



CREATE

Canterbury Research and Theses Environment

Canterbury Christ Church University's repository of research outputs

<http://create.canterbury.ac.uk>

Copyright © and Moral Rights for this thesis are retained by the author and/or other copyright owners. A copy can be downloaded for personal non-commercial research or study, without prior permission or charge. This thesis cannot be reproduced or quoted extensively from without first obtaining permission in writing from the copyright holder/s. The content must not be changed in any way or sold commercially in any format or medium without the formal permission of the copyright holders.

When referring to this work, full bibliographic details including the author, title, awarding institution and date of the thesis must be given e.g. Bourne, P. (2018) Dyadic arts interventions for people living with dementia. D.Clin.Psychol. thesis, Canterbury Christ Church University.

Contact: create.library@canterbury.ac.uk



PHILIPPA BOURNE BSc (Hons)

DYADIC ARTS INTERVENTIONS FOR PEOPLE LIVING WITH
DEMENTIA

Section A: Arts-based interventions for people with a dementia and their caregivers: A
systematised literature review

Word Count: 7199 (505)

Section B: An exploratory investigation into the relationship between choral singing, stress
and wellbeing in people with a dementia and their caregivers

Word Count: 7922 (878)

Overall Word Count: 15,121 (1,383)

A thesis submitted in partial fulfilment of the requirements of Canterbury Christ Church
University for the degree of Doctor of Clinical Psychology

MAY 2018

SALOMONS CENTRE FOR APPLIED PSYCHOLOGY
CANTERBURY CHRIST CHURCH UNIVERSITY

Acknowledgements

Thank you to the participants of this study who generously volunteered their time and shared their enthusiasm for music, singing and life itself. Thank you also to the choral group organisers, musicians and associated organisations; this project wouldn't have been possible without you.

Many thanks to Sarah Strohmaier and Emma Harding for your assistance in data collection, Rachel Hughes for completing initial analysis of the heart rate data and Dr Sabina Hulbert and Dr Daisy Fancourt for your invaluable help throughout data analysis.

Thank you to my supervisors Professor Paul Camic and Professor Sebastian Crutch for your unwavering support and encouragement at all stages of the project.

I would like to thank my family and friends for your love, laughs, patience and guidance over the last few years, I can't wait to spend more time with you! Particular thanks to Jess for being a brilliant housemate and amazing friend, bringing all the joy and right kinds of tears into my life and to Claire for your optimism and endless fun times. Special thanks to my dad, Bruce, for your unfailing belief in me and always being there with kind supportive words.

Finally, thank you to Gin and Gramps, (the OG Dr Bournes) for always inspiring me in every area of my life.

Summary of the Portfolio

Section A

This section contains a systematised literature review on the influence of community dyadic arts-based interventions on people with a dementia and their caregivers. Twelve peer-reviewed studies were included, five focusing on performing arts interventions and seven on visual arts. Findings suggest that arts interventions may have positive effects on psychological outcomes for both people with dementia and their informal caregivers, particularly based on qualitative data. The findings provide a rationale for further research addressing the methodological limitations of the current evidence base including the use of control groups and consistent quantitative outcome measures. Recommendations for clinical practice are also discussed.

Section B

This mixed methods, exploratory study investigated the influence of a dyadic choral singing group on people with a dementia and their caregivers. Physiological measures of stress (salivary cortisol and heart rate) were combined with subjective measures of wellbeing and stress and interviews. Quantitative data analysis showed positive effects of group singing on subjective stress and wellbeing. The majority of salivary cortisol results showed a decreasing trend and heart rate variability significantly increased for people with dementia. The thematic analysis revealed positive influences including effects on mood and cognition, aspects of the intervention associated with these effects were also described. The findings suggest that additional research is warranted to further investigate interactions between physiological and psychological variables related to choral singing in people with a dementia. Clinical and research implications are discussed.

Table of Contents

SECTION A

Abstract	1
Introduction	2
The impact of dementia on psychological functioning	2
The impact of dementia on family caregivers	3
The impact of dementia on relationships	3
The arts	4
Dyadic interventions	6
Rationale for current review	7
Methodology	8
Definition of terms	8
Literature search	8
Data extraction and analysis	9
Structure of review	9
Results	19
Performing arts	19
Methodological critique of the literature	21
Study design	21
Sampling strategy	21
Participant characteristics	22
Outcome measures	23
Data analysis	23
Verification and reflexivity	24
Visual arts	24
Methodological critique of the literature	26
Study design	26
Sampling strategy	27
Participant characteristics	28

Outcome measures	28
Data collection and analysis	29
Conclusions	29
Reflexivity	30
Discussion	30
Clinical implications	33
Research implications	34
Conclusion	36
References	37
SECTION B	
Abstract	1
Introduction	2
The dementias	2
Therapeutic use of music in dementia care	3
In the moment	5
Wellbeing in dementia	5
Measurement of stress	6
Research hypotheses and questions	9
Method	9
Design	9
Participants	9
Procedure	10
Singing session	10
Control condition	12
Interviews	13
Measures	13
Subjective measures	13
Saliva assays	14
Heart rate variability	14

Ethics	14
Data analysis	15
Quality assurance	16
Results	16
Quantitative results	16
Initial analysis	16
Stress VAS scale	18
CWS scales	18
Saliva assays	19
Heart rate variability	20
Summary of quantitative analyses	21
Qualitative findings	26
Theme 1 – Influence on PWD	27
Theme 2 – Influence on caregiver	27
Theme 3 – Singing in a group	27
Theme 4 – Group dynamics	28
Theme 5 – Group mechanics	28
Summary of qualitative analysis	32
Discussion	32
Quantitative results	32
Qualitative findings	34
Connecting quantitative and qualitative findings	35
Limitations	36
Clinical implications	38
Research implications	39
Conclusion	40
References	42

List of Tables

SECTION A

Table 1. Search terms and database results	10
Table 2. Literature search inclusion and exclusion criteria	11
Table 3. Summary of literature included in review	13

SECTION B

Table 1. Participant demographics	11
Table 2. Example repertoire of songs sung by the choir	12
Table 3. Results from Kolmogorov-Smirnov tests of normality	17
Table 4. Results from Wilcoxon signed-rank analyses pre- and post- data	23
Table 5. Results from Wilcoxon signed-rank analyses of heart rate variability data	25
Table 6. Table of themes, subthemes and illustrative quotations	29

List of Figures

SECTION A

Figure 1. PRISMA flowchart diagram showing search process	12
---	----

SECTION B

Figure 1. Stages of thematic analysis based on Braun and Clarke	17
Figure 2. Mean heart rate variability scores for PWD and caregivers	26

List of Appendices

SECTION C

Appendix A. Quality assessment criteria for evaluating primary research papers	1
Appendix B. Quality assessment criteria scores	2
Appendix C. Ethical approval	4
Appendix D. Consent form	5
Appendix E. Participant information sheet	7
Appendix F. Demographic questionnaire	10
Appendix G. Canterbury Wellbeing Scales and stress VAS scale	11
Appendix H. Further details of Empatica [®] procedure and data analysis	12
Appendix I. Interview schedule	14
Appendix J. List of medications taken by participants	15
Appendix K. Histograms showing normality	16
Appendix L. Wilcoxon signed-rank tests for all participants combined	18
Appendix M. Extracts from research diary	20
Appendix N. Coded interview transcript	21
Appendix O. Themes not associated with research questions	22
Appendix P. Letter to ethics panel	23
Appendix Q. Submission guidelines for intended journals	24

Section A: Literature Review

Arts-based interventions for people with a dementia and their caregivers: A systematised literature review

Word count: 7199 (505)

Philippa Bourne BSc (Hons)

For submission to International Journal of Psychogeriatrics

Abstract

Dementia is a neurodegenerative condition that can lead to profound psychological challenges for people with dementia and their informal caregivers. Previous research has found positive effects of arts-based interventions for people with dementia and caregivers that have been dyadic in nature. A systematised literature review was conducted to investigate psychological outcomes of dyadic arts interventions delivered to both people with dementia and their caregivers. PsychINFO, Medline, Web of Science and ASSIA databases were searched as well as Google Scholar and reference lists of relevant studies. Twelve peer-reviewed journal articles met the criteria for inclusion in this review, five focusing on performing arts and seven on visual arts. The findings suggested that arts interventions may have positive effects on psychological outcomes for both people with dementia and their informal caregivers particularly based on qualitative findings. Improved wellbeing, quality of life and mood were reported in some studies. However, methodological limitations of the literature including small sample sizes, a lack of control groups and the lack of consistent quantitative outcome measures, make firm conclusions difficult to draw. Recommendations for clinical practice and further research were proposed.

Keywords: the arts, dementia, caregivers, dyad, psychological impact

Introduction

The term dementia refers to a set of neurodegenerative conditions that impact cognitive, behavioural and emotional functioning. It is most commonly diagnosed in older adults and there are estimated to be 850,000 people living in the UK with dementia (Prince et al., 2014). As a result of increased dementia awareness and diagnosis and older people living longer due to advances in healthcare, the number of people diagnosed with dementia is increasing (Lewis, Karlsberg Schaffer, Sussex, O'Neill, & Cockroft, 2014). As the dementias are progressive conditions, more areas of the brain are affected over time and more symptoms develop. Cognitive symptoms of dementia can include difficulties with memory, expressive language or comprehension, visuospatial skills, attention and orientation (Alzheimer's Society, 2017). Other symptoms can include changes to behaviour (e.g. socially inappropriate behaviour) and psychological difficulties (e.g. depression). The most commonly diagnosed form of dementia is Alzheimer's disease and other forms of dementia include vascular dementia (VD), frontotemporal dementia (FTD) and dementia with Lewy bodies (DLB).

The impact of dementia on psychological functioning

In addition to the cognitive and behavioural symptoms experienced by people with dementia, it can also have an impact on psychological and social functioning. People can develop difficulties with emotional regulation and a reduced capacity to deal with stress (Cheston, 1998). Following a diagnosis of dementia, a range of responses can be experienced including denial of difficulties/diagnosis, grief due to anticipatory loss and developing positive coping strategies (Aminzadeh, Byszewski, Molnar, & Eisner, 2007). Emotional difficulties including anxiety and depression can develop due to feelings of hopelessness, fear, anger and insecurity which can further impact on quality of life (QOL) (Bender & Cheston, 1997; Rusted, Sheppard, & Waller, 2006; Woods, 2001). Over time, psychological

difficulties and loss of independence can also lead to social withdrawal which can have a further impact on mood. Kitwood (1997) highlighted that people can also experience positive emotions including humour, pleasure and affection when their needs are being met.

The impact of dementia on family caregivers

Research has also investigated the impact of dementia on family caregivers. Pinquart and Sörensen (2003) highlighted that caregiving can maintain closeness and provide satisfaction for some caregivers, and Carbonneau, Caron and Desrosiers (2010) found that the role can be associated with increased wellbeing. However, the demands of caregiving and feelings of loss over the course of dementia can have a negative impact on caregiver wellbeing and be associated with increased stress and depression (Baikie, 2002; Balfour, 2014; Pinquart & Sörensen, 2003). Some interventions have been found to have positive effects on depression, burden and wellbeing of caregivers including counselling, social skills and behaviour management training and support groups (Pusey & Richards, 2001), although findings are mixed (Selwood, Johnston, Katona, Lyketsos, & Livingston, 2007).

The impact of dementia on relationships

Dementia can also have an impact on the relationship between the person and their informal caregiver(s), whether this is a spousal or other relationship (NICE, 2006). As the dementia progresses, there can be a change of roles, loss of closeness and intimacy and a reduction in shared activities (Baikie, 2002; Balfour, 2014). The concept of 'couplehood' in dementia literature refers to the relationship between a person with dementia and spousal caregiver (Hellström, Nolan, & Lundh, 2007). Hellström et al. (2007) found that couples positively focus on 'sustaining couplehood' and both attempt to maintain involvement in the relationship, although this can become increasingly difficult for people in the later stages of dementia. Merrick, Camic and O'Shaughnessy (2016) interviewed couples on the effects of

dementia from a relational perspective. One theme that emerged was of “altered structures”, focusing on how the structure and organisation of the relationship changes when one person has a diagnosis. This theme included changes in the level of reciprocity in the relationship, with fewer reciprocal conversations and less shared understanding. They also found that couples focused on maintaining normalcy and, in some cases, found a strengthening of the relationship. One aspect of sustaining couplehood involves shared activities and “doing things together” (Hellström, Nolan, & Lundh, 2005, p. 16). It is possible therefore that dyadic activities could support this concept of ‘couplehood’ and normalcy and help people to maintain these relationships. Discovering new ways to spend enjoyable time together (e.g. through shared activities), can also increase wellbeing and happiness for people with dementia and their caregivers (Carbonneau et al., 2010; Voelkl, 1998).

The arts

NICE guidelines (2006) for people with dementia recommend that they should be supported in engaging in activities they enjoy and one of the recommended treatments for non-cognitive symptoms of dementia (e.g. anxiety and apathy) is the use of music as a therapeutic tool. There are many different forms of arts interventions for people with dementia and their caregivers including visual, performing and literary arts. One type of performing arts intervention is music-based interventions and the majority utilize either music therapy, singing, music-listening or a combination of these. There has been a plethora of research into the influence of music-based interventions and therefore also numerous literature reviews. A recent Cochrane review concluded that they may have an impact on depressive symptoms for people with dementia (van der Steen et al., 2017). Only randomised control trials were included in this review and although most evidence was of low to medium quality, there was no conclusive evidence that music interventions had an impact on wellbeing, QOL, anxiety or agitation. Other papers reviewing the literature have concluded

that there is evidence that music interventions have a positive impact on mood and behavioural disturbances (McDermott, Crellin, Ridder, & Orrell, 2013) and behavioural and psychological symptoms of dementia (BPSD) (Raglio et al., 2012). However, the lack of methodologically robust studies makes conclusions difficult to draw (Blackburn & Bradshaw, 2014; Vink, Bruinsma, & Scholten, 2004).

There are fewer reports involving visual arts interventions. Rentz (2002) and Kinney and Rentz (2005) evaluated a visual arts programme called *Memories in the Making*® with people with dementia attending day programmes or living in residential settings and found increased pleasure, self-esteem and wellbeing following participation. Beard (2012) conducted a review of the wider arts literature including visual arts and found positive effects of these interventions on self-esteem and wellbeing, concluding that visual arts interventions can play a meaningful role in the lives of people with dementia. However, she concluded that further research is needed investigating effects from the viewpoint of the person with dementia and those living in the community (Beard, 2012). Windle et al. (2017) recently found that an art-viewing and art-making program increased wellbeing and QOL for participants.

Literary arts interventions have included storytelling and reading. Reading groups have been associated with reductions in the severity of BPSDs (as rated by professional caregivers) and themes from interviews included enjoyment and links to renewed identity (Billington, Carroll, Davis, Healey, & Kinderman, 2013). Phillips, Reid-Arndt and Pak (2010) evaluated the impact of a *TimeSlips* storytelling intervention with people with dementia and found improved communication skills and increased positive affect and expressions of pleasure compared to a control group.

McDermott, Orrell, & Ridder (2014) developed the psychosocial model of music in dementia, highlighting that it is the interaction between “who you are”, the “here and now” and “connectedness” with others that contributes to the positive effects of music on people with dementia. Although this model was developed with people living in residential settings, the social benefits of connecting with others in the community, experiencing joy in the present moment and connecting with the person’s own identity are all likely to be important for those living in the community with dementia. As the other areas of arts-based interventions (visual and literary arts) are still in the early stages of research, there have yet to be developed specific theories for the possible effects of these activities. However, an art-viewing grounded theory study highlighted the importance of psychosocial programmes reducing “excess disability”, by focusing on people’s strengths and not underestimating their abilities (Macpherson, Bird, Anderson, Davis, & Blair, 2009). They also concluded that this provides support for the importance of supporting people with dementia to access “normal” activities such as arts based interventions.

Dyadic interventions

Literature reviews have found that psychosocial interventions such as stress management training and social support may positively impact psychological difficulties and QOL for people with dementia and their caregivers and delay residential home placement (e.g. Brodarty, Green, & Koschera, 2003; Van’t Leven et al., 2013). These interventions can be delivered to the person with dementia and caregiver separately or jointly. It has been suggested that joint interventions and incorporating social components may be more effective (Brodarty et al., 2003; Cooke, McNally, Mulligan, Harrison, & Newman, 2001). Some research has also investigated the impact of dyadic arts-based interventions, delivered to both the person with dementia and caregiver jointly. It is possible that dyadic interventions provide a connectedness to others close to the person with dementia and allow them to express and

connect with their identity (“who you are”) both as an individual and in other roles (e.g. as a husband/wife/mother) which were reported to be important aspects of music interventions in McDermott et al.’s model (2014). Also, removing “excess disability” may have positive effects on the relationship between the person with dementia and their caregiver. This may reduce feelings of caregiver burden (through observing the person with dementia’s sense of mastery and achievement) and provide an enjoyable activity that both can engage in equally and experience shared enjoyment, important in “couplehood” (Hellström et al., 2005; Macpherson et al., 2009). These processes may have positive influences on the person with dementia, their caregiver and the relationship between the two.

Rationale for current review

There have been many research studies and reviews of the impact of arts-based interventions on people with dementia. The majority have focused on music-based interventions and found positive effects on mood, behavioural disturbances and BPSD (McDermott et al., 2013; Raglio et al., 2012), although a recent Cochrane review only found evidence for positive effects on depression (van der Steen et al., 2017). Research into visual arts interventions has found positive effects on self-esteem, QOL and wellbeing (Beard, 2012) and literary arts interventions have been shown to reduce BPSD’s and increase positive affect (Billington et al., 2013; Phillips et al., 2010). These studies have focused on interventions delivered solely to the person with dementia rather than as a dyad. One recent review has looked at the influence of dyadic psychosocial interventions including psycho-education and art viewing in seven studies (Rausch, Caljouw, & van der Ploeg, 2017). Dyadic arts-based interventions were reported to have positive effects on qualitative measures but no significant differences were found on quantitative measures. The authors concluded that there is a need to develop more interventions focusing on the needs of the dyad. No currently published reviews have solely reviewed the influence of dyadic arts-based interventions on

psychological outcomes. This review will therefore seek to answer the following question: Are dyadic arts-based interventions shown to influence psychological outcomes in people living with a dementia and their informal caregivers?

Methodology

A systematised literature review (Grant & Booth, 2009) was conducted to examine research on the psychological influence of dyadic arts interventions for people with a dementia and their informal caregivers.

Definition of terms

In this review, influence on psychological outcomes refers to any reported or observed effects on emotions, wellbeing, QOL or behaviour. Dyadic arts interventions refer to any activity using a form of the arts which is participated in simultaneously by both a person with a dementia and their informal caregiver. The definition of informal caregiver used is “persons without formal health care education who are caring for, or helping, a person with functional disabilities, prolonged psychiatric or physical illness, or age-related problems” (Lethin, 2016, p. 16). Most often, informal caregivers are family members (e.g. spouses, adult children) and friends.

Literature search

The electronic databases PsychINFO, Medline, Web of Science (Core Collection) and ASSIA were searched in February 2018 to identify studies relevant to the review. Further searches were conducted on Google Scholar and hand-searching of reference lists of relevant articles. Search terms covered three main areas of arts-based interventions, performing arts, visual arts and literary arts; Boolean operators ‘AND’ and ‘OR’ were used to combine search terms (see Table 1 for search terms and database results). Articles were screened for relevance by title and then by abstract before retrieving full texts, see Figure 1 for flowchart

showing search process. Inclusion and exclusion criteria for screening papers can be seen in Table 2. Papers including formal (paid) caregivers were not included due to the differing relationships between people with dementia and their informal and formal caregivers. Interventions conducted in residential settings were also not included due to the different caring responsibilities of family caregivers in the community. Papers were also excluded if the intervention was not solely arts-based as it would be difficult to determine the influence of the arts intervention. Dance and other exercise-based interventions were excluded due to the overlap with the psychological impact of physical exercise (Thuné-Boyle, Iliffe, Cerga-Pashoja, Lowery, & Warner, 2012). Twelve studies met the inclusion criteria (Table 3). Of these studies, seven were visual arts interventions and five were performing arts (no literary arts intervention studies met the inclusion criteria for this review). Three studies were quantitative in design, five were mixed methods and four qualitative.

