  
46 FA, HB, CH contributed to revising the manuscript. All authors (MP, KH, KW, RA, HB, CH,  
47 HB, JM, SM, SP, CG) read and agreed to the published version of the manuscript.  
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53 **Data availability statement:** Data generated in this study will be made available on Open  
54 Science Framework upon completion of the study.  
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## FIGURE TITLE

**Figure 1.** Study timeline

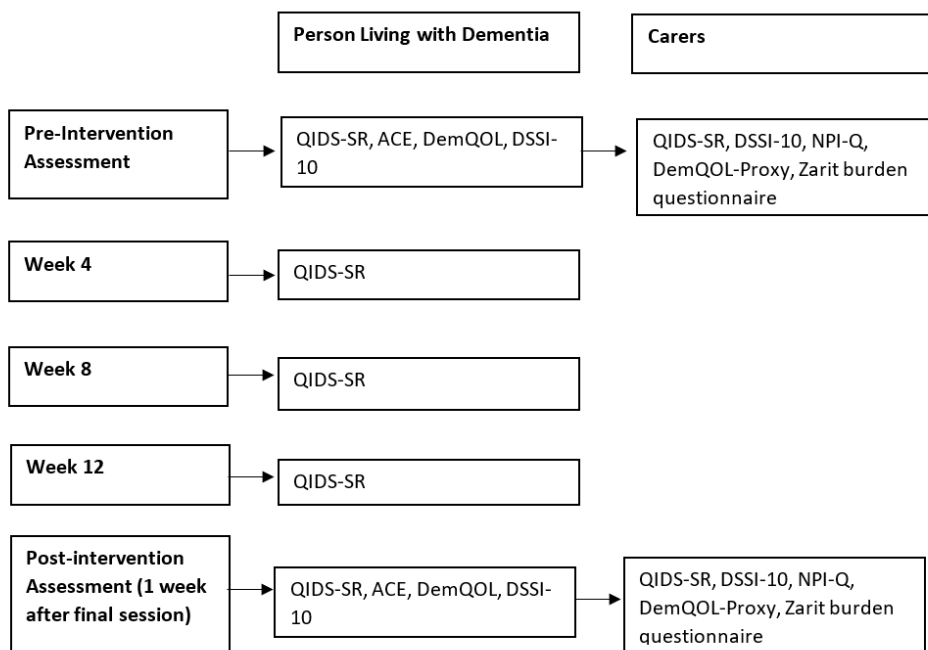


Figure 1. Timeline of cognitive assessments for PwD and unpaid carers

682x470mm (38 x 38 DPI)