Data extraction and analysis

The quality of papers was reviewed using the quality assessment criteria developed by Kmet, Lee and Cook (2004) as this was applicable to a range of study designs. The criteria and full scoring for quantitative and qualitative studies can be seen in Appendices A and B, with summary scores in Table 3. Mixed methods studies have been scored using both quantitative and qualitative criteria.

Structure of review

The literature search identified studies measuring the influence of performing arts and visual arts, therefore this is reflected in the structure of this review. Study findings are summarised under each type of arts intervention before considering the methodological limitations across the areas of literature. Finally, the clinical and research implications of the

review are considered. Only findings related to psychological outcomes will be included due to the scope of this review.

Table 1

Search terms and database results

Search	Search terms	Database			
		PsycINFO	Medline	Web of Science Core collection	ASSIA
1	“dement*” OR “Alzheimer*”	94 279	202 011	282 874	9 170
2	“carer*” OR “caregiv*” OR “spous*” OR “family*” OR “care partner” OR “dyad*”	388 592	961 884	1 120 126	98 461
3	“art” OR “arts” OR “sing” OR “singing” OR “music*” OR “theatre” OR “drama” OR “museum*” OR “literary” OR “creative writing” OR “poetry” OR “colo*ring” OR “storytell*”	199 898	196 532	827 942	13 515
4	1 & 2 & 3	344	310	366	56

Table 2

Literature search inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Reports findings from an arts-based intervention	No report of the relationship between caregiver and person with dementia or intervention setting (e.g. formal/informal caregiver, residential/community)
Both people with dementia and their informal caregivers participated in the intervention	Included formal caregivers (if results were not reported separately from informal caregivers)
Outcomes included psychological impact or influence of intervention on participants	Included people with dementia living in residential settings (if results were not reported separately)
Intervention was delivered in the community	Written in any language other than English
Peer reviewed journal article	Intervention consists of training caregivers to deliver an intervention to the person with dementia separately
Any methodology	Included other interventions alongside arts-based intervention (e.g. counselling)
Published in any year	Included exercise-based interventions (e.g. dance)

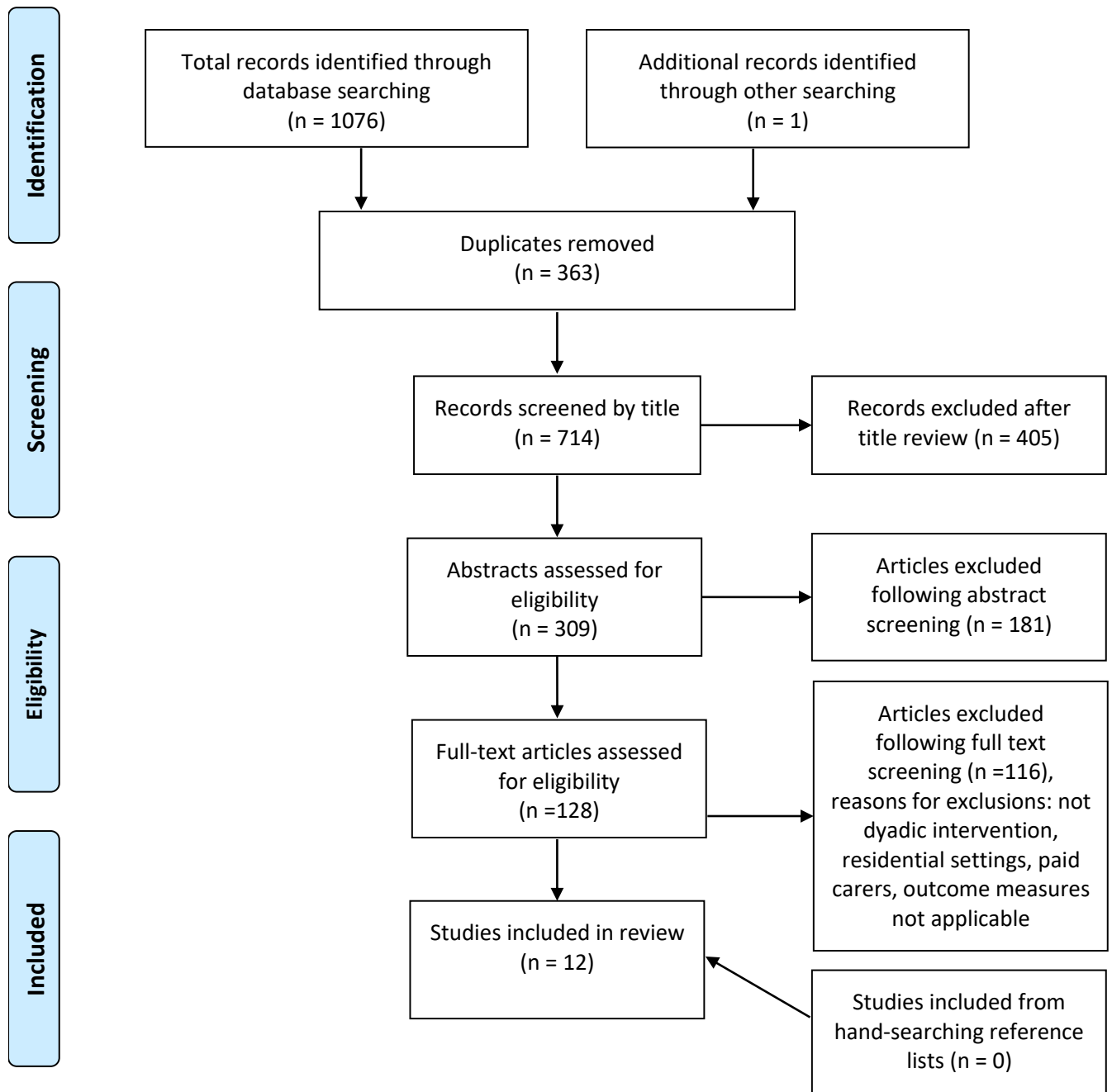


Figure 1. PRISMA flowchart diagram showing search process (Moher, Liberati, Tetzlaff, & Altman, 2009)

Table 3

Summary of literature included in review

Study (year) Location	Sample	Aim(s)	Intervention	Methodology/ design (overall Kmet score)	Measures	Key findings
Camic et al., (2013) UK	PWD: n=10, 50% male. Mean age 75 (range 68-88). Diagnoses: 60% AD, 20% VD, 10% MD, 10% MCI. MMSE mean 19 (range 5-28) Caregivers: n=10. Relationship: spouse=9, daughter=1	Does a community singing group have a positive impact on wellbeing, day-to- day functioning and social exclusion for PWD and their caregivers	10 weekly group singing sessions	Mixed methods, repeated measures pre-, post- and 10- week follow-up, exploratory study using thematic analysis Kmet scores: Quantitative: 86% Qualitative: 85%	Standardised: PWD: cognition (ACE- R/MMSE), depression (GDS), QOL (DEMQOL-4); Proxy measures completed by caregivers: QOL (DEMQOL-Proxy), BPSD (NPI), activities of daily living (BADLS); Self-report caregiver: anxiety, stress, depression (DASS), QOL (WHO-QoL BREF) Observations of engagement for PWD Separate semi-structured interviews with PWD and caregivers	PWD: Slight deterioration in cognition, ADL's and BPSD. Slight increase in depression. No sig difference in QOL. Caregivers: slight decreases in anxiety and depression, slight increases in stress, none sig. QOL - no change. Engagement – high. PWD themes: Challenged beliefs and attitudes, enjoyment, opportunity, singing, facilitator characteristics, new learning, personal changes. Caregiver themes: response to group – pre-group deliberation, ambience and environment, structure, social inclusion, experience of singing Perception of influence on PWD: social inclusion, new learning, enhanced emotions, impact outside the group
Camic et al., (2014) UK	PWD: n=12. Mean age 78.3 (range 58- 94). MMSE mean 20.1 (range 10-24). Caregivers: n=12.	Explore experiences of art gallery viewing and impact on caregiver burden, PWD-caregiver relationship, social and cognitive domains, social inclusion and QOL for PWD	8 weekly group art gallery sessions; 1- hour art- viewing, 1- hour art- making	Mixed methods, pre-post- and comparing two intervention sites. Interviews 2-3 weeks post- using thematic analysis Kmet score: Quantitative: 82%	Standardised: PWD: QOL (DEMQOL-4); Caregivers: caregiver burden (ZBI), activities of daily living (BADLS) Joint semi-structured interviews	No sig differences on any quantitative measures pre-post or when compared between sites (traditional/contemporary). Trend for reduction in caregiver burden. Three overarching themes – social, cognitive abilities, gallery setting.

				Qualitative: 90%		
Camic et al., (2016) UK	PWD: n=12. Mean age 78.3 (range 58-94). MMSE mean 20.1 (range 10-24). Caregivers: n=12 Facilitators n = 4	Develop a theoretical understanding of how art viewing and making impacts PWD and their caregivers	As above (Camic et al., 2014)	Qualitative, grounded theory Kmet score: 95%	Joint semi-structured interviews with PWD/caregivers; facilitator interviews; analysis of field notes; email blog	Four categories – gallery setting, intellectual stimulation, social relationships and changed perceptions. Theory developed of a three-way interaction between the intervention providing social interaction and intellectual stimulation in a valued place contributing to effects on PWD and caregivers
Davidson & Almeida (2014) Australia. (Only group A included in this review as group B conducted in residential settings and control setting unspecified)	PWD: n=6. Mean age 79.5 (range 73-88). DSM-IV-TR: mild to moderate dementia. Caregivers: n=6. Mean age 69.67 (range 42-86). Relationship: spouse or child.	Exploratory study to examine whether a singing group has an impact on PWD's lucidity, mood, agitated behaviour and focus after a single session or six sessions	Stage 1: 1x 2-hour singing session Stage 2: 6x 2-hour weekly singing sessions	Quantitative Stage 1: Repeated measures, pre-post- Stage 2: Repeated measures, pre-post- sessions 2, 4 and 6 Kmet score: 77%	Stage 1: Bi-polar rating scales: completed by caregiver about PWD: lucidity, mood, agitation/relaxation, focus; Caregiver self-report: energy, mood, stress/relaxation, focus. Stage 2: Rating scales as in stage 1; brief qualitative joint interviews regarding mood and experience (not formally analysed)	Stage 1: sig improvement in PWD lucidity and caregiver mood, non-sig trends for improvement on all other variables pre- to post-. Stage 2: sig difference in PWD focus at week 2. Non-sig trends for improvement on all other variables except caregiver focus week 2 and 4. Interviews supported quantitative findings of improvements on variables measured and other themes included identity, reminiscence, connection and proximity.
Eekelaar et al., (2012) UK	PWD: n=6, 50% male. Mean age 78.67 (range 68-91). MMSE mean 21.67 (range 18-24). Caregivers: n=6, 50% male. Mean age 70.22 (range 66-96). Relationship: 83% spouse, 17% child.	Exploratory study of the associations between visual arts-based interventions and cognitive stimulation	3x 90-min group art gallery sessions; 30 mins art-viewing, 60 mins art-making	Mixed methods, during sessions, pre-, post- and 4 week follow-up Kmet score: Quantitative: 77% Qualitative: 75%	Semi-structured interviews pre-, post- and follow-up Quantitative content analysis of recordings looking at episodic memory and verbal fluency for PWD Thematic analysis of caregiver's experiences of the group	Increase in episodic memory and semantic fluency during the gallery session compared to pre-interview and episodic memory maintained at post-interview. Themes included participating in a social activity, observing the PWD more like their "old selves" and sharing the experience together

Flatt et al., (2015) USA	PWD: n=10, 50% male. Age: >60y =8. Diagnoses: 80% early stage AD, 20% "related cognitive disorders". Caregivers: n=10, 40% male. Age: >60y =6. Relationship: often spouse/significant other or other family member	1. Identify enjoyable features of the activity 2. Ways the activity could be improved 3. Does group cohesion influence participant satisfaction 4. Are past art experiences associated with overall experiences	Art-museum engagement activity; 1 hour art-viewing, 2 hours art-making	Cross-sectional, qualitative using thematic analysis Kmet score: 85%	Brief satisfaction survey; focus group interviews with both PWD and their caregivers	Art making was the most enjoyable activity followed by group interaction and guided discussion. Overall satisfaction correlated with feelings of belonging and morale. Five themes identified: cognitive stimulation, social interactions, self-esteem and two themes related to particular aspects of the programme, activity related e.g. small groups and practical issues e.g. timing.
Johnson et al., (2017) UK	PWD: n=36, 69% male. Mean age 74 (range 58-85). Diagnoses: 8% early-onset AD, 47% AD, 13% FTD, 11% VD, 21% MD. CDR (.5 or 1): early to mid-stage dementia. Caregivers: n=30, 13% male. Mean age 66 (range 48-83). Relationship: spouse, relative or friend.	Investigate the impact of art-viewing and object handling on subjective wellbeing for PWD and their caregivers	11 sessions of museum-based art-viewing (45 mins) and object handling (45 mins)	Quantitative, quasi-experimental, mixed 2x4 repeated measures crossover study Kmet score: 91%	Visual analogue scales (VAS) pre- and post- each activity measuring subjective wellbeing (happy/sad, well/unwell, interested/bored, confident/not confident, optimistic/not optimistic) completed by both PWD and their caregivers Brief evaluation questionnaire	Overall wellbeing sig increased following art-viewing and object handling for both PWD and caregivers.
McGuigan et al., (2015) New Zealand	PWD: n=8, 38% male. Mean age 81 (range 73-90). Diagnoses: 75% AD, 12.5% VD, 12.5% MD	Investigate the experiences of PWD and their caregivers who attended a six-week art gallery programme, to	Six weekly 2-hour museum-based programmes including art-viewing,	Mixed methods, repeated measures and evaluative focus groups using thematic analysis	Attentiveness scale rated by observer every 60 seconds to measure PWD's concentration levels Focus groups with caregivers and volunteers on	PWD consistently showed "high" attention levels during the session. Themes included socialising, aspects of programme delivery, shared experience and practical issues.

	Caregivers: n=7, 43% male. Age: 29% 35-44, 71% 55+. Relationship: 71% spouse, 29% child.	determine caregiver satisfaction and feedback for future programmes	object handling and exhibition tours	Kmet score: Quantitative: 75% Qualitative 80%	satisfaction, successes and improvements	
Mittelman & Papayannopoulou (2018) USA	PWD: n=11, 64% male. Mean age 79.4. Early to early-mid stage of dementia estimated with Global Deterioration Scale. Caregivers: n=11, 45% male. Mean age 71.7. Relationship: spouse=9, child=1, close friend=1.	Pilot study of a dyadic singing group to inform future interventions and investigate possible benefits of the intervention	13 week singing group culminating in a concert performance	Mixed methods, pre-post-repeated measures, used "informal thematic analysis" Kmet score: Quantitative: 86% Qualitative 60%	Standardised: PWD and caregiver: family communication (FAM), self-esteem (RSES); PWD only: QOL (QOL-AD; DEMQOL); caregivers only: social support (MOS), health-related QOL (SF-8) and depression (GDS). PWD's measures completed by social workers/health professionals with the PWD. Open-ended questionnaires and joint focus groups	For PWD, sig improvement in QOL and communication with caregiver, non-sig trend for greater self-esteem. For caregivers, sig. improvement in self-esteem and non-sig trends for increased QOL and social support with no change in depression or communication. Qualitative reports included benefits of group belonging/socialising, enjoying the activity of singing and learning new skills.
Osman et al., (2016) UK	PWD: n=10, 50% male. Caregivers: n=10, 20% male. Relationship: spouse=7, daughter=3.	Examine the experiences of PWD and their caregivers following group singing	Ongoing singing groups	Qualitative, thematic analysis Kmet score: 85%	Joint semi-structured interviews examining experiences of attending, effects of the group on communication and relationships and any health/behaviour changes	Six themes emerged – social inclusion and support, sharing the experience, positive impact on relationships and memory, improved mood/wellbeing and accepting the diagnosis.
Schall et al., (2017) Germany	PWD (intervention group): n=25, 40% male. Mean age 75.1. MMSE mean score 18.08. Mild to moderate dementia. PWD (controls): n=19, 32% male. Mean age 76.4.	Art museum-based interventions will have beneficial effects on emotional wellbeing, QOL and BPSD for PWD	Six weekly 2-hour art museum sessions including museum tours (60 mins) and	RCT, mixed-method design Kmet score: 88%	Self-report PWD measures: cognition (MMSE; ADAS-Cog), depression (GDS), QOL (QoL-AD), neuropsychiatric symptoms (NPI), emotional wellbeing (smiley face rating scale; FAHW; completed pre- and post- every session).	No sig. difference in cognition, dementia severity or depression. Sig. increase in QOL post- intervention. Sig decrease in apathy following both intervention and control. After the control group participated in the intervention, their pre-post scores were combined with the intervention group, showing sig. decreases in overall

	<p>Diagnoses (groups combined): 72.7% AD, 15.9% VD, 4.6% PDD, 6.8% etiology unclear.</p> <p>Caregivers (intervention and controls combined): n=44. Mean age 62.9. Relationship: 56.8% spouse, 31.8% adult children, 11.4% other.</p>		art-making (60 mins)		<p>Follow-up caregiver questionnaires after each session and at 3-month follow-up. Questions based on observation of PWD's communication, behaviour and engagement, included open-ended questions and evaluation of the art programme</p>	<p>neuropsychiatric symptoms, apathy and negative affect (depression/anxiety) after the intervention. Statistically sig. improvements in wellbeing after sessions.</p> <p>Caregiver questionnaires confirmed positive impact on wellbeing and emotional state and gave positive feedback on the intervention.</p>
Unadkat et al., (2017) UK	<p>PWD: n=17, 53% male. Mean age 77 (range 66-87). Diagnoses: 41% AD, 18% VD, 12% FTD, 12% MD, 6% MCI, 6% unspecified, 6% other. CDR impairment: 18% "questionable", 24% mild, 53% moderate, 6% severe.</p> <p>Caregivers: n=17, 47% male. Mean age 75 (range 61-89). Relationship: 100% spouses.</p>	Understanding the impact of group singing on the relationship between the PWD and caregiver and what factors contribute to this experience	Various singing groups	<p>Qualitative, grounded theory</p> <p>Kmet score: 95%</p>	Joint semi-structured interviews about the impact of the group and influencing factors	Theory developed describing the impact of the singing experience and the importance of effective facilitation, equal participation, group belonging and new experiences and the effects of these on PWD, caregivers and the relationship between them.

Key: PWD = people with dementia; ACE-R = Addenbrookes Cognitive Examination - Revised (Mioshi, Dawson, Mitchell, Arnold, & Hodges, 2006); MMSE = Mini Mental State Examination (Folstein, Folstein, & McHugh, 1975); GDS = Geriatric Depression Scale (Sheikh & Yesavage, 1986); DEM-QOL = Dementia Quality of Life Measure (Smith et al., 2005); DEM-QOL-Proxy = Dementia Quality of Life Proxy Measure (Brod, Stewart, Sands, & Walton, 1999); NPI = Neuropsychiatric Inventory (Cummings, Mega, Gray, Roseberg-Thompson, & Gornbein, 1994); BADLS = Bristol Activities of Daily Living Scale (Bucks, Ashworth, Wilcock, & Siegfried, 1996); DASS = Depression Anxiety Stress Scales (Crawford & Henry, 2003; Lovibond & Lovibond, 1995); WHO-QoL-BREF = World Health Organization Quality-of-Life Scale (Skevington, Lofty, & O'Connell, 2004); ZBI = Zarit Burden Interview (Zarit, Reever, & Bach-Peterson, 1980); RSES = Rosenberg self-esteem scale (Rosenberg, 1965); FAM = Family Assessment Measure (Skinner, Steinhauer, & Santa-Barbara, 1983); QOL-AD = Quality of Life-Alzheimer's Disease (Logsdon, Gibbons, McCurry, & Teri, 2002); MOS = Medical Outcomes Study social support survey (Sherbourne & Stewart, 1991); SF-8 (Ware, Kosinski, Dewey, & Gandek, 2001); ADAS-Cog = Alzheimer's Disease Assessment Scale-cognitive subscale (Rosen, Mohs, & Davis, 1984); FAHW = Questionnaire of General Habitual Well-being (Wydra, 2003); Global Deterioration Scale (Reisberg, Ferris, de Leon, & Crook, 1982); Kmet = Standard Quality Assessment Criteria (Kmet et al., 2004); CDR = Clinical Dementia Rating Scale (Morris, 2003); DSM-IV-TR = Diagnostic and Statistical Manual of Mental Disorders 4th ed, text revision (American Psychiatric Association, 2000).

Results

Performing arts

All five studies measuring the impact of dyadic performing arts interventions focused on group singing interventions. Three studies measured the effects of time-limited, multi-session singing groups (Camic, Williams, & Meeten, 2013; Davidson & Almeida, 2014), one of which culminated in a concert performance (Mittelman & Papayannopoulou, 2018). One study focused on participants from on-going, multi-session groups (Osman, Tischler, & Schneider, 2016) and the final study recruited participants from a range of five different groups including both on-going and time-limited (Unadkat, Camic, & Vella-Burrows, 2017).

Three studies used quantitative measures; one solely quantitative study (Davidson & Almeida, 2014) and two mixed methods (Camic et al., 2013; Mittelman & Papayannopoulou, 2018) and the findings were mixed. Whilst Camic et al. (2013) found a significant increase in depression and no change in QOL for people with dementia following the group, this was in the context of slightly deteriorated scores on cognition and activities of daily living assessments. In contrast, the remaining two studies found significantly positive improvements in QOL and communication with the caregiver (Mittelman & Papayannopoulou, 2018) and lucidity (Davidson & Almeida, 2014) with additional benefit found from attending multiple sessions, with significant improvements in lucidity, mood and level of focus.

For caregivers, the quantitative findings were generally positive, with significant improvements in mood, relaxation (Davidson & Almeida, 2014) and self-esteem (Mittelman & Papayannopoulou, 2018). Davidson and Almeida (2014) commented that some of the lack of significant findings may have been due to a small sample size. However, the quantitative findings were also mixed, as one study reported no change in depression scores (Mittelman & Papayannopoulou, 2018). One study also reported no change in QOL, although this may have

been due to the relatively high levels of QOL rated throughout the study (Camic et al., 2013). Although, not significant, Camic et al. also reported an increase in stress levels whilst Davidson and Almeida found that they decreased. Again, this may have been due to the deterioration in cognitive scores and decrease in ADLs for people with dementia. Although it is difficult to conclude whether people's cognition deteriorated similarly in Davidson and Almeida's study as they did not include measures of cognitive ability, they did report an increase in caregiver-rated lucidity and focus which may suggest that their abilities remained stable throughout the study period.

All five studies included a form of qualitative information, although two did not use formal qualitative analysis (Davidson & Almeida, 2014; Mittelman & Papayannopoulou, 2018). All studies included reports of the positive impact of the activity of singing and doing so in a social/group setting with other people with dementia and their caregivers. Three studies each highlighted other important parts of the singing group experience including the accessibility of singing for all members (Camic et al., 2013; Osman et al., 2016; Unadkat et al., 2017), that it was a shared experience between the person with dementia and caregiver (Davidson & Almeida, 2014; Osman et al., 2016; Unadkat et al., 2017), enjoying the challenge of learning new songs and facilitator skills and characteristics (Camic et al., 2013; Mittelman & Papayannopoulou, 2018; Unadkat et al., 2017). Participants in one study also reported gaining enjoyment from singing familiar songs that facilitated reminiscence (Osman et al., 2016). All five studies included comments relating to improved mood or wellbeing and three commented on the extended impact, both in terms of mood (Mittelman & Papayannopoulou, 2018) and the enjoyment of singing at home (Camic et al., 2013; Mittelman & Papayannopoulou, 2018; Unadkat et al., 2017). Two studies highlighted how singing groups helped develop the person with dementia's identity outside that of someone with a diagnosis (Davidson & Almeida, 2014; Unadkat et al., 2017). Only two studies

reported neutral or negative comments regarding participation in the group. These included some caregivers reporting initial apprehensiveness about attending, no effect on themselves but effects on the person they care for, and difficulties with relaxation due to concerns about the person with dementia (Camic et al., 2013; Davidson & Almeida, 2014).

Methodological critique of the literature.

With the exception of the qualitative aspects of Mittelman and Papayannopoulou's (2018) mixed methods pilot study, all of the performing arts intervention papers reviewed were good quality (> 75%) according to the Kmet criteria (Kmet et al., 2004; Table 3). Overall, the papers included clear and well-defined objectives and results, and the conclusions were supported by the findings. Nevertheless, there were methodological limitations across the literature.

Study design.

Although well described, all three studies using quantitative methods were either exploratory or pilot studies with small sample sizes (ranging from 12 to 22) (Camic et al., 2013; Davidson & Almeida, 2014; Mittelman & Papayannopoulou, 2018). Whilst these were appropriate sample sizes for the designs, it is difficult to draw firm conclusions about the impact of the interventions. Positively, where relevant, changes to the number of participants due to their unavailability was reported. Also, no control groups with community participants were used, reducing the ability to determine causality. The study designs were clear and well described in qualitative studies.

Sampling strategy.

All studies described the sample that participants were recruited from, with one recruiting from a community mental health service (Camic et al., 2013) and the remaining studies from existing singing groups. Unadkat et al. (2017) included participants from five

different types of singing groups which increased the reliability of the findings but there was less information reported about the content and context of the groups. Three studies scored “partially” on the sampling strategy criteria due to insufficient sampling description (Camic et al., 2013; Davidson & Almeida, 2014; Mittelman & Papayannopoulou, 2018). These studies did not fully describe how participants were recruited (e.g. volunteer sampling) therefore it is unclear if some members of the target population were more likely to be recruited than others and it is difficult to evaluate possible sampling bias.

Participant characteristics.

Four studies reported limited data on participant characteristics including minimal demographic information about caregivers (Camic et al., 2013) and no reporting of gender for people with dementia (Davidson & Almeida, 2014) or type of dementia diagnosis (Davidson & Almeida, 2014; Mittelman & Papayannopoulou, 2018; Osman et al., 2016). This reduces the replicability of the studies and ability to generalise findings, however specific dementia diagnosis is not often sought in community arts-based interventions. Information that was relatively well reported included stage of dementia/level of impairment and relationship between the caregiver and person with dementia. Most caregivers were spouses, with smaller numbers of adult children participating and one “close friend” (Mittelman & Papayannopoulou, 2018). The majority of studies included people with mild to moderate dementia, with two studies including some participants with severe dementia (Camic et al., 2013; Unadkat et al., 2017). Whilst the tendency to include spousal caregivers and those with mild-moderate dementia may reduce the applicability of findings to other caregivers and those with more advanced dementia, it may also be reflective of the demographic living in the community (Lewis et al., 2014). All studies took place in Western countries, three in the UK and one each in the USA (Mittelman & Papayannopoulou, 2018) and Australia (Davidson &

Almeida, 2014). These findings, therefore, may not be applicable in other countries with different socio-economic populations and cultures.

Outcome measures.

Quantitative outcome measures were well defined and reported, however a range of psychological measures were used across the studies including mood, QOL, stress, anxiety and self-esteem. Whilst these may all be related constructs, it makes it more difficult to compare study findings and to compare interventions.

Data analysis.

The studies using quantitative data all used parametric t-tests, however none commented on whether the sample was normally distributed (Camic et al., 2013; Davidson & Almeida, 2014; Mittelman & Papayannopoulou, 2018). If the data were not normally distributed but parametric tests were used, this increases the likelihood of Type 2 errors. Mittelman and Papayannopoulou also used $p < .1$ as their significance value rather than $p < .05$. Although the justification for this was given as the small sample size, it may also increase the likelihood of a Type 1 error. Davidson and Almeida did not report the variance of scores including the mean and standard deviation, meaning that the distribution of scores could not be evaluated. One mixed methods study reported using “informal thematic analysis” (Mittelman & Papayannopoulou, 2018) but included very little description of the method of analysis and the development of codes and themes, as did Osman et al. (2016) in their qualitative study. This makes it difficult to assess their analysis. Positively, all studies included a form of qualitative information from participants, gaining more in-depth information about their experiences.

Verification and reflexivity.

Positively, four studies reported verification methods for qualitative data analysis (e.g. inter-rater reliability), however one did not (Mittelman & Papayannopoulou, 2018). This study also based the findings on only one researcher's notes therefore it is unclear whether the themes would have been verified by others. Unadkat et al. (2017) explicitly discussed the possible impact of their own preconceptions on the qualitative data analysis and ways that this was minimised. The remaining three studies using a form of qualitative analysis (thematic analysis and "informal thematic analysis"), did not comment on the possible impact of their own preconceptions, therefore it is not clear that they were considered throughout the study (Camic et al., 2013; Mittelman & Papayanapoulou, 2018; Osman et al., 2016).

Visual arts

Five of the seven visual arts interventions assessed the impact of a combination of gallery/museum art-viewing and art-making (Camic, Tischler, & Pearman, 2014; Camic, Baker, & Tischler, 2016; Eekelaar, Camic, & Springham, 2012; Flatt et al., 2015; Schall, Tesky, Adams, & Pantel, 2017) and two assessed art-viewing with object handling (Johnson, Culverwell, Hulbert, Robertson, & Camic, 2017; McGuigan, Legget, & Horsburgh, 2015). Two studies used single-session interventions (Flatt et al., 2015; Johnson et al., 2017) and the remaining five used multiple sessions. Three studies used quantitative measures of psychological functioning, one mixed methods study (Camic et al., 2014) and two solely quantitative (Johnson et al., 2017), one of which was a randomised controlled design (Schall et al., 2017). Overall, the findings were mostly positive. Camic et al. (2014) reported no significant differences on measures of caregiver burden, QOL or activities of daily living for people with dementia. These non-significant results may have been affected by a small sample size. They also found no site-specific differences between a Georgian period art

gallery with mostly 17th and 18th paintings and a contemporary gallery with conceptual and abstract art. Johnson et al. (2017) used a crossover design to control for the order of art-viewing and object-handling activities. They found a significant increase in wellbeing for people with dementia and their caregivers following both activities which was not affected by the order of activity. Also, there was not a significant increase in wellbeing following the refreshment break, suggesting that the findings were related to the art activities rather than only group participation. Schall et al. (2017) also found significant improvements in wellbeing, QOL and apathy for people with dementia following art-viewing and art-making activities. In this study, the wait-list control group took part in independent museum visits and also reported significant improvements in apathy. This may suggest that engagement with museum environments has an impact on apathy regardless of format. When both groups had participated in the art intervention programme, the groups were combined and there were significant pre- post- decreases in overall neuropsychiatric symptoms, apathy and negative affect (depression and anxiety). These positive findings regarding wellbeing and emotional state were also confirmed in caregiver questionnaires.

All five studies reporting qualitative analysis described the positive impact of socialising with others and reduced isolation and four further papers also reported positive effects of its dyadic nature and sharing positive experiences (Camic et al., 2014; Camic et al., 2016; Eekelaar et al., 2012; McGuigan et al., 2015). Enjoyment of the programme was reported in all studies as well as positive effects on affect in two studies (Camic et al., 2016; Eekelaar et al., 2012) and self-esteem in one (Flatt et al., 2015). The art activities themselves were highlighted as important aspects in all papers, both through new learning and stimulation and the accessibility of the intervention, creating a sense of normalcy and changing perceptions about abilities. This was supported by McGuigan et al. (2015) who found consistently high levels of attention during the sessions, suggesting that people with

dementia can engage in visual arts sessions. Three papers also reported an increase in reminiscence by the people with dementia during the interventions (Eekelaar et al., 2012; Flatt et al., 2015; McGuigan et al., 2015). Two papers highlighted the importance of the gallery setting (Camic et al., 2014; Camic et al., 2016) and facilitator characteristics as valued aspects of the intervention (Camic et al., 2016; Flatt et al., 2015). Although no negative effects were reported, some commented that they were disappointed that the intervention was time-limited (Camic et al., 2016; Eekelaar et al., 2012) and others, conversely, that it would be difficult to continue the sessions long-term due to caregiving responsibilities (Camic et al., 2016). There were few reports of an extended effect after the sessions, with two studies highlighting caregiver-reported post-session cognitive benefits (Camic et al., 2014; McGuigan et al., 2015) and three reporting an intention to continue with visual art activities after the intervention (Camic et al., 2014; Camic et al., 2016; Eekelaar et al., 2012). Themes and quantitative outcomes did not appear to differ between the object handling and art-making interventions.

Methodological critique of the literature.

All visual arts studies reviewed were rated as good quality (> 75%) using the Kmet criteria (Kmet et al., 2004) (Table 3). The papers generally contained well-defined objectives, results and conclusions, outcome measures were clear and data verification strategies were described in all qualitative studies. However, some limitations of methodologies are described below.

Study design.

Designs were clearly described in all studies. Johnson et al. (2017) used a crossover design and found no change following a refreshment break, increasing the likelihood that improvements were due to the art activities. Positively, an RCT study included a wait-list

control group (Schall et al., 2017), however the general lack of control groups in study designs reduces the ability to determine causality.

Sample sizes for the three studies using quantitative data to assess psychological outcomes were varied (ranging from 24 to 88), with one study including a relatively small number of participants (Camic et al., 2014). Two further studies also used quantitative data however these did not measure psychological outcomes and the sample sizes were small (12 and 15) (Eekelaar et al., 2012; McGuigan et al., 2015). Except for Eekelaar et al. the other studies with small sample sizes were not exploratory or pilot studies. Only Johnson et al. (2017) reported power analyses to determine sample size, finding that the sample size was adequate for the within-subject comparisons. However, the authors reported that the non-significant findings for the between-subjects analysis on the effect of activity order may have been underpowered. The seldom use of power calculations and the small sample sizes makes it difficult to determine whether the studies were sufficiently powered. The unavailability of participants at some sessions further reduced sample sizes; in one study this meant that only one dyad attended all three sessions (Eekelaar et al., 2012), reducing the generalisability of findings.

Sampling strategy.

All studies described the recruitment settings, however three studies scored partially on this criterion due to insufficient description of sampling methods (Camic et al., 2014; Eekelaar et al., 2012; Flatt et al., 2015). For example, it is unclear whether some participants in the target populations were more likely to be selected than others. Some studies recruited participants from specific populations (e.g. Johnson et al., 2017 recruited from a post-diagnostic memory support group and Eekelaar et al., 2012 from a community mental health service), which may limit the generalisability of findings.

Participant characteristics.

Three studies did not report specific dementia diagnoses (Camic et al., 2014; Camic et al., 2016; Eekelaar et al., 2012) but it is unusual for a specific dementia diagnosis to be sought in arts-based activities occurring in community settings. Two studies did not report the gender of people with dementia or specific caregiver characteristics (Camic et al., 2014; Camic et al., 2016). Most studies that reported the gender of participants had similar numbers of males and females in the study samples, with the exception of Johnson et al. (2017) who had a greater number of male people with dementia and female caregivers. These limitations may reduce the replicability and generalisability of findings. Positively, five studies reported the relationship between the caregiver and person with dementia; most caregivers were spouses, followed by adult children. Participant ages were relatively well reported as were stage of dementia/levels of impairment, with all participants in the early to mid-stages of dementia or with mild to moderate impairment. These levels of impairment and the primary inclusion of spousal caregivers are likely to be reflective of those living with dementia in the community (Lewis et al., 2014). All studies were conducted in Western countries, with four in the UK and one each conducted in the USA (Flatt et al., 2015), New Zealand (McGuigan et al., 2015) and Germany (Schall et al., 2017). Therefore, the findings may not be generalisable to other countries with different ethnic and socio-economic groups.

Outcome measures.

Although the use of quantitative outcome measures was well described, there was a range used across the studies making it difficult to compare between them. Two studies included measures of QOL with the people with dementia (Camic et al., 2014; Schall et al., 2017) and two used measures of wellbeing (Johnson et al., 2017; Schall et al., 2017), however in both cases they used different scales, reducing the possibility to make direct

comparisons. Other outcomes included cognition, depression, neuropsychiatric symptoms, caregiver burden and activities of daily living. For caregivers, only caregiver burden and wellbeing were measured in one study each (Camic et al., 2014; Johnson et al., 2017). The findings suggested that the interventions had positive outcomes for caregivers but this is only based on two studies.

Data collection and analysis.

The description of qualitative data collection methods was limited in two studies due to minimal information being available about interview questions or topics (Camic et al., 2016; Eekelaar et al., 2012), contrastingly Flatt et al. (2015) included a good example of a focus group script. Eekelaar et al. also did not include very detailed description of how the themes were developed. Although McGuigan et al. (2015) included an adequate description of data analysis, few quotes were included to illustrate the themes, making it more difficult to link the data with the theory. In Camic et al., (2014), only themes reported by all participants were included in the final themes. Whilst this increased the validity of findings, it may also have omitted identifying important, but not universal, experiences. Quantitative analysis methods were generally well described, however Schall et al. (2017) did not appear to account for multiple statistical analyses (e.g. Bonferroni correction) which may increase the likelihood of Type 1 errors in this study, for example, five t-tests were conducted on the Neuropsychiatric Inventory data. Also, McGuigan et al. did not report variance in their analysis, meaning that the distribution of scores could not be evaluated.

Conclusions.

In six studies, the conclusions drawn appear to be supported by the results. However, in one study (McGuigan et al., 2015), one conclusion drawn was that the results “strongly suggest... that future sessions should include objects and images to maximize engagement”

as this appeared to produce the highest attention levels (p. 268). Although this may have been an effective intervention, the absence of a control group and statistical testing and the small sample size makes it difficult to draw such strong conclusions. In addition, they also included a limited description of the content of intervention sessions, making it difficult to attribute any differences to particular interventions and not to other factors (e.g. different facilitators).

Reflexivity.

Only one of the papers utilizing qualitative components scored 2/2 on the reflexivity criterion (Kmet et al., 2004) (Camic et al., 2016). The remaining studies either contained no reference to the consideration of possible researcher preconceptions (Eekelaar et al., 2012; Flatt et al., 2015; McGuigan et al., 2015) or referred to reflexivity in the study design but did not explicitly consider the impact of potential preconceptions (Camic et al., 2014). As a result of this, the possible influence of the authors assumptions on data analysis is unknown.

Discussion

Some previous research has found positive effects of performing and visual arts on mood, self-esteem, wellbeing, QOL and BPSD for people with dementia when provided solely to this group (Beard, 2012; Kinney & Rentz, 2005; McDermott et al., 2013; Raglio et al., 2012; Rentz, 2002; Windle et al., 2017). However, there has also recently been a focus on interventions provided jointly to both the person with dementia and their caregiver. The aim of this paper was to review the literature on the influence of dyadic arts-based interventions on psychological outcomes for people with dementia and their informal caregivers. Overall the findings appeared generally positive, supporting previous research, but it is difficult to draw firm conclusions given the methodological limitations and the small number of studies available. Despite these limitations, the methodological quality of studies was high using the

Kmet criteria (>75%; Kmet et al., 2004), with only one study scoring below this for its qualitative component (Mittelman & Papayannopoulou, 2018).

Quantitative results suggested that people with dementia were able to engage in group singing interventions and that they may have a positive influence on QOL and communication with the caregiver. Camic et al. (2013) found a significant increase in depression and stable QOL in the context of subtle cognitive decline, therefore future research should consider measuring cognition alongside other quantitative measures to assess psychological outcomes relative to cognitive deterioration. For caregivers, the quantitative findings were generally positive, with significant improvements in mood and self-esteem. Although some studies reported no change in depression scores or QOL (Camic et al., 2013; Mittelman & Papayannopoulou, 2018). It is possible that some of the lack of change on these measures was related to the cognitive deterioration experienced by people with dementia (evidenced by Camic et al., 2013), therefore this should be considered in future research with dyad relationships.

Qualitative findings of the influence of group singing included improved mood and wellbeing, and a positive impact on the person with dementia's identity beyond that of someone with the diagnosis. In some cases, it was reported that there was a longer lasting impact of the group in terms of mood and continuing singing activities at home (Camic et al., 2013; Mittelman & Papayannopoulou, 2018; Unadkat et al., 2017). Important contributing factors to the positive influence of interventions included the activity of singing, the group setting in reducing isolation, the dyadic nature of the activity and enjoyment in learning new skills and information. Facilitator characteristics were also noted as important in engaging participants and ensuring the group is accessible (e.g. Unadkat et al., 2017). Methodological limitations of this research included mostly small sample sizes, lack of control groups and limited demographic information. All studies were also conducted in affluent, Western

countries; therefore the findings may not be directly applicable to people in other societies. More detailed information on data collection and analysis methods and consideration of reflexivity is needed in qualitative research. In quantitative research, more consistent outcome measures are needed, as is clarity in the consideration of normality testing and sampling strategies.

Quantitative measures on the impact of visual arts interventions on people with dementia were slightly more conclusive, although this was based only on three studies. In two studies, significant increases in wellbeing were reported (Johnson et al., 2017; Schall et al., 2017) and other measures including QOL, affect and apathy significantly improved in one study (Schall et al., 2017). Contrastingly, one study found no change in QOL (Camic et al., 2014). For caregivers, only two studies used quantitative outcomes to measure the effects of visual arts, with one finding a significant increase in wellbeing, and another a trend for reduction in caregiver burden but no significant differences (Camic et al., 2014; Johnson et al., 2017).

Qualitative reports from people with dementia and caregivers highlighted similar findings to the performing arts literature in the importance of socialising in the group, its dyadic nature and enjoyment of new learning. In all studies, participants also reported enjoying the visual arts-based activity. Some qualitative findings also highlighted the effects of the intervention on affect, self-esteem and changing perceptions about people with dementia's abilities through their engagement in the sessions (e.g. Camic et al., 2016; Flatt et al., 2015). The longer lasting impact of the group was also reported in some studies in terms of cognitive benefits for the person with dementia and a desire to continue with similar activities (Camic et al., 2014; McGuigan et al., 2015). Additionally, some qualitative visual arts studies also noted the importance of the gallery setting (Camic et al., 2014; Camic et al., 2016). Methodologically, similar limitations were noted as in the performing arts studies,

including limited information on sampling methods, demographics, qualitative data collection and explicit reflexivity. Also, the studies were conducted in Westernized countries with those with mild to moderate dementia, possibly limiting the applicability of findings to other countries. The visual arts literature did include two studies with larger sample sizes, one with a control group and another using a crossover design, however further research using larger samples and control groups is needed. Unlike the performing arts literature, there was a very limited number of quantitative outcome measures used with caregivers.

Clinical implications

With the lack of medications to cure or substantially slow the progression of dementia and the potential for negative impacts on psychological functioning, there is a great need for interventions to improve the quality of life in people with dementia and their caregivers. The increase in the number of people living with dementia in the community and the high demand on health and social care services increases the need for alternative ways of improving wellbeing and mental health. There is also a need for interventions not only provided for the person with dementia but also caregivers who can also experience lower levels of quality of life (Pinquart & Sörensen, 2003).

Although quantitative outcomes were mixed, performing and visual arts interventions can tentatively be linked with improved psychological outcomes for people with dementia and their caregivers as supported by qualitative findings. Engagement in group dyadic arts-interventions was associated with improved wellbeing, QOL, communication with the caregiver, self-esteem and mood (Davidson & Almeida, 2014; Johnson et al., 2017; Mittelman & Papayannopoulou, 2018; Schall et al., 2017). The accessibility, high engagement and new learning aspects of the group may have led to the increased self-esteem and positive effects on the identity of the person with dementia and changes in the way they

are seen by others. The group nature of the interventions facilitated decreased isolation and a sense of community with others experiencing the same challenges. The significant increase in communication from people with dementia towards caregivers in one study may also have been facilitated by the dyadic nature of the group. This may be due to the activities facilitating a sense of mastery and achievement for both the person with dementia and caregiver and removing “excess disability”, increasing communication between those present (Macpherson et al., 2009). This positive impact of the dyadic aspect of the group was highlighted in six of the twelve studies reviewed and may indicate that the interventions provided a shared activity promoting ‘couplehood’ (Hellström et al., 2005). As the group was for both partners of the dyad and reported to be accessible, this may have had a positive influence on relationships and communication, facilitating a sense of reciprocity (Merrick et al., 2016). It may also have allowed people with dementia to connect with their identity (“who you are”) and with others (both dyadically and more generally) in the “here and now”, highlighted as important processes in the psychosocial model of music in dementia (McDermott et al., 2014). Although further, additional research is needed in order to routinely suggest recommending dyadic arts-interventions in standard care, clinicians can now consider these as community-based activities that could be beneficial to dyads, particularly those who are socially isolated, have lower QOL or wellbeing or have mood difficulties.

Research implications

It is important to note that research into arts and dementia is in the early stages and remains poorly funded. Due to the methodological limitations of current literature, the conclusions that can be drawn about the impact of dyadic arts-based interventions on people with dementia and their caregivers is limited. The findings suggest that further research is warranted to investigate these links. Similar to recommendations from previous reviews,

future studies should utilise larger sample sizes and control groups wherever possible, to determine if there is a causal relationship (Kinney & Rentz, 2005; Rausch et al., 2017; van der Steen et al., 2017). If feasible, future research should include more detailed demographic information (e.g. dementia diagnoses) as also concluded by Rentz (2002), however it is important to note that community arts-based programmes do not routinely seek this information. The existing research associates choral singing and visual arts interventions with increased wellbeing, QOL, improved mood and decreased isolation, however the range of outcome measures makes findings difficult to compare. Therefore, further research with consistent outcome measures is necessary, supporting recommendations by Beard (2012) and van der Steen et al. (2017) that consistency is needed in outcome measures and that “process” measures (e.g. wellbeing and QOL), rather than clinical, medical focused measures are preferred. It may also be helpful to include measures of the dyadic relationship in future studies to assess any impact of dyadic group singing on aspects of the relationship e.g. satisfaction. The most common design used was mixed methods, allowing researchers to gain further insight into participant’s experiences of interventions and factors contributing to quantitatively-measured changes on psychological outcomes. Qualitative findings supported the positive experience of participating in arts-based activities for both people with dementia and caregivers in all studies. Due to the inconsistent findings on quantitative measures, it is important for future research to consider other quantitative methods to be used alongside qualitative measures in further mixed methods studies. McDermott et al. (2013) also highlighted the need to find quantitative measures that are sensitive to change, as effects of interventions may be short-lived due to cognitive impairment. They also noted that interventions are still worthwhile if they improve QOL, even if the effects are temporary. Johnson et al., (2017) supported this recommendation by providing evidence for the use of a brief wellbeing measure. Positively, this review suggests that research is focusing on the

impact of arts-based interventions on people with early to mid-stages of dementia living in the community and their caregivers, previously highlighted as areas lacking in arts-based research (Beard, 2012).

Conclusion

The aim of this review was to evaluate the literature on the influence of dyadic arts-based interventions on psychological outcomes for those with dementia and their informal caregivers. This review tentatively links arts interventions with improved outcomes, as seen in some increases in QOL, wellbeing and mood on quantitative measures. These positive effects were validated through qualitative data. In all studies participants reported enjoyment from engaging in the interventions and in some studies, participants reported increased wellbeing and self-esteem, improved mood and positive effects on the identity of the person with dementia. Aspects of the interventions reported to have a positive impact on participants included the activity itself (either choral singing or visual arts), both the group and dyadic nature of the sessions and learning new skills. In some studies, the longer lasting impact of the intervention was noted, both on psychological outcomes and continuing the shared activity after the study. However, more firm conclusions about the impact of the interventions are difficult to draw due to methodological limitations. Clinical and research implications have been discussed and future research should aim to improve on the methodological issues discussed in this review.

References

- Alzheimer's Society. (2017). *What is Alzheimer's disease?* Retrieved from:
https://www.alzheimers.org.uk/download/downloads/id/3379/what_is_alzheimers_disease.pdf
- American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders* (4th Ed., Text Revision). Washington, DC: American Psychiatric Association
- Aminzadeh, F., Byszewski, A., Molnar, F. J., & Eisner, M. (2007). Emotional impact of dementia diagnosis: exploring persons with dementia and caregivers' perspectives. *Aging and Mental Health, 11*, 281-290. doi: 10.1080/13607860600963695
- Baikie, E. (2002). The impact of dementia on marital relationships. *Sexual and Relationship Therapy, 17*, 289-299. doi: 10.1080/14681990220149095
- Balfour, A. (2014). Developing therapeutic couple work in dementia care—the living together with dementia project. *Psychoanalytic Psychotherapy, 28*, 304-320. doi: 10.1080/02668734.2014.934524
- Beard, R. L. (2012). Art therapies and dementia care: A systematic review. *Dementia, 11*, 633-656. doi: 10.1177/1471301211421090
- Bender, M. P. & Cheston, R. (1997). Inhabitants of a lost kingdom: a model for the subjective experiences of dementia. *Ageing & Society, 17*, 513–532. doi: 10.1017/s0144686x97006570
- Billington, J., Carroll, J., Davis, P., Healey, C., & Kinderman, P. (2013). A literature-based intervention for older people living with dementia. *Perspectives in Public Health, 133*, 165-173. doi: 10.1177/1757913912470052

- Blackburn, R., & Bradshaw, T. (2014). Music therapy for service users with dementia: a critical review of the literature. *Journal of Psychiatric and Mental Health Nursing*, *21*, 879-888. doi: 10.1111/jpm.12165
- Brod, M., Stewart, A. L., Sands, L., & Walton, P. (1999). Conceptualization and measurement of quality of life in dementia: The dementia quality of life instrument (DQoL). *The Gerontologist*, *39*, 25–35. doi: 10.1093/geront/39.1.25
- Brodaty, H., Green, A., & Koschera, A. (2003). Meta-analysis of psychosocial interventions for caregivers of people with dementia. *Journal of the American Geriatrics Society*, *51*, 657-664. doi: 10.1034/j.1600-0579.2003.00210.x
- Bucks, R. S., Ashworth, D. L., Wilcock, G. K., & Siegfried, K. (1996). Assessment of activities of daily living in dementia: Development of the Bristol activities of daily living scale. *Age & Ageing*, *25*, 113–120. doi: 10.1093/ageing/25.2.113
- Camic, P. M., Baker, E. L., & Tischler, V. (2016). Theorizing how art gallery interventions impact people with dementia and their caregivers. *The Gerontologist*, *56*, 1033-1041. doi: 10.1093/geront/gnv063
- Camic, P. M., Tischler, V., & Pearman, C. H. (2014). Viewing and making art together: a multi-session art-gallery-based intervention for people with dementia and their carers. *Ageing & Mental Health*, *18*, 161-168. doi: 10.1080/13607863.2013.818101
- Camic, P. M., Williams, C. M., & Meeten, F. (2013). Does a ‘singing together group’ improve the quality of life of people with a dementia and their caregivers? A pilot evaluation study. *Dementia: The International Journal for Social Research and Practice*, *12*, 152-171. doi: 10.1177/1471301211422761

- Carbonneau, H., Caron, C., & Desrosiers, J. (2010). Development of a conceptual framework of positive aspects of caregiving in dementia. *Dementia, 9*, 327-353. doi: 10.1177/1471301210375316
- Cheston, R. (1998). Psychotherapeutic work with people with dementia: A review of the literature. *British Journal of Medical Psychology, 71*, 211–231. doi:10.1111/j.2044-8341.1998.tb00987.x
- Cooke, D. D., McNally, L., Mulligan, K. T., Harrison, M. J. G., & Newman, S. P. (2001). Psychosocial interventions for caregivers of people with dementia: a systematic review. *Aging & Mental Health, 5*, 120-135. doi: 10.1080/713650019
- Crawford, J. R., & Henry, J. D. (2003). The Depression and Anxiety Stress Scales (DASS): Normative data and latent structure in a large non-clinical sample. *British Journal of Clinical Psychology, 42*, 111–131. doi: 10.1348/014466503321903544
- Cummings, J. L., Mega, M. S., Gray, K., Rosemberg-Thompson, S., & Gornbein, T. (1994). The Neuropsychiatric Inventory: Comprehensive assessment of psychopathology in dementia. *Neurology, 44*, 2308–2314. doi: 10.1212/wnl.44.12.2308
- Davidson, J. W., & Almeida, R. A. (2014). An exploratory study of the impact of group singing activities on lucidity, energy, focus, mood and relaxation for persons with dementia and their caregivers. *Psychology of Well-Being, 4*. doi: 10.1186/s13612-014-0024-5
- Eekelaar, C., Camic, P. M., & Springham, N. (2012). Art galleries, episodic memory and verbal fluency in dementia: An exploratory study. *Psychology of Aesthetics, Creativity, and the Arts, 6*, 262–272. doi:10.1037/a0027499

- Flatt, J. D., Liptak, A., Oakley, M. A., Gogan, J., Varner, T., & Lingler, J. H. (2015). Subjective experiences of an art museum engagement activity for persons with early-stage Alzheimer's disease and their family caregivers. *American Journal of Alzheimer's Disease & Other Dementias*®, 30, 380-389. doi: 10.1177/1533317514549953
- Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). Mini-mental state: A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research*, 12, 189–198. doi: 10.1016/0022-3956(75)90026-6
- Grant, M. J. & Booth, A. (2009). A typology of reviews: an analysis of 14 review types and associated methodologies. *Health Information and Libraries Journal*, 26, 91–108. doi:10.1111/j.1471-1842.2009.00848.x
- Hellström, I., Nolan, M., & Lundh, U. (2005). 'We do things together': A case study of 'couplehood' in dementia. *Dementia*, 4, 7-22. doi: 10.1177/1471301205049188
- Hellström, I., Nolan, M., & Lundh, U. (2007). Sustaining 'couplehood': Spouses' strategies for living positively with dementia. *Dementia*, 6, 383-409. doi: 10.1177/1471301207081571
- Johnson, J., Culverwell, A., Hulbert, S., Robertson, M., & Camic, P. M. (2017). Museum activities in dementia care: Using visual analog scales to measure subjective wellbeing. *Dementia*, 16, 591-610. doi: 10.1177/1471301215611763
- Kinney, J. M., & Rentz, C. A. (2005). Observed well-being among individuals with dementia: Memories in the Making©, an art program, versus other structured activity. *American Journal of Alzheimer's Disease & Other Dementias*®, 20, 220-227. doi: 10.1177/153331750502000406

- Kitwood, T. (1997). *Dementia reconsidered: The person comes first*. Buckingham, UK: Open University Press
- Kmet, L. M., Lee, R. C., & Cook, L. S. (2004). *Standard quality assessment criteria for evaluating primary research papers from a variety of fields*. Edmonton: Alberta Heritage Foundation for Medical Research. Retrieved from:
<https://www.ihe.ca/advanced-search/standard-quality-assessment-criteria-for-evaluating-primary-research-papers-from-a-variety-of-fields>
- Lethin, C. (2016). *Informal caregivers of older persons with dementia in eight European countries. Experiences, support, well-being and burden*. Lund: Lund University, Faculty of Medicine. Retrieved from
http://portal.research.lu.se/portal/files/11626472/Connie_Lethin_webb_papers_3.pdf
- Lewis, F., Karlsberg Schaffer, S., Sussex, J., O'Neill, P., & Cockcroft, L. (2014). *The trajectory of dementia in the UK – Making a difference*. Retrieved from
<http://www.alzheimersresearchuk.org/wp-content/uploads/2015/01/OHE-report-Full.pdf>
- Logsdon, R. G., Gibbons, L. E., McCurry, S. M., & Teri, L. (2002). Assessing quality of life in older adults with cognitive impairment. *Psychosomatic Medicine*, *64*, 510–519. doi: 10.1097/00006842-200205000-00016
- Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the Depression Anxiety Stress Scales* (2nd ed.). Sydney: Psychology Foundation.
- MacPherson, S., Bird, M., Anderson, K., Davis, T., & Blair, A. (2009). An art gallery access programme for people with dementia: “You do it for the moment”. *Aging & Mental Health*, *13*, 744–752. doi:10.1080/13607860902918207

- McDermott, O., Crellin, N., Ridder, H. M., & Orrell, M. (2013). Music therapy in dementia: a narrative synthesis systematic review. *International Journal of Geriatric Psychiatry*, 28, 781-794. doi: 10.1002/gps.3895
- McDermott, O., Orrell, M., & Ridder, H. M. (2014). The importance of music for people with dementia: the perspectives of people with dementia, family carers, staff and music therapists. *Aging & Mental Health*, 18, 706-716. doi: 10.1080/13607863.2013.875124
- McGuigan, K. A., Legget, J. A., & Horsburgh, M. (2015). Visiting the museum together: Evaluating a programme at Auckland Museum for people living with dementia and their carers. *Arts & Health*, 7, 261-270. doi: 10.1080/17533015.2015.1045531
- Merrick, K., Camic, P. M., & O'Shaughnessy, M. (2016). Couples constructing their experiences of dementia: A relational perspective. *Dementia*, 15, 34-50. doi: 10.1177/147130121351302
- Mioshi, E., Dawson, K., Mitchell, J., Arnold, R., & Hodges, J. R. (2006). The Addenbrooke's Cognitive Examination Revised (ACE-R): A brief cognitive test battery for dementia screening. *International Journal of Geriatric Psychiatry*, 21, 1078-1085. doi: 10.1002/gps.1610
- Mittelman, M. S., & Papayannopoulou, P. M. (2018). The Unforgettables: a chorus for people with dementia with their family members and friends. *International Psychogeriatrics*. Advance online publication. doi: 10.1017/S1041610217001867
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Med*, 6. doi: 10.1371/journal.pmed1000097

- Morris, J. C. (1993). The Clinical Dementia Rating (CDR): Current vision and scoring rules. *Neurology, 19*, 2412–2414. doi:10.1212/WNL.43.11.2412-a
- NICE. (2006). *Dementia: supporting people with dementia and their caregivers in health and social care*. Retrieved from <https://www.nice.org.uk/guidance/cg42?unlid=13608378720158241495>
- Osman, S. E., Tischler, V., & Schneider, J. (2016). ‘Singing for the Brain’: A qualitative study exploring the health and well-being benefits of singing for people with dementia and their caregivers. *Dementia, 15*, 1326-1339. doi:10.1177/1471301214556291
- Phillips, L. J., Reid-Arndt, S. A., & Pak, Y. (2010). Effects of a creative expression intervention on emotions, communication, and quality of life in persons with dementia. *Nursing Research, 59*, 417-425. doi: 10.1097/nnr.0b013e3181faff52
- Pinquart, M., & Sörensen, S. (2003). Differences between caregivers and noncaregivers in psychological health and physical health: A meta-analysis. *Psychology and Aging, 18*, 250–267. doi:10.1037/0882-7974.18.2.250
- Prince, M., Knapp, M., Guerchet, M., McCrone, P., Prina, M., Comas-Herrera, A., ... Salimkumar, D. (2014). *Dementia UK: Update*. Alzheimer’s Society: London.
- Pusey, H., & Richards, D. (2001). A systematic review of the effectiveness of psychosocial interventions for carers of people with dementia. *Aging & Mental Health, 5*, 107-119. doi: 10.1080/13607860120038302
- Raglio, A., Bellelli, G., Mazzola, P., Bellandi, D., Giovagnoli, A. R., Farina, E., ... & Zanetti, O. (2012). Music, music therapy and dementia: a review of literature and the recommendations of the Italian Psychogeriatric Association. *Maturitas, 72*, 305-310. doi: 10.1016/j.maturitas.2012.05.016

- Rausch, A., Caljouw, M. A., & van der Ploeg, E. S. (2017). Keeping the person with dementia and the informal caregiver together: a systematic review of psychosocial interventions. *International Psychogeriatrics*, *29*, 583-593. doi: 10.1017/s1041610216002106
- Reisberg, B., Ferris, S. H., de Leon, M. J., & Crook, T. (1982). The global deterioration scale for assessment of primary degenerative dementia. *American Journal of Psychiatry*, *139*, 1136–1139. doi: 10.1176/ajp.139.9.1136
- Rentz, C. A. (2002). Memories in the Making©: Outcome-based evaluation of an art program for individuals with dementing illnesses. *American Journal of Alzheimer's Disease & Other Dementias*®, *17*, 175-181. doi: 10.1177/153331750201700310
- Rosen, W. G., Mohs, R. C., & Davis, K. L. (1984). A new rating scale for Alzheimer's disease. *The American Journal of Psychiatry*, *141*, 1356–1364. doi: 10.1176/ajp.141.11.1356
- Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.
- Rusted, J., Sheppard, L., & Waller, D. (2006). A multi-centre randomized control group trial on the use of art therapy for older people with dementia. *Group Analysis*, *39*, 517-536. doi: 10.1177/0533316406071447
- Schall, A., Tesky, V. A., Adams, A. K., & Pantel, J. (2017). Art museum-based intervention to promote emotional well-being and improve quality of life in people with dementia: The ARTEMIS project. *Dementia*. Advance online publication. doi: 10.1177/1471301217730451

- Selwood, A., Johnston, K., Katona, C., Lyketsos, C., & Livingston, G. (2007). Systematic review of the effect of psychological interventions on family caregivers of people with dementia. *Journal of Affective Disorders, 101*, 75-89. doi: 10.1016/j.jad.2006.10.025
- Sheikh, J. I., & Yesavage, J. A. (1986). Geriatric Depression Scale (GDS): Recent evidence and development of a shorter version. *Clinical Gerontologist: The Journal of Aging and Mental Health, 5*, 165–173. doi: 10.1300/j018v05n01_09
- Sherbourne, C. D., & Stewart, A. L. (1991). The MOS social support survey. *Social Science & Medicine, 32*, 705–714. doi: 10.1016/0277-9536(91)90150-b
- Skevington, S. M., Lotfy, M., & O’Connell, K. A. (2004). The World Health Organization’s WHOQOL-BREF quality of life assessment: Psychometric properties and results of the international field trial. A report from the WHOQOL Group. *Quality of Life Research, 13*, 299–310. doi: 10.1023/b:qure.0000018486.91360.00
- Skinner, H. A., Steinhauer, P. D., & Santa-Barbara, J. (1983). The family assessment measure. *Canadian Journal of Community Mental Health, 2*, 91–103. doi: 10.7870/cjcmh-1983-0018
- Smith, S. C., Lamping, D. L., Banerjee, S., Harwood, R., Foley, B., Smith, P., ... Knapp, M. (2005). Measurement of health-related quality of life for people with dementia: Development of a new instrument (DEMQOL) and an evaluation of current methodology. *Health Technology Assessment, 9*, 101–108. doi: 10.3310/hta9100
- Thuné-Boyle, I. C. V., Iliffe, S., Cerga-Pashoja, A., Lowery, D., & Warner, J. (2012). The effect of exercise on behavioral and psychological symptoms of dementia: towards a research agenda. *International Psychogeriatrics, 24*, 1046-1057. doi: 10.1017/s1041610211002365

- Unadkat, S., Camic, P., & Vella-Burrows, T. (2017). Understanding the experience of group singing for couples where one partner has a diagnosis of dementia. *Gerontologist, 57*, 469-478. doi: 10.1093/geront/gnv698
- van der Steen, J. T., van Soest-Poortvliet, M. C., van der Wouden, J. C., Bruinsma, M. S., Scholten, R. J., & Vink, A. C. (2017). Music-based therapeutic interventions for people with dementia. *Cochrane Database of Systematic Reviews*. doi: 10.1002/14651858.cd003477.pub3
- Van't Leven, N., Prick, A. E. J., Groenewoud, J. G., Roelofs, P. D., de Lange, J., & Pot, A. M. (2013). Dyadic interventions for community-dwelling people with dementia and their family caregivers: a systematic review. *International Psychogeriatrics, 25*, 1581-1603. doi: 10.1017/s1041610213000860
- Vink, A. C., Bruinsma, M. S., & Scholten, R. J. (2003). Music therapy for people with dementia. *Cochrane Database of Systematic Reviews*. doi: 10.1002/14651858.cd003477.pub2
- Voelkl, J. E. (1998). The shared activities of older adults with dementia and their caregivers. *Therapeutic Recreation Journal, 32*, 231-239. Retrieved from <https://search.proquest.com/openview/4247af65bf158120d0047f6be8ad3eb7>
- Ware, J. E., Kosinski, M., Dewey, J. E., & Gandek, B. (2001). *How to score and interpret single-item health status measures: A manual for users of the SF-8 Health Survey*. Lincoln, RI: QualityMetric, Inc.
- Windle, G., Joling, K. J., Howson-Griffiths, T., Woods, B., Jones, C. H., van de Ven, P. M., ... & Parkinson, C. (2017). The impact of a visual arts program on quality of life, communication, and well-being of people living with dementia: a mixed-methods

longitudinal investigation. *International Psychogeriatrics*. Advance online publication. doi: 10.1017/s1041610217002162

Woods, R. T. (2001). Discovering the person with Alzheimer's disease: Cognitive, emotional and behavioural aspects. *Aging and Mental Health*, 5, 7–16. doi: 10.1080/713650008

Wydra, G. (2003). Der Fragebogen zum allgemeinen habituellen Wohlbefinden (FAHW) [Questionnaire of General Habitual Well-being]. In J. Schumacher, A. Klaiberg, & E. Brähler (Eds.), *Diagnostische verfahren zu lebensqualität und wohlbefinden* (pp. 102–107). Göttingen, Germany: Hogrefe.

Zarit, S. H., Reever, K. E., & Bach-Peterson, J. (1980). Relatives of the impaired elderly: Correlates of feelings of burden. *The Gerontologist*, 20, 649–655. doi: 10.1093/geront/20.6.649

Section B: Empirical Paper

An exploratory investigation into the relationship between choral singing, stress and wellbeing in people with a dementia and their caregivers

Word count: 7922 (878)

Philippa Bourne BSc (Hons)

For submission to Dementia: The International Journal of Social Research and Practice

Abstract

Background: In recent years, evidence for the positive effects of singing with people with dementia has been promising. Some research has used physiological measures to analyse the impact of singing, however this method has not before been used in a community study with people with dementia; this study explored the interactions between these areas of research.

Method: A mixed methods, quasi-experimental design was employed in this exploratory, within-subjects study. Physiological measures of stress (salivary cortisol and heart rate) and subjective measures of wellbeing and stress were obtained during a choral singing group from 17 participants, 10 with a dementia and 7 caregivers. Data were also collected during a non-singing control condition. Interviews investigating the influence of the singing group were conducted with caregivers and analysed using thematic analysis.

Results: Quantitative results showed positive effects of group singing on composite wellbeing, happiness and optimism. Stress hormone results were mixed. Heart rate variability significantly increased for people with dementia which may be associated with the significant increase in happiness, as shown in previous research. Qualitatively, group singing was overall reported to have a positive influence on people with dementia and caregivers. These influences included effects on mood and cognition, and positive aspects of the intervention were described.

Conclusions: The findings suggest that additional research is warranted to further investigate interactions of physiological and psychological variables related to choral singing in people with a dementia. Methodological difficulties of saliva collection with this population need to be addressed if stress hormones are used in future research.

Keywords: dementia, choral singing, wellbeing, stress, physiological measures

Introduction

The dementias

The dementias are progressive neurodegenerative conditions that cause brain cell loss and affect cognitive, behavioural and emotional functioning. It has been estimated that there are 850,000 people living with dementia in the UK (Prince et al., 2014). The onset of dementia is most commonly in later life and, as the population over 60 in the UK increases and with better awareness and diagnostic abilities, the rate of dementia diagnosis is also increasing (Lewis, Karlsberg Schaffer, Sussex, O'Neill, & Cockcroft, 2014). As well as impacting the person with dementia and their family, the increase in rates of dementia also increases demands on health and social care services.

Different types of dementia have different effects on people's functioning, the most commonly diagnosed are Alzheimer's disease (AD), vascular dementia (VD), frontotemporal dementia (FTD) and dementia with Lewy bodies (DLB). Cognitive symptoms can include memory loss, difficulty producing or understanding language and loss of executive functions. Some forms of dementia can affect social functioning (e.g. using inappropriate language or behaving in ways deemed inappropriate by others). Emotional regulation and capacity to deal with stress can also be affected (Cheston, 1998). Alongside the symptoms outlined above, people may experience mental health difficulties and decreased wellbeing.

As impairment increases, greater assistance with activities of daily living is required, provided by informal caregivers (e.g. family members, friends), formal caregivers (e.g. agency care staff, residential care) or a combination of both. Whilst caring for a family member with dementia can be perceived positively by caregivers (e.g. maintaining closeness and gaining satisfaction; Pinquart & Sörensen, 2003), it can also be stressful. Caregivers experience higher levels of stress and lower levels of wellbeing than non-caregivers, this

difference increasing when the person cared for has dementia (Pinquart & Sörensen, 2003). High levels of “caregiver burden” are associated with lower quality of life for people with dementia and earlier residential care placement (Yaffe et al., 2002).

Therapeutic use of music in dementia care

Although there are currently no curative or disease-modifying treatments for any of the dementias, recommendations have been made for addressing symptoms associated with the disease. One recommended non-pharmacological intervention for non-cognitive symptoms (e.g. agitation and anxiety) is the “therapeutic use of music” (NICE, 2006, p. 29), based on moderate evidence that a randomised control trial of music therapy reduced wandering in nursing home residents (Groene, 1993; NICE, 2007). Earlier, Kitwood (1997) also highlighted the importance of providing person-centred activities, such as the arts, to enable people to feel a sense of purpose, identity and attachment to others. Music therapy and music interventions differ, in that music therapy is delivered by a qualified music therapist with specific therapeutic goals and music interventions do not necessarily have a music therapist present and have broader aims such as improving wellbeing (Petrovsky, Cacchione, & George, 2015). Both can take place individually or in a group and can consist of different activities e.g. singing, playing instruments and listening to music.

Most studies have found positive effects (particularly short term) of group singing on cognitive abilities (e.g. orientation and attention), psychological factors (e.g. stress, anxiety QOL and mood), and behaviour (e.g. agitation and aggression) in people with dementia (Bruer, Spitznagel, & Cloninger, 2007; Ledger & Baker, 2007; Mittelman & Papayannopoulou, 2018; Osman, Tischler, & Schneider, 2016; Raglio et al., 2008; Suzuki et al., 2004). Singing in a group can also decrease social isolation, something particularly of concern for people with a dementia (Camic, Williams, & Meeten, 2013). Two literature

CHORAL SINGING, DEMENTIA, STRESS AND WELLBEING

reviews have also found positive effects of music as an intervention for people with dementia, including on mood and behavioural disturbances (McDermott, Crellin, Ridder, & Orrell, 2013) and behavioural and psychological symptoms of dementia (Raglio et al., 2012). Other studies however, have found inconclusive results or no change in quantitative measures following group singing (Petrovsky et al., 2015; Cooke, Moyle, Shum, Harrison, & Murfield, 2010) and methodological difficulties such as small sample sizes make conclusions difficult to draw (Vink, Bruinsma, & Scholten, 2003). Also, a recent Cochrane review concluded that although music interventions may have an impact on depressive symptoms for people with dementia, there was no conclusive evidence that they had an impact on wellbeing, QOL, anxiety or agitation, and the evidence was of low to medium quality (van der Steen et al., 2017). Therefore, it was recommended that future research should include larger sample sizes and “positive” outcome measures such as wellbeing and social factors. Although some evidence suggests that active music interventions have greater positive effects than receptive (e.g. group singing vs listening to music) (Sakamoto, Ando, & Tsutou, 2013), this has not been found consistently (Raglio et al., 2015) and further research is needed to investigate any differences.

Research has also investigated the impact of music and singing on dementia caregivers, particularly important in the context of caregiver burden and increased stress for this population. Singing groups attended by both caregivers and those with dementia have been found to improve wellbeing, mood and social inclusiveness, provide a sense of belonging for both groups and have a positive impact on their relationship (e.g. Davidson & Almeida, 2014; Osman et al., 2016; Unadkat, Camic, & Vella-Burrows, 2017). The provision of music-based interventions for the caregiver-cared for dyad has also been recommended in a systematic review of non-pharmacological interventions for people with dementia (Hulme, Wright, Crocker, Oluboyede, & House, 2010).

In the moment

Due to the deteriorating effects on memory of some dementias, the longer-term influence of interventions can be challenging to measure and understand fully due to difficulties with awareness of any impact and ability to recall and communicate this over time. Quantitative research with the dementias has begun to focus on short-term “in the moment” effects (e.g. Johnson, Culverwell, Hulbert, Robertson, & Camic, 2017; Petrovsky et al., 2015) based on interventions of up to two hours. The importance of this was highlighted by a caregiver when recalling the benefits of even short-term effects of art interventions on a family member, “you do it for the moment”, as well as in a recent literature review (MacPherson, Bird, Anderson, Davis, & Blair, 2009; McDermott et al., 2013).

Wellbeing in dementia

A consensus on the definition of wellbeing has not been reached, creating differences in its description and measurement between research studies. Wellbeing was originally based on theories of happiness and the ability to assimilate and accomplish one’s goals (Camic, Hulbert, & Kimmel, 2017). The difficulties in conceptualising wellbeing were considered by Dodge, Daly, Huyton and Sanders (2012) who proposed a new definition, combining aspects from previous theories. They defined stable wellbeing as “when individuals have the psychological, social and physical resources they need to meet a particular psychological, social and/or physical challenge” (p. 230). They depicted this as a “see-saw”, with wellbeing as the mid-point, impacted upon by life challenges on one side and the resources to cope with these challenges on the other.

Kitwood (1997) emphasised the importance of those with dementia retaining their “personhood” (related to high levels of wellbeing) and how this should be a key task in their care. Retaining personhood “involves enabling the exercise of choice, the use of abilities, the

expression of feelings, and living in the context of relationship” (Kitwood, 1997, p. 60). A NICE quality standard (2013) focused on the importance of improving wellbeing in dementia and recommended ways to facilitate this, including supporting people with attending leisure activities of their choice and creating and maintaining relationships. Evidence suggests that music and singing can have a positive impact on the wellbeing of both people with dementia and their caregivers (Osman et al., 2016; Unadkat et al., 2017).

Measurement of stress

Cohen, Kessler and Underwood-Gordon (1997) proposed a heuristic model of stress incorporating psychological, biological and environmental factors. The model describes how appraising an inability to manage environmental demands leads a person to perceive the situation as stressful, causing negative emotions. This is followed by physiological and behavioural responses which can increase the risk of physical illness and mental health difficulties. When a situation is perceived as stressful, the body enters an acute stress response, which includes the activation of the hypothalamic-pituitary-adrenocortical (HPA) axis and the release of the steroid hormone cortisol (Ulrich-Lai & Herman, 2009). One way that cortisol affects the body is to increase glucose production which prepares the body to react to stressful stimuli (Everly & Lating, 2013).

Psychological stress can be defined as “a relationship with the environment that the person appraises as significant for his or her wellbeing and in which the demands tax or exceed available coping resources” (Lazarus & Folkman, 1986, p. 63). The term stress is often used interchangeably with the term anxiety, defined as “a complex, affective, physiological and behavioural response system (i.e., threat mode) that is activated when anticipated events or circumstances are deemed to be highly aversive” (Clark & Beck, 2011, p. 5). Feelings of anxiety and perseverative cognitions (worry and rumination) can extend the

CHORAL SINGING, DEMENTIA, STRESS AND WELLBEING

length of the temporary stress reaction (Brosschot, Gerin, & Thayer, 2006). The definition of stress used throughout this study is “a response characterized by physiological arousal and negative affect, especially anxiety” (Folkman, 2013).

Although previous research has not commented on the prevalence of high stress levels in people with dementia, reported estimates of anxiety prevalence vary from 5 to 70 percent and anxiety is one of the most common mental health difficulties in older adults with early stage dementia (Petrovsky et al., 2015). Increased stress and anxiety may be related to receiving a dementia diagnosis, difficulties with daily living and worries about the future; higher anxiety levels have been associated with increases in verbal aggression, wandering and likelihood of nursing home placement (Petrovsky et al., 2015).

Subjective measures (e.g. self-report questionnaires and interviews) are the most common methods of assessing stress. One way to measure stress objectively is using hormonal markers (e.g. cortisol levels) (Ice, 2005; Smyth, Hucklebridge, Thorn, Evans, & Clow, 2013). Cortisol levels have been used to examine the effects of music on stress in healthy populations and reductions have been found following low stress singing, concert attendance and group drumming interventions (Fancourt, Auffeger, & Williamon, 2015; Fancourt et al., 2016; Fancourt & Williamon, 2016). Research has also studied links between other hormones and stress levels including cortisone, testosterone, progesterone and dehydroepiandrosterone (DHEA) (Fancourt et al., 2015; Fancourt et al., 2016; Fancourt & Williamon, 2016). Like cortisol, cortisone is a glucocorticoid, a hormone released from the HPA axis during the stress response. Testosterone and progesterone are gonadocorticoids (sex steroid hormones) affected by the body’s stress response and DHEA is a steroid hormone involved in the body’s immune response (Fancourt & Williamon, 2016).

To date, there have been no published studies analysing the effect of group singing on cortisol levels as an indicator of stress in this population. A recent paper has recommended future research to investigate the effects of music on biomarkers in populations with different health conditions (Fancourt, 2014). Using physiological measures of stress may be particularly relevant in research studies with people with cognitive impairment, who may not be able to accurately remember or communicate their levels of stress e.g. those with advanced dementia.

As well as stress hormones, heart rate (HR) is another method of measuring the body's physiological response. HR is controlled by the autonomic nervous system (ANS), which consists of two parts: the sympathetic nervous system (SNS) responsible for preparing the body for the fight-or-flight response and increasing HR, and the parasympathetic nervous system (PNS), responsible for rest, digestion and decreasing HR (McCorry, 2007). HR can be analysed crudely in mean changes in the number of beats per minute, or by analysing heart rate variability (HRV), the variation in the time interval between heartbeats (Shaffer, McCraty, & Zerr, 2014). HR data can be difficult to interpret as it can be affected by numerous factors including anxiety, excitement and exercise (Wilhelm, Pfaltz, Grossman, & Roth, 2006). However, evidence suggests HR is reliably influenced by stress (e.g. Zhai & Barreto, 2006), and different music tempi, with high tempo music increasing HR and low tempo reducing HR (Bernardi, Porta, & Sleight, 2006; Sandstrom & Russo, 2010). Healthy HRV indicates the body's ability to respond to different situations, and low HRV is associated with a range of health problems (e.g. Tsuji et al., 1994). HR and HRV can be assessed using wearable sensors, however this is a relatively new area of research and further work is needed to understand their reliability and validity. Therefore, it is important to combine the use of these measures with self-report measures to aid interpretation.

Research hypotheses and questions

- 1). Level of salivary cortisol will decrease following choral group singing and the decrease will be significantly greater than after a non-singing control condition for both PWD and caregivers;
- 2). Wellbeing levels will increase following choral group singing and the increase will be significantly greater than a control condition for both PWD and caregivers;
- 3). Subjective stress levels will decrease following choral group singing and the decrease will be significantly greater than a control condition for both PWD and caregivers;
- 4). Heart rate variability will be greater in the singing condition for both PWD and caregivers
- 5). The following question guided the interviews: How does participating in choral singing influence the person with dementia and participating caregiver?

Method**Design**

A mixed methods, quasi-experimental design was employed in this naturalistic, within-subjects, exploratory study integrating quantitative data from physiological measures and self-report questionnaires with qualitative interviews.

Participants

Participants were recruited from an existing weekly singing group which had been running for approximately two months and all attendees were invited to participate in both conditions (Table 1). Inclusion criteria: diagnosed with a mild to moderate dementia or the caregiver of an attending person, able to attend a singing group and ability to give consent. Sample size was pre-determined due to group membership therefore a G*Power sensitivity

CHORAL SINGING, DEMENTIA, STRESS AND WELLBEING

analysis was computed rather than *a priori* (Faul, Erdfelder, Buchner, & Lang, 2009). With an α score of .05, power of .80 and sample size of 20, the effect size d_z is .59 meaning that this sample size would only detect significant differences if the effect size is $\geq .59$. Twenty people were approached and all but three consented to participate. Seventeen (10 people with dementia/7 caregivers) completed quantitative measures at the singing session and 13 (7 people with dementia/6 caregivers) at the control session. At the control session, one person with dementia (PWD) chose not to provide a saliva sample after the group, therefore there was paired salivary data for 12 participants. Interviews were conducted with seven caregivers. No participants reported taking immunosuppressant medications (which can affect hormone levels) (see Appendix J for a list of participants' medications).

Procedure**Singing session.**

Upon arrival, wristbands were fitted to participants' dominant wrists, followed by collection of pre- measures of saliva, stress and wellbeing questionnaires. They also completed a demographic questionnaire (Appendix F). For saliva samples, participants placed swabs in their mouths and chewed for 60 seconds whilst holding onto the end to reduce the risk of swallowing the polymer roll. Once the chewing process was complete, they returned the swab to the tube, it was immediately sealed and the samples were placed on ice. Samples were frozen at -20°C for at least 3 weeks before analysis. The singing session then took place for the usual 60-minutes and was led by an experienced choral conductor and accompanied by a pianist. It began with a welcome song, initiated by the conductor as an indicator for group members to move to the two rows of seats as the session was starting, they also joined in with singing as they moved. Following this, participants engaged in physical (e.g. stretching) and vocal warmup exercises and sang three songs in both sitting and standing positions.

CHORAL SINGING, DEMENTIA, STRESS AND WELLBEING

Table 1

Participant demographics

Person with dementia					Caregiver					Both
Participant ^a	Gender	Age	Ethnicity	Dementia diagnosis ^b	Participant ^a	Gender	Age	Ethnicity	Relationship to PWD	Sessions attended
102	F	<65	W British	AD	101	F	<65	W British	Professional caregiver	Both
103	M	65-75	W European	FTD	DNC					Singing only
104	M	65-75	W British	DLB	105	M	65-75	W British	Professional caregiver	Both
107	F	65-75	W European	AD	DNC					Both
110	F	>85	W European	AD	100	F	<65	W British	Daughter	Both
112	M	76-85	W British	AD	111	F	65-75	W British	Wife	Both
114	M	65-75	W British	Mixed dementia	113	F	76-85	W British	Wife	Both
115	M	76-85	W British	AD	106	F	<65	W British	Wife	Both
119	F	>85	W British	AD	DNC					Singing only
123	M	76-85	W British	FTD	DNC					Singing only
DNC					118	F	<65	W British	Sister (who did not participate)	Singing only
	Mean age (SD): 76.5 (8.78)					Mean age (SD): 60.86 (11.10)				
	Range: 62-91					Range: 45-79				

^aDNC refers data not collected where PWD attended the group without a caregiver or caregivers participated in the study but the person they care for did not

^bAD – Alzheimer’s disease, FTD – Frontotemporal dementia, DLB – Dementia with Lewy bodies, Mixed dementia – Both AD and FTD

The songs had previously been either partly or fully practised in previous sessions. The choral group focused on vocal production and technique as well as exploring repertoire from sea shanties to opera (Table 2). At the end of the session, saliva samples and questionnaires were again completed and Empatica® wristbands removed, followed by socialising and refreshments.

Control condition.

The within-subjects control condition consisted of art-viewing at a local gallery. Participants were previously invited to an exploratory session at the same venue two weeks before to familiarise themselves with the environment. The same data collection procedures were employed as in the singing session. The session was led by an experienced gallery educator who displayed PowerPoint slides of paintings, described the paintings' history and engaged the group by asking questions. There were also three opportunities to stretch and move around. Fourteen paintings from the 17th and 18th centuries were shown in pairs and participants were asked to interpret and identify links between paintings. Visualisation techniques were also used (e.g. imagine you are in this scene, what can you hear/see/smell). The session lasted 60 minutes at the same time and day of the week as the singing session, four weeks later. Art-viewing as a control was chosen to account for group effects, facilitator expertise and similar levels of movement.

Table 2

Example repertoire of songs sung by the choir

List of song repertoire
Come and Sing (Nick Prater)
Bella Mama (trad)
Bei Männern (Mozart, from Magic Flute)
Rio Grande (trad)
Wiegenlied (Brahms)
Erie Canal (Thomas S Allen arr. John Owen Edwards)
Oh what a beautiful morning (Rodgers and Hammerstein)

Interviews.

Semi-structured interviews were conducted with caregivers by phone within one week of the control session. The purpose of the interviews was to gain further insight into how the singing group was experienced by caregivers and their perception of how it was experienced by the person they care for (see Appendix I for interview schedule). Interviews were completed with all seven caregivers who consented to take part in the study, lasting between 8 and 26 minutes, depending on the level of detail given.

Measures**Subjective measures.**

The Canterbury Wellbeing Scales (CWS; Appendix G; Johnson et al., 2017) are comprised of five vertical visual analogue scales (VAS) developed to measure subjective wellbeing in PWD. Each scale is numbered from 0-100 and participants are asked to mark how happy/sad, well/unwell, interested/bored, confident/not confident and optimistic/not optimistic they feel in the moment of completing the scales. A composite score of the sum of all scales is also calculated (0-500). The CWS have been used in previous studies and reliability analyses found good internal consistency (Camic et al., 2017; Johnson et al., 2017). Alongside the CWS, participants also completed a VAS stress scale (Appendix G; as described by Wewers & Lowe, 1990) to indicate their subjective stress levels in that moment (stressed/not stressed, 0-100). Lesage, Berjot and Deschamps (2012) found support for the interconcept and construct validity of VAS scales for measuring stress and concluded that they are “at least as discriminating as a questionnaire” when comparing two groups. Others have found that people with dementia use VAS scales “in a similar way to the general population” (Arons, Krabbe, van der Wilt, Olde Rikkert, & Adang, 2013). VAS scales were chosen as they are valid for use in within-subjects designs and can assess change over short

CHORAL SINGING, DEMENTIA, STRESS AND WELLBEING

periods of time (Wewers & Lowe, 1990). They are reliable, brief and easy to administer, important considerations when assessing people with dementia (Camic et al., 2017; Wewers & Lowe, 1990).

Saliva assays.

Materials for saliva collection included the SalivaBio® Oral Swab, valid for measuring the hormones tested in this study (Salimetrics, 2017). Levels of five hormones (cortisol, cortisone, testosterone, progesterone and DHEA) were measured, all of which have previously been used as indicators of stress in research participants (Fancourt et al., 2014; Fancourt et al., 2015; Fancourt & Williamon, 2016).

Heart rate variability.

Wearable sensors were used to monitor continuous measurement of blood volume pulse (from which HRV can be derived). To explore the effects of group singing on HRV in this population, Empatica® (2017) wristbands were placed on each participant at the beginning of the session and removed following post-group measures. Detailed information on HRV data collection methods can be seen in Appendix H.

Ethics

Ethical approval for this study was obtained from a research ethics panel at Canterbury Christ Church University (Appendix C) and the study adhered to British Psychological Society guidance (2010). A vital ethical issue centred around obtaining informed consent, considering the cognitive impairment experienced by this population. Participants' capacity to consent was considered during each process of obtaining consent and, where appropriate, a capacity assessment (Dewing, 2007) was completed beforehand. As the majority of PWD attended the group with a caregiver, consent was to be sought from them if there was uncertainty. Participants were initially informed about the study by the organisers of the choral programme

and provided with information sheets (Appendix E). A researcher then attended a singing session to further explain the study and answer questions. All participants were deemed to have capacity to consent and gave informed written consent (Appendix D).

Data analysis

Quantitative analysis was completed using SPSS version 24. Initial interpretation of the data showed that it did not consistently meet the requirements of parametric data, therefore Wilcoxon signed-rank tests were used. Pearson's r effect sizes were reported for all analyses (Fields, 2013). Pre- and post-session scores for the CWS, stress scale and stress hormone levels for PWD and caregivers were compared for both the intervention and control conditions. Change scores were also calculated by subtracting pre- scores from post- scores and were compared between sessions using Wilcoxon tests. Although data are reported separately for PWD and caregivers in this paper, analysis for all participants combined can be seen in Appendix L. Bonferroni-corrected significance levels were used for the CWS ($a = .05 / 6 = .008$) and HRV ($a = .05 / 3 = .015$) data to reduce the risk of Type 1 errors due to the use of multiple statistical tests (Bland & Altman, 1995).

Mean HRV scores were determined before, during and after both sessions. For the singing session, the before and after periods were 2 minutes 33 seconds immediately before and after the activity and for the control session, 3 minutes before and after. Data analysis used Wilcoxon signed-rank tests to compare mean HRV scores for the time periods before-during, during-after, before-after each session. The mean change in HRV between the time periods was also compared between the singing and control conditions using Wilcoxon signed-rank tests.

Interviews were analysed using thematic analysis based on Braun and Clarke's (2006) six-stage approach (Figure 1).

Quality assurance

Subjective measures were scored “blind” to reduce researcher bias. Researchers and staff assisted in data collection, reducing the possibility of group members assisting one another and potentially biasing results. Saliva assays can be affected by a number of factors including eating or drinking within one hour of giving the sample and some medications (Salimetrics, 2015). Participants were therefore asked not to eat or drink anything except water in the hour prior to giving the saliva sample and medications were documented. During the thematic analysis, regular meetings with the first supervisor discussed codes and themes, which allowed for modification as needed. Twenty percent of these data were also reviewed by this supervisor. Throughout the project, a research diary was kept, supporting continuous reflection of personal interests and preconceptions that could inadvertently affect results (see Appendix M for example research diary extracts).

Results

Quantitative results

Initial analysis.

Following consultation with an expert in analysing saliva data, the data were cleaned to remove one outlier from the cortisol data. Examination of histograms (Appendix K) and significant results on Kolmogorov-Smirnov tests (Table 3) showed that some variables were not normally distributed, therefore, non-parametric equivalents were used for all analyses. These need to be interpreted with caution due to small sample sizes. Wilcoxon signed-rank tests were used to compare pre- and post- scores for the singing and control sessions and between activities.

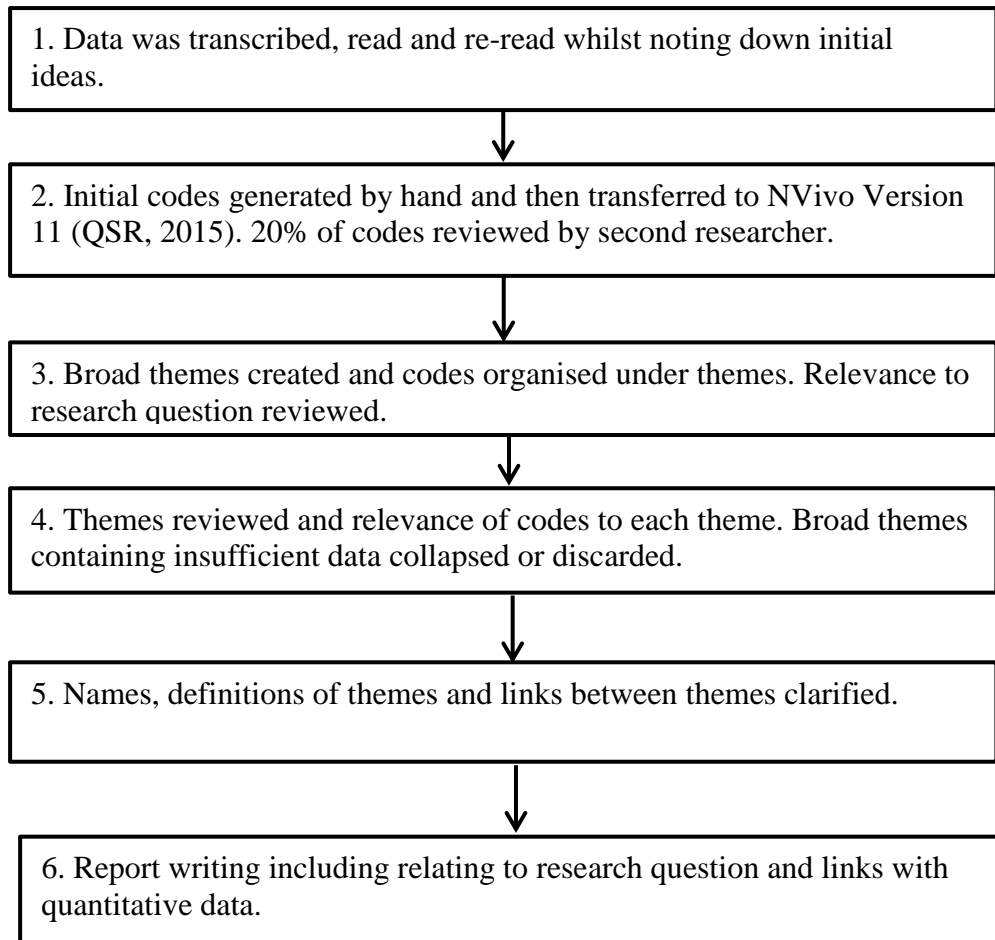


Figure 1. Stages of thematic analysis based on Braun and Clarke (2006)

Table 3

Results from Kolmogorov-Smirnov tests of normality

Session	Measure	Kolmogorov-Smirnov results		
		Statistic	df	Sig.
<i>Singing session</i>				
	Stress VAS	.135	17	.200
	CWS composite score	.150	12	.200
	CWS happiness	.096	17	.200
	CWS wellness	.153	17	.200
	CWS interest	.203	17	.060
	CWS confidence	.149	17	.200
	CWS optimism	.102	17	.200
	Cortisol	.183	11	.200
	Cortisone	.228	12	.085

CHORAL SINGING, DEMENTIA, STRESS AND WELLBEING

	Testosterone	.282	8	.060
	HRV before-during	.193	16	.114
	HRV after-before	.147	16	.200
	HRV after-during	.226	16	.028*
<i>Control session</i>				
	Stress VAS	.256	13	.020*
	CWS composite score	.149	12	.200
	CWS happiness	.160	13	.200
	CWS wellness	.261	13	.015*
	CWS interest	.179	13	.200
	CWS confidence	.188	12	.200
	CWS optimism	.178	13	.200
	Cortisol	.208	7	.200
	Cortisone	.250	8	.151
	Testosterone	.190	7	.200
	HRV before-during	.176	12	.200
	HRV after-before	.194	12	.200
	HRV after-during	.301	12	.004*

Note. *Significant results indicate data which significantly deviates from a normal distribution

Stress VAS scale.

Wilcoxon signed-rank tests (Table 4) were used to compare subjective stress levels. The stress scale was inversely scored, where a higher score indicated less stress. PWD reported a significant increase in stress following the control session with a large effect size ($p = .027$, $r = -.59$). Although not significant, scores decreased for both PWD and caregivers after the singing session and for caregivers after the control session ($p > .05$). When comparing the intervention and control sessions there were no significant differences ($p > .05$).

CWS scales.

Full details of the CWS analysis can be seen in Table 4. The Bonferroni-corrected significance level was .008 as there were six CWS analyses completed. Following the singing session, PWD showed significant increases on the composite, happiness and optimism scales with large effect sizes ($p < .008$, $r = -.60$ to $-.63$). Also of note, although not significant

CHORAL SINGING, DEMENTIA, STRESS AND WELLBEING

following Bonferroni correction, PWD's wellness scale ($n = 10$, $p = .036$, $r = -.47$) and caregivers' composite wellbeing ($n = 7$, $p = .028$, $r = -.59$), happiness ($n = 7$, $p = .028$, $r = -.36$), wellness ($n = 7$, $p = .046$, $r = -.53$) and optimism ($n = 7$, $p = .028$, $r = -.59$) scores increased and were approaching significance. There were no significant differences on Wilcoxon signed-rank tests following the control session ($p > .008$), however the increase in optimism for caregivers was approaching significance ($n = 6$, $p = .043$, $r = -.58$). When comparing change in CWS scores between sessions, none of the analyses were significant ($p > .008$). However, the trend for a greater increase in happiness following the singing session was approaching significance for both groups with large effect sizes (PWD $n = 7$, $p = .063$, $r = -.50$; caregivers $n = 6$, $p = .046$, $r = .57$).

Saliva assays.

The sample size was further decreased when analysing the saliva samples. This was due to an insignificant amount of saliva in some vials. As a result, statistical analysis could not be completed on the progesterone and DHEA hormones. Wilcoxon signed-rank tests were performed on the remaining three hormones, cortisol, cortisone and testosterone; however, these should be interpreted with extreme caution as sample sizes ranged from $n = 2$ to $n = 7$ (Table 4). All caregivers showed a decrease in cortisone levels following the singing session, this difference was significant and had a large effect size ($p = .043$, $r = -.64$). None of the other hormone analyses following the singing session were significant. When the two groups were combined (Appendix L), the decrease in cortisol levels reached statistical significance, suggesting that a larger sample size may be needed in future studies.

In the control condition, none of the analyses were significant. When comparing the singing and control conditions, none of the analyses were significant. However, for caregivers, cortisol and cortisone levels showed a greater decrease following the singing

session compared to the control condition and, although these were not significantly different, they were approaching significance and had large effect sizes ($n = 4$, $p = .068$, $r = -.65$).

Heart rate variability.

Due to a device malfunction, data for one participant was not available; HRV analysis was based on 16 participants (9 PWD, 7 caregivers) at the singing session and 12 (6 PWD, 6 caregivers) at the control condition. Figure 2 shows HRV scores for both conditions, with the largest HRV score for PWD during the singing session and the smallest for caregivers before the control condition. For PWD, the before and after HRV scores appeared to be similar at the singing and control conditions but the during HRV scores appear to be quite different. For caregivers, there also appeared to be an increase in HRV during the singing session compared to the control session, with slightly higher HRV before and after the control session than the singing session and the least amount of change in HRV in the control condition. Wilcoxon signed-rank tests were used to compare the three time-periods with one another and then to compare these differences across the two sessions (Table 5).

When comparing HRV during the singing session to before and after, PWD had significantly more variability during the session compared to the other time periods. Although non-significant, caregiver scores also suggested more variability during the session compared to before ($n = 7$, $p = .018$, $r = -.63$) and after ($n = 7$, $p = .063$, $r = -.50$) as well as more variability after compared to before ($n = 7$, $p = .063$, $r = -.50$), which were approaching significance. In the control session, none of the analyses were significant ($p > .015$). When comparing HRV across the sessions, none of the analyses were significant ($p > .015$), although the difference between HRV during and after the control condition was approaching significance, with a greater difference at the control condition ($n = 6$, $p = .028$, $r = -.64$).

Summary of quantitative analyses.

In the context of the small sample sizes, these analyses need to be interpreted with caution, particularly the hormone data. Despite this, some trends and statistically significant differences were present. Overall, wellbeing significantly increased on the composite, happiness and optimism scales for PWD with large effect sizes and caregiver increases in composite wellbeing ($n = 7, p = .028, r = -.59$), happiness ($n = 7, p = .028, r = -.36$), wellness ($n = 7, p = .046, r = -.53$) and optimism ($n = 7, p = .028, r = -.59$) were approaching significance, as was wellness for PWD ($n = 10, p = .036, r = -.47$). Subjective and hormonal stress remained relatively stable, with a significant decrease in cortisone for caregivers following singing. Following the control session, PWD had a significant increase in self-reported stress and caregivers' increase in optimism scores was approaching significance ($n = 6, p = .043, r = -.58$). When comparing the singing and control sessions, although the analyses were non-significant, some trends were approaching significance: a greater increase in happiness for both groups (PWD $n = 7, p = .063, r = -.50$; caregivers $n = 6, p = .046, r = .57$) and decreases in cortisol and cortisone for caregivers following singing ($n = 4, p = .068, r = -.65$). For PWD, there was significantly more HRV during the singing session compared to before and after and this was approaching significance for caregivers (during vs before $n = 7, p = .018, r = -.63$; during vs after $n = 7, p = .063, r = -.50$), as was the greater variability after compared to before ($n = 7, p = .063, r = -.50$). When comparing HRV across the sessions, none of the analyses were significant ($p > .015$), although the difference between HRV during and after the control condition was approaching significance, with a greater difference at the control condition ($n = 6, p = .028, r = -.64$). Effect sizes varied from trivial to large across the analyses, with the majority of large effects seen for increases in wellbeing and change in HRV at the singing session.

A summary of the Wilcoxon signed-rank test scores for the stress VAS, CWS and saliva hormones can be seen in Table 4 and for HRV in Table 5. Due to Bonferroni corrections being applied, the significance levels for the CWS analyses was $p < .008$ and for the HRV analyses was $p < .015$ whilst the significance level for the stress VAS and saliva analysis remained at $p < .05$. Pearson's r effect sizes were calculated according to Fields (2013) and classifications used were small ($r = .10$), medium ($r = .30$) and large ($r = .50$). In Table 4, analyses compared pre- and post- scores for PWD and caregivers for each condition (singing and control) and then compared the amount of change between the two conditions. In Table 5, analyses compared the amount of HRV in each time period (before, during and after) with one another and then also compared these differences across the two conditions.

CHORAL SINGING, DEMENTIA, STRESS AND WELLBEING

Table 4

Results from Wilcoxon signed-rank analyses pre- and post- data

Measure	<i>Singing session PWD</i>	<i>Singing session caregiver</i>	<i>Control session PWD</i>	<i>Session Control session caregiver</i>	<i>Comparison between singing and control PWD^a</i>	<i>Comparison between singing and control caregiver^d</i>
<i>Self-report questionnaires</i>						
Stress	Pre 76.80 (17.97) Post 78.90 (26.95) n=10, z=-0.56, p=.575, r=-.13	Pre 62.00 (36.77) Post 80.86 (12.52) N=7, Z=-1.36, p=.173, r=-.36	Pre 80.00 (26.34) Post 62.00 (30.68) n=7, z= -2.21, p=.027*, r= -.59	Pre 70.00 (22.05) Post 75.67 (20.87) n=6, z=-0.63, p=.528, r=-.18	Singing -3.00 (24.70) Control -18.00 (27.20) n=7, z=-1.35, p=.176, r= -.36	Singing 20.83 (31.32) Control 5.67 (18.98) n=6, z=-0.94, p=.345, r= -.27
CWS*** Composite	Pre 333.60 (77.53) Post 412.80 (63.54) n=10, z=-2.80, p=.005**, r= -.63	Pre 343.14 (93.22) Post 426.86 (41.69) n=7, z=-2.20, p=.028, r= -.59	Pre 368.33 (97.00) Post 387.83 (86.71) n=6, z=-1.15, p=.249, r= -.33	Pre 360.17 (93.79) Post 407.83 (60.60) n=6, z=-1.58, p=.115, r= -.46	Singing 53.33 (26.07) Control 19.50 (41.20) n=6, z=-1.15, p=.249, r= -.33	Singing 82.00 (75.21) Control 47.67 (64.96) n=6, z=-0.41, p=.686 r= -.12
CWS 1 – happy	Pre 60.70 (23.83) Post 80.70 (23.82) n=10, z=-2.70, p=.007**, r= -.60	Pre 57.00 (29.26) Post 83.00 (18.95) n=7, z=-2.20, p=.028, r= -.59	Pre 81.29 (22.54) Post 67.43 (24.51) n=7, z=-1.36, p=.175, r= -.36	Pre 68.67 (24.67) Post 73.50 (19.76) n=6, z=-0.54, p=.588, r= -.16	Singing 16.86 (14.32) Control -13.86 (19.35) n=7, z=-1.86, p=.063, r= -.50	Singing 27.00 (18.62) Control 4.83 (18.59) n=6, z=-1.99, p=.046, r= -.57
CWS 2 – well	Pre 60.30 (31.60) Post 84.30 (16.68) n=10, z=-2.10, p=.036, r= -.47	Pre 66.00 (29.12) Post 83.57 (11.43) n=7, z=-1.99, p=.046, r= -.53	Pre 73.00 (29.83) Post 69.14 (27.96) n=7, z=-0.31, p=.753, r= -.08	Pre 69.33 (22.30) Post 74.50 (17.13) n=6, z=-0.63, p=.528, r= -.18	Singing 20.29 (31.79) Control -3.86 (31.34) n=7, z=-1.18, p=.237, r= -.32	Singing 17.50 (21.70) Control 5.17 (15.35) n=6, z=-0.84, p=.400, r= -.24
CWS 3 - interested	Pre 73.30 (21.77) Post 85.20 (12.77) n=10, z=-1.07, p=.284, r= -.24	Pre 80.00 (16.93) Post 85.57 (7.50) n=7, z=-0.67, p=.500, r= -.18	Pre 71.29 (22.47) Post 76.00 (28.38) n=7, z=-1.05, p=.292, r= -.28	Pre 77.17 (14.84) Post 88.67 (15.83) n=6, z=-1.47, p=.141, r= -.42	Singing 3.57 (28.34) Control 4.71 (18.21) n=7, z=-0.51, p=.612, r= -.14	Singing 2.83 (20.06) Control 11.50 (19.08) n=6, z=-0.94, p=.345, r= -.27
CWS 4 – confident	Pre 77.70 (17.03) Post 80.80 (15.34) n=10, z=-0.87, p=.386, r= -.19	Pre 72.86 (24.27) Post 86.43 (6.32) n=7, z=-1.57, p=.116, r= -.42	Pre 72.67 (22.69) Post 80.67 (17.34) n=6, z=-1.08, p=.279, r= -.31	Pre 73.33 (24.38) Post 87.17 (7.71) n=6, z=-1.47, p=.141, r= -.42	Singing -1.50 (20.10) Control 8.00 (15.94) n=6, z=-0.94, p=.345, r= -.27	Singing 13.00 (21.11) Control 13.83 (18.91) n=6, z=-0.52, p=.600, r= -.15
CWS 5 - optimistic	Pre 61.60 (24.90) Post 81.80 (23.46) n=10, z=-2.67, p=.008**, r= -.60	Pre 67.29 (23.79) Post 88.29 (4.27) n=7, z=-2.20, p=.028, r= -.59	Pre 67.86 (23.43) Post 72.29 (36.73) n=7, z=-0.73, p=.463, r= -.20	Pre 71.67 (22.68) Post 84.00 (12.62) n=6, z=-2.02, p=.043, r= -.58	Singing 17.14 (11.01) Control 4.43 (23.12) n=7, z=-1.61, p=.108, r= -.43	Singing 21.67 (24.25) Control 12.33 (12.19) n=6, z=-0.32, p=.752, r= -.09

CHORAL SINGING, DEMENTIA, STRESS AND WELLBEING

<i>Physiological</i>						
Cortisol	Pre 3.01 (2.00) Post 2.60 (1.90) n=6, z=-1.36, p=.173, r= -.39	Pre 3.87 (2.17) Post 2.26 (1.02) n=5, z=-1.48, p=.138, r= -.47	Pre 4.22 (1.67) Post 3.26 (1.48) n=3, z=-0.54, p=.593, r= -.22	Pre 2.44 (1.05) Post 3.06 (1.78) n=4, z=-0.37, p=.715, r= -.13	Singing -.66 (.25) Control .25 (2.56) n=2, z=-0.45, p=.655, r= -.23	Singing -2.13 (1.50) Control .62 (1.96) n=4, z=-1.83, p=.068, r= -.65
Cortisone	Pre 5.96 (2.21) Post 6.77 (4.37) n=7, z=-0.51, p=.612, r= -.14	Pre 6.95 (1.71) Post 5.28 (1.24) n=5, z=-2.02, p=.043*, r= -.64	Pre 8.09 (3.29) Post 6.58 (1.47) n=4, z=-1.10, p=.273, r= -.39	Pre 5.32 (1.12) Post 5.33 (1.37) n=4, z=0.00, p=1.000, r=.00	Singing 1.48 (2.96) Control -1.84 (3.28) n=3, z=-0.54, p=.593, r=-.22	Singing -2.03 (.32) Control .02 (1.24) n=4, z=-1.83, p=.068, r= -.65
Testosterone	Pre 12.99 (13.14) Post 12.53 (13.18) n=6, z=-0.11, p=.917, r= -.03	Pre 11.72 (11.85) Post 11.64 (13.24) n=2, z=-0.45, p=.655, r= -.23	Pre 11.56 (11.74) Post 12.47 (12.38) n=4, z=-0.73, p=.465, r=-.26	Pre 10.19 (10.06) Post 9.73 (12.54) n=3, z=0.00, p=1.000, r=.00	Singing -2.51 (3.98) Control -1.49 (5.18) n=3, z=-1.07, p=.285, r= -.44	Singing .90 Control 2.40 n=1

* p<.05

**p<.008 (Bonferroni corrected significance level)

*** CWS = Canterbury Wellbeing Scales

^aThese figures refer to change in mean scores

CHORAL SINGING, DEMENTIA, STRESS AND WELLBEING

Table 5

Results from Wilcoxon signed-rank analyses of heart rate variability data

	<i>Singing session PWD</i>	<i>Singing session caregiver</i>	Session		<i>Comparison between singing and control PWD^a</i>	<i>Comparison between singing and control caregiver^a</i>
			<i>Control session PWD</i>	<i>Control session caregiver</i>		
During vs before	During 192.53 (166.18) Before 37.87 (53.84) n=9, z=-2.43, p=.015*, r=-.57	During 95.62 (66.35) Before 12.27 (19.96) n=7, z=-2.37, p=.018, r=-.63	During 100.39 (136.15) Before 29.77 (27.57) n=6, z=-1.57, p=.116, r=-.45	During 60.27 (64.84) Before 58.22 (92.61) n=6, z=-.31, p=.753 r=-.09	Singing 74.93 (76.21) Control 70.63 (116.26) n=6, z=-1.05, p=.917, r= -.30	Singing 63.96 (51.64) Control 2.05 (129.02) n=6, z=-1.57, p=.116, r=-.45
After vs before	After 35.92 (28.61) Before 37.87 (53.84) n=9, z=-0.78, p=.859, r=-.18	After 54.05 (48.73) Before 12.27 (19.96) N=7, Z=-1.86, p=.063, r=-.50	After 33.62 (32.43) Before 29.77 (27.57) n=6, z= -0.31, p=.753, r= -.09	After 101.48 (94.74) Before 58.22 (92.61) n=6, z=-1.15, p=.249, r=-.33	Singing -20.09 (69.39) Control 3.85 (43.81) n=6, z=-0.94, p=.345, r= -.27	Singing 37.76 (59.27) Control 43.26 (159.37) n=6, z=-1.05, p=.917, r= -.30
During vs after	During 192.53 (166.18) After 35.92 (28.61) n=9, z=-2.67, p=.008*, r=-.63	During 95.62 (66.35) After 54.05 (48.73) N=7, Z=-1.86, p=.063, r=-.50	During 100.39 (136.15) After 33.62 (32.43) n=6, z= -0.73, p=.463, r= -.21	During 60.27 (64.84) After 101.48 (94.74) n=6, z=-1.15, p=.249, r=-.33	Singing -95.02 (47.97) Control -66.78 (147.38) n=6, z=-0.73, p=.463, r= -.21	Singing -26.20 (31.00) Control 41.21 (62.97) n=6, z=-2.20, p=.028, r= -.64

*p<.015 (Bonferroni corrected significance level)

^aThese figures refer to change in mean scores

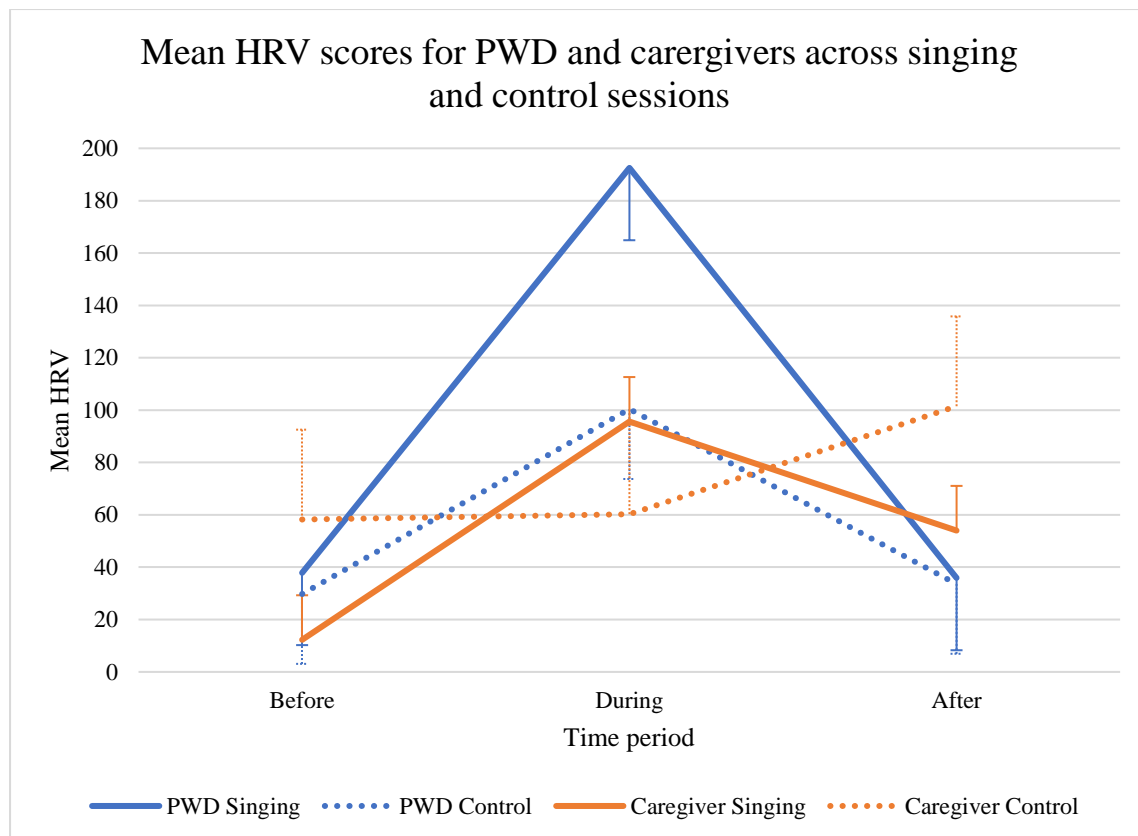


Figure 2. Mean heart rate variability scores for PWD and caregivers

Qualitative findings

The initial coding process identified 53 codes from seven interviews. The process of searching for themes and sub-themes by combining codes resulted in five themes being identified with 21 sub-themes (Table 6). The influence of the group on caregivers and PWD were categorised into separate themes to acknowledge the similarities and differences between these groups, whilst the remaining three themes related to aspects of the group experience that contributed to these influences. Five themes emerged which were not related to the research questions but contained interesting information such as experiences of caring for PWD. They have been included in Appendix O but not in further analysis in this report.

Theme 1 – Influence on PWD.

This theme highlights the observed differences as noticed by caregivers including positive changes in mood, behaviour and cognition. Alongside appearing more relaxed, caregivers also reported that they seemed more alert and active after the singing group and had improved language and organisation skills. The group allowed PWD to feel accepted for who they were and safe to be themselves. A further subtheme related to the length of time these changes were observed, particularly relevant in the context of the cognitive difficulties experienced by PWD. The effects noticed usually occurred during and after the group, sometimes for the rest of the day, it was seldom reported that these effects continued onto subsequent days.

Theme 2 – Influence on caregiver.

Some similarities were noted between the influence on the PWD and caregiver including positive mood changes. All caregivers reported enjoying the group and some felt more relaxed and optimistic afterwards. They also reported positive influences from observing the enjoyment of others, most often the person they care for. Two caregivers however, did not report any changes to their own mood. A couple also noted physical changes as a result of singing including changes to their voice and posture. Several described an impact on their feelings of identity from attending the group, allowing them to extend beyond their role into “more” than a caregiver. One caregiver reported feeling more tired following the group due to the air conditioning and concentration demands but still found the group a relaxing and rewarding experience.

Theme 3 – Singing in a group.

All caregivers reported that the activity of singing in a group was enjoyable for both themselves and the PWD. A couple commented on the positive impact of listening to music

in general but highlighted the particular influence of actively taking part. Two caregivers also commented on the positive experience of singing together with the person they care for and how this extended beyond the weekly sessions. Two caregivers highlighted the enjoyable experience of learning new songs, whilst one noted that more familiar songs were easier for the PWD to engage with.

Theme 4 – Group dynamics.

The theme of group dynamics related to processes or forces within the group which contributed to the influence of the group on participants. Six caregivers reported that socialising with others had a positive impact on the PWD, particularly their mood. Four also reported positive experiences of socialising in the group for themselves, particularly being in a group with other caregivers who had a shared understanding of this role. The welcoming, non-judgemental atmosphere of the group was also a group dynamic leading to positive influences on PWD and caregivers. This atmosphere was contributed to by the welcoming attitude and skills of the singing group staff.

Theme 5 – Group mechanics.

The theme of group mechanics encompassed the fixed aspects of the group which had an influence on group members as opposed to the interactional nature of dynamic sub-themes. Three caregivers reported the location of the choir as important, particularly the “posh” venue and geographical location in the centre of a large city. One caregiver explained that this made the choir feel like a “proper choir”. The other sub-theme that emerged under group mechanics was based on the timing of the group. Both the regularity of the group and the fact that the group was ongoing rather than time-limited were seen as positive influences.

CHORAL SINGING, DEMENTIA, STRESS AND WELLBEING

Table 6

Table of themes, subthemes and illustrative quotations

Theme	Subtheme (<i>definition of subtheme</i>)	Quotation(s)
Influence on caregiver	Mood (<i>reported changes to own emotional state</i>)	“I feel more relaxed and...like I did definitely have a good time” 64
		“I feel lighter and more optimistic and I think ‘we can do this’” 83
		“It’s definitely a physical weight off my mind, it...makes you feel a bit lighter and brighter” 84
	Observing PWD (<i>reported impact on caregivers of observing the person they care for during the group</i>)	“It really is...lovely to see people enjoying themselves, both the caregivers and the people suffering from dementia” 70
		“It’s nice to do something with my mum and...to see her enjoying herself. I think that’s the...best thing...that she’s got something” 84
	Physical (<i>physiological effects of singing noticed by caregivers</i>).	“I notice my voice changes so from being quite a low voice, just my whole voice is better and, you know, my posture and everything” 84
Identity outside of being a caregiver (<i>comments on connecting with other identities in addition to being a caregiver</i>)	“Long-term it’s the idea that you actually exist...when you’re buried looking after somebody else, you become a non-person, you sort of live their life” 66	
	“There’s an implicit shared experience between the people who attend...we all know that we’re facing something together in our care-giving roles, but that there’s so much more to us than that” 83	
No influence (<i>any comments relating to the group having no influence on caregivers</i>)	“I don’t know that it really affects my mood as such...I would say it’s quite neutral in terms of mood” 84	
Negative influence (<i>any comments relating to the group having a negative influence on caregivers</i>)	“Personally, I find it extremely tiring. But, apart from that, it’s quite rewarding at the same time – a contradiction...But, I come out completely washed out but when I’ve recovered I feel better... It’s more the building than the actual what’s going on” 72	
Influence on person with dementia	Mood (<i>observed changes to the emotional state of the PWD</i>)	“It is a delight when you can sort of find that key into a person’s personality. It’s maybe how music is probably one of the last things to go and it’s absolutely amazing when somebody who seems – the sort of embodiment of their personality seems to be turned right down – and suddenly a tune will wake them up and they’re getting huge joy out of it” 66
		“There’s more of a happiness or a relaxed nature to (her) whilst doing it and then afterwards” 70 “I know he feels very happy when he’s there. I can really see how he enjoys every moment of it...and I think afterwards...he [thinks] ‘that’s something I’ve really enjoyed’ and...the day’s been a very good one” 83
	Cognition (<i>observed changes in cognitive abilities in the PWD</i>)	“Her speech comes...more fluently. ...In the morning...she can’t really come up with the words that she wants to express...and after the choir she can actually make a full sentence... We can have a full conversation” 64 “After the choir she’s more active, ...plans ahead and we talk about lots of things[.] She...remembers things from her childhood, from her work...before she retired and...had the dementia problem,...her memory kind of improves a bit” 64

CHORAL SINGING, DEMENTIA, STRESS AND WELLBEING

	Behaviour (<i>observed behavioural changes in the PWD</i>)	<p>“More alert, happy and chatty” 64</p> <p>“More animated and getting her back to her flat and things she was, you know, very much more chatty” 70</p> <p>“And physically, her...mentally she gets stuck in her own world, but physically she also does – her posture and her use of her arms and legs, and the way she uses them is different. So I think physical co-ordination improves as well” 84</p>
	Feeling accepted for who you are (<i>comments on PWD feeling accepted within the group and safe to express themselves</i>)	<p>“He feels safe there...less inhibited” 66</p> <p>“It provides a really wonderful opportunity for [him] to really be exuberant...without somebody...clipping his wings...I think he likes feeling that he can just be himself and...how he is is really welcomed” 83</p>
	Length of influence (<i>comments relating to the length of time the influences of the group are observed</i>)	<p>“Sometimes it stays for a day or two, sometimes it doesn’t but...whatever positive you make the most of!” 72</p> <p>“The next day I have to...remind him where we’ve been... I always find with people with dementia, it’s what’s happening at that time, at that moment, with them, you know?... I have tried it with him say two or three days later and sometimes he does remember...sometimes he doesn’t but often he’ll join in with me” 76</p> <p>“On one level it has a continuous affect because she knows that she has the...choir on every week...it gives her something to look forward to. But in terms of immediately...the next day she’s pretty much back to normal... The other thing that’s continuous is the actual music... Often we’re in the car and we will sing and...the songs that we’ve been learning...she remembers those and...she does all the parts, so the actual music itself sinks in as well” 84</p>
Singing in a group	Enjoyment of singing (<i>reports about the enjoyment of the activity of singing</i>)	<p>“I particularly enjoy the music that we sing” 66</p> <p>“She loves singing... And she always looks forward to going to the choir.” 64</p> <p>“It’s the singing that is the key into it...I think the [art-viewing]...shows that a group activity is good but a group activity with music is even better” 66</p>
	Active participation (<i>comments on the importance of participating actively in singing rather than being a passive recipient</i>)	<p>“I always enjoy listening to music as well, so taking part makes a bit of a difference... It’s a difference between being passive and sitting down” 72</p> <p>“And then obviously you are completely immersed in this activity, both your body and your mind and...it sort of transforms the place you’re in into somewhere else” 83</p>
	Joint experience between PWD and caregiver (<i>comments relating to the joint nature of the group, with both PWD and caregiver taking part and how singing extends beyond the sessions</i>)	<p>“There is somebody that would normally look after [him] on Tuesday mornings but I thought, ‘mmm, no I’m going to be there...and have the experience with him. It’s such a wonderful opportunity, it really is!’” 83</p> <p>“We quite often find ourselves singing along in the car so that is really, really nice...we used to do that when we were little... I quite often pipe up at home or wherever and we do sing a bit... So, the tunes come back. She doesn’t always remember, but she does sometimes” 84</p>

CHORAL SINGING, DEMENTIA, STRESS AND WELLBEING

	Type of music (<i>comments on preferences for learning new songs or more familiar ones</i>)	<p>“I like singing and I’ve never been in a choir before! ... I learn new songs and the...way you’re supposed to sing them...it’s very nice and I quite enjoy that” 64</p> <p>“most people they seem to remember the old songs from them times... With most cases with dementia, they don’t remember what happened three hours ago or last week or the day before but...they can always remember [the past] and music helps them with their memory. He plays all his old music all the time” 76</p> <p>“If it’s something he likes he’ll make an effort. He’s finding it very difficult trying to memorise anything so when it’s...familiar...he really goes for it and enjoys it and tries his best. If it’s something he doesn’t know quite as well, then he might not bother quite as much.” 72</p>
Group dynamics	Socialising with other caregivers (<i>reflections on the interaction between caregivers and the shared understanding of the caring role</i>)	<p>“I think it’s a very friendly group... It’s nice to get together with people who are in the same situation as we are ...it’s quite lonely care-giving and it’s quite nice to...be with people who understand” 66</p> <p>“I was...very tearful because I’d had a very restless night, up and down, we really were very sleep deprived...and so it makes me feel much more vulnerable. So there was something about being there amongst people who I knew would understand completely..., without me having to say very much. I just said, “oh god, he’s had a hard night” and they’d say, “oh yes, we know what that’s like”... So, there’s a sense of being understood without a lot of words.” 83</p>
	Socialising for PWD (<i>comments on the importance of social interactions in the group for PWD</i>)	<p>“She loves meeting new people...and [chatting] about their day-to-day lives and the pets.” 64</p> <p>“He’s quite keen to speak with the other people...he’s quite pleased when he sees those familiar faces, whether they are part of the organisation or participating members of the group. You find his face always sort of lights up and you can see it in his eyes that he’s really pleased to see these other people!” 72</p>
	Atmosphere (<i>reflections on the “feeling” of the group</i>)	<p>“I think it’s beautifully sort of unpressured” 66</p> <p>“He likes feeling that he can just be himself and whatever, how he is is really welcomed” 83</p>
	Staff characteristics (<i>comments on staff members qualities or actions</i>)	<p>“The thing that [he] particularly likes about it is the pianist. The pianist is <i>marvellous!</i>” 66</p> <p>“They take what he brings and incorporate it into what’s happening so he might be waving his arms...so then [conductor] just says, “okay then, darling, you’re going to be conducting us now” It’s...very skilful to do that” 83</p>
Group mechanics	Location (<i>comments on the location of the choir including geographical and the building/room</i>)	<p>“He likes being in town, in the centre of [town] and we don’t often go there and...we are in this very posh venue” 83</p> <p>“We do another similar thing...however the setting isn’t as good – so it’s sort of more a community feel rather than a proper choir” 84</p>
	Frequency (<i>the influence of the frequency and ongoing nature of the choir</i>)	<p>“Meeting so regularly...there’s a weekly feeling about it, and that it’s ongoing. It is really unique...in my experience as a...provision” 83</p> <p>“You know that it’s going to carry on...[and]... there’s an element of commitment there from everybody... I think that’s quite important with a choir” 84</p>

Summary of qualitative analysis.

Caregivers reported multiple positive influences of participating in the singing group on themselves and the people they cared for. All of those interviewed highlighted the positive influence of the activity of singing. Doing so in a group was also reported to have positive influences and various other group dynamics and mechanics were reported, enhancing the experience. These included socialising with others for both PWD and their caregivers and the regular, ongoing nature of the group.

Discussion

The purpose of this exploratory study was to investigate the influence of a choral singing group on stress and wellbeing in PWD and caregivers using physiological and psychological measures. This study sought to expand previous research by adding novel psychophysiological measures alongside visual analogue scale measures of wellbeing (Johnson et al., 2017) and stress (Wewers & Lowe, 1990). In line with previous research (Camic et al., 2013), the overall results suggested that group singing had a positive effect on subjective wellbeing in PWD, and that physiological measurement has promise for detecting change in this population. A larger scale study is warranted to better understand relationships between physiological and psychological measures and qualitative reports during arts activities for this population.

Quantitative results

The first and third hypotheses were not supported (that salivary cortisol and subjective stress would decrease following singing and the decrease would be greater than the control session). Following the singing session, there were no significant differences in subjective stress or salivary cortisol and no significant differences compared to the control activity. The relatively stable subjective stress levels were similarly found in a previous study with this

population following music-based interventions (Camic et al., 2013). The findings may begin to provide evidence for the use of salivary cortisol as a physiological measure of stress, however further analysis using a pilot study is required to investigate the correlations between hormone and subjective stress levels. Caregivers had a significant decrease in cortisone, similar to previous findings in healthy populations (Fancourt et al., 2015).

On reflection, it could have been anticipated that there would not be a significant decrease in subjective and hormonal stress following the singing session. As the group was a weekly, ongoing activity that was reported to be enjoyable, it would not be expected that participants would be particularly stressed prior to the group. If some participants had experienced recent stressful life events, it may be likely that their scores would decrease more, due to higher stress levels beforehand, however this information was not collected. PWD reported a significant increase in stress following the control session, it is possible that this may have been due to disappointment that they were not singing as enjoyment of singing was noted in all interviews with caregivers and one participant was observed to begin singing at the start of the control condition.

Regarding the second hypothesis of this study, (wellbeing will increase following singing and the increase will be greater than the control condition) the findings partially support this. CWS subscale scores for happiness and optimism and the composite score significantly increased for PWD following the singing session. Although not significant following Bonferroni corrections, caregivers increased scores on the composite scale, happiness, wellness and optimism and PWD's wellness scores were approaching significance. For both groups, the greater increases in happiness following singing compared to the control session were approaching significance. However, none of the increases were significantly greater, therefore the hypothesis is only partially supported. The increases in

CWS scores support findings from previous research into the effects of singing (Camic et al., 2013) on PWD and their caregivers.

The HRV data analysis showed trends for greater HRV during the singing session compared to before and after for PWD and caregivers, with significant differences for PWD. This may suggest that participants were engaged in the singing session and this had an impact on HRV. A recent pilot study looking at the relationship between HRV and the emotional states of happiness and sadness found a positive association between HRV variables and each emotional state (Shi et al., 2017). In this study, PWD in the singing condition were the only group-condition combination in which both significant effects of subjective happiness and significant increases in HRV were observed. There were also trends for more HRV during the control session compared to before and after for PWD but these were non-significant.

Qualitative findings

The thematic analysis of follow-up interviews with caregivers found five themes relating to the influence of the singing group on PWD and caregivers. Multiple positive influences were reported for both groups and the activity of singing seemed integral and was reported by one caregiver to be the “key” to the group’s positive influences. Other group dynamics and mechanics present in the group also contributed to the positive influences. Some subthemes that emerged in this study were similar to those reported in other studies including the enjoyment of singing, influence on mood and cognition, importance of staff characteristics, positive effects on caregivers of observing the enjoyment of those they care for and the extension of singing beyond the group when at home (Camic et al., 2013; Davidson & Almeida, 2014; Mittelman & Papayannopoulou; Osman et al., 2016; Unadkat et al., 2017). Caregivers reported that taking part in the singing group allowed PWD to express themselves and “be accepted for who they are”. Similar benefits were reported by Unadkat et

al. (2017) and this could be interpreted as allowing them to retain their personhood, as this involves self-expression, exercising choice and using their abilities (Kitwood, 1997). Another reported influence of the group was in allowing caregivers to retain an identity outside of that as a caregiver, related to Unadkat et al.'s subtheme of "release from caregiver burden". The importance of reducing caregiver burden for the wellbeing of both PWD and caregivers was highlighted by Yaffe et al. (2002). The positive impact of belonging to a group and reducing social isolation for PWD was highlighted in this study by caregivers describing the influence of relationships with other group members and the ongoing nature of the group, this supports findings from previous studies (Unadkat et al., 2017; Eekelaar, Camic, & Springham, 2012).

Connecting quantitative and qualitative findings

Similarities were seen in the quantitative and qualitative findings in this study. Caregivers reported improvements in mood for both themselves and PWD from attending the singing group and this was substantiated by the increases in happiness reported on the CWS and increases in HRV. During interviewing, one caregiver reported feeling more optimistic after the group which was also shown in CWS increases for both PWD and caregivers. Both subjective stress and stress hormone levels remained relatively stable, providing preliminary evidence that this may be a feasible way of measuring stress in this population.

This study focused on "in the moment" effects of taking part in the singing group on PWD. This was related to the "length of influence" subtheme in the thematic analysis, with most caregivers reporting that effects of the group were relatively short-term. This was anticipated in the context of PWD's cognitive difficulties but some caregivers reported a longer-term influence of being part of the group (e.g. looking forward to sessions and singing at home). Although the length of influence on caregivers was not discussed in this study, a

previous RCT found that group singing had positive effects on long-term wellbeing with this population (Särkämö et al., 2013).

Limitations

As this was an exploratory study, it is not possible to draw definitive conclusions about the effects of group singing. Therefore, any conclusions regarding the effects of group singing based on these results should be made with caution. This was particularly relevant for the stress hormone analyses as there were difficulties with saliva collection and they were based on very small participant numbers. In addition, only a small proportion of results were statistically significant and results approaching significance have also been highlighted in this project. These have been included due to the possibility of Type 2 errors (incorrectly accepting the null hypothesis) due to small sample sizes and the application of strict Bonferroni corrections, however their inclusion increases the risk of Type 1 errors (incorrect rejection of the null hypothesis). The issue of whether to comment on results approaching significance is a contentious one as a significant difference has not been found, therefore it cannot be said that there has been an effect on the dependent variable. Due to the exploratory nature of this study and restrictive aspects of the analysis (Bonferroni and small sample size), the approaching significance results have been included in this project to guide further research, however it is important to note that they cannot be said to indicate change.

Demographic information indicated that the balance of male and female PWD was roughly similar but caregivers were predominantly female. The majority had a diagnosis of Alzheimer's disease which may bring into question the applicability of results to those with other dementia diagnoses; however, this is reflective of the prevalence seen in the wider population and diagnostic information is not often available in research investigating the effects of the arts on people with dementia. The subjective VAS data may have been subject

CHORAL SINGING, DEMENTIA, STRESS AND WELLBEING

to demand characteristics, particularly with caregivers, who may have predicted the aims of the study. The possibility of the impact of this was reduced by not having pre- scores available at the time of completing post-measures.

There were also limitations associated with saliva collection. As this was a community-based project, the researchers did not have the opportunity to control participants' activities prior to attending the group. Although the researchers were able to ensure that participants did not have a drink in the twenty minutes before giving saliva samples, they were not able to control for participants eating in the hour prior to attending, which can affect hormone levels. The measures completed at the control session may have been affected by the change in location and the high external temperature that day (30°C). Although participants were given the opportunity to familiarise themselves with the art gallery at a previous session, this may have contributed to the more varying data seen following art-viewing.

The interviews were only conducted with caregivers to minimise the disruption to PWD's routine (as it was a pre-existing group) and due to possible difficulties recalling their experiences which could have caused distress. During the process of obtaining consent, multiple caregivers said that it would not have been helpful to interview the person they cared for as they would not recall having attended the group a day or so later. Therefore, whilst the interviews gave an account of caregiver experiences, it was an indirect exploration of how PWD experienced the singing group and its perceived influence. The pre- and post- measures did indicate positive influences of the group but more in-depth exploration of their own experiences was not obtained.

As the cortisol and cortisone measures did not always appear to correlate with the subjective stress measure (e.g. PWD reported an increase in stress and had non-significant

decreases in cortisol and cortisone levels following the control condition), it is possible that different phenomena were being measured and it is important for future studies to investigate this further.

Choosing an appropriate control condition in this study was a particularly challenge as there was no existing standard control condition for community singing groups with PWD. Both within-subject and between-subject control groups were considered, however due to time constraints it was not possible to recruit a between-subjects group (who would also need to be matched to the singing participants). To provide a within-subjects comparison, it was decided that the control condition should have similar characteristics to the singing session, for example in a prestigious building, in a group setting, with similar levels of movement and led by an experienced facilitator. Various within-subject control conditions were considered including sitting in a waiting-room, looking at postcards of art and the art-viewing session chosen. This was chosen in consultation with the choral group organisers and service users who were part of an organisation related to the project, as the most ethical option to engage PWD rather than inviting them to take part in an activity which would likely not be stimulating for them. There were, however, limitations to the choice of this control condition including that differences would be less likely to be observed when compared to the singing session because it was more engaging than a waiting-room control group.

Clinical implications

As a result of this exploratory study and findings from previous studies (e.g. Camic et al., 2013; Unadkat et al., 2017), it is tentatively suggested that ongoing choral singing groups are useful community-based activities with this population and may be considered as part of social prescribing schemes being encouraged by NHS England (Chatterjee, Thomson, Lockyer, & Camic, 2017). Clinical psychologists could recommend singing groups to PWD

and their caregivers to support wellbeing for early to mid-stage dementias. They could also provide consultation to colleagues in mental health and social services on the effects of group singing with these populations, increasing awareness and signposting to relevant groups. Increasing wellbeing for both PWD and caregivers may enhance the possibility of remaining living at home rather than moving into residential care and allow people to maintain more of their personhood (Kitwood, 1997; Yaffe et al., 2002). Furthermore, there may also be implications for public health policy supporting community-based arts and health programmes (APPG, 2017). Reducing caregiver burden may also have positive implications for health and social care services due to the links between these factors and physical and mental health (Pinquart & Sörensen, 2003). Therefore, it may be cost effective to fund similar singing groups associated with improvements in wellbeing (Camic et al., 2013; Unadkat et al., 2017). It is important to note that these implications are based on both the findings from this study and findings from other studies (e.g. Camic et al., 2013; Unadkat et al., 2017) and that only a small proportion of results in the current study were significant, with a larger number “approaching significance”, the inclusion of which is a contentious issue. Caregivers also made recommendations which could be incorporated into the existing singing group, which have been passed on to the organisers.

Research implications

The results from this study indicate that further research is warranted to better understand the interaction of physiological and psychological aspects of choral singing for both PWD and caregivers. Future research should consider the methodological difficulties encountered in this exploratory study. It would be helpful to allow additional time for data collection and to use an alternative form of saliva sample collection (the passive drool technique), increasing the likelihood that more saliva is collected for a viable analysis. Wearable sensors (e.g. Empatica[®] wristbands) are a non-intrusive and easy to administer

method of physiological data collection, that can collect multiple continuous measurements including heart rate, skin conductance and movement. A larger scale, between-subjects pilot study is suggested to further investigate correlations between physiological and psychological measures of stress and wellbeing. It would also be expedient to undertake a longitudinal study where measurements are collected over multiple intervention and control sessions. Further qualitative research could include interviews with PWD immediately after a singing group to gain their opinions on the influence of the group. Although a specifically relational measure was not used in this study, it is possible that being part of a dyadic singing group could have an impact on the relationship between the PWD and caregiver. The measures used in this study related to the dyadic nature of the group in that any impact of the intervention on the PWD may in turn impact the wellbeing and stress levels of the caregiver and vice versa. This could be due to observing the other person enjoying themselves (as reported in the interviews with caregivers) and through a sense of achievement and mastery. Future research could include measures focusing more specifically on the dyadic relationship or correlational analyses looking at any relationships between change on individual measures of wellbeing and stress between each member of the dyad.

Conclusion

The present exploratory study cautiously supports that there are positive interrelationships between psychological measures of wellbeing and physiological measures of heart rate variability during a choral singing group for people with a dementia. There were also similarities between outcomes on psychological measures of stress and saliva hormone data. This is the first study of its kind to combine these physiological measures with this population. The ease of obtaining heart rate data was a particular contribution and can be explored in future research. A larger scale study of choral singing is warranted to better understand these interrelationships. Further research is needed to address the methodological

CHORAL SINGING, DEMENTIA, STRESS AND WELLBEING

challenges encountered in this study, most notably the difficulties obtaining sufficient amounts of saliva for analysis, should this method be used in the future. Studies with larger sample sizes, a between-subjects design and data collection over multiple sessions would also allow more definitive conclusions to be drawn. Notwithstanding, there are implications for clinicians working with this population including improving awareness and access to these activities as well as public health policy implications that support community-based arts and health programmes (APPG, 2017) through social prescribing schemes.

References

- APPG. (2017). *Creative health: The all-party parliamentary group report on arts, health and wellbeing*. Retrieved from <http://www.artshealthandwellbeing.org.uk/appg-inquiry/>
- Arons, A. M. M., Krabbe, P. F. M., van der Wilt, D. J., Olde Rikkert, M. G. M., & Adang, E. M. M. (2013). Visual analogue scales: scale recalibration by patients with dementia and their proxies. *Quality of Life Research, 22*, 979-986. doi: 10.1007/s11136-012-0226-3
- Bernardi, L., Porta, C., & Sleight, P. (2006). Cardiovascular, cerebrovascular, and respiratory changes induced by different types of music in musicians and non-musicians: the importance of silence. *Heart, 92*, 445-452. doi: 10.1136/hrt.2005.064600
- Bland, J. M., & Altman, D. G. (1995). Multiple significance tests: the Bonferroni method. *BMJ, 310*, 170. doi: 10.1136/bmj.310.6973.170
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*, 77-101. doi: 10.1191/1478088706qp063oa
- British Psychological Society. (2010). *Code of human research ethics*. Retrieved from http://www.bps.org.uk/sites/default/files/documents/code_of_human_research_ethics.pdf
- Brosschot, J. F., Gerin, W., & Thayer, J. F. (2006). The perseverative cognition hypothesis: A review of worry prolonged stress-related physiological activation, and health. *Journal of Psychosomatic Research, 60*, 113-124. doi: 10.1016/j.jpsychores.2005.06.074
- Bruer, R. A., Spitznagel, E., & Cloninger, C. R. (2007). The temporal limits of cognitive change from music therapy in elderly persons with dementia or dementia-like

- cognitive impairment: A randomized controlled trial. *Journal of Music Therapy*, 4, 308-328. doi: 10.1093/jmt/44.4.308
- Camic, P. M., Hulbert, S., & Kimmel, J. (2017). Museum object handling: A health-promoting community-based activity for dementia care. *Journal of Health Psychology*. Advance online publication. doi: 10.1177/1359105316685899
- Camic, P. M., Williams, C. M., & Meeten, F. (2013). Does a 'singing together group' improve the quality of life of people with a dementia and their caregivers? A pilot evaluation study. *Dementia: The International Journal for Social Research and Practice*, 12, 152-171. doi: 10.1177/1471301211422761
- Chatterjee, H. E., Thomson, L. J., Lockyer, B., & Camic, P.M. (2017). Non-clinical community interventions: A systemised review of social prescribing schemes. *Arts & Health: An International Journal for Research, Policy and Practice*. Advance online publication. doi: 10.1080/17533015.2017.1334002
- Cheston, R. (1998). Psychotherapeutic work with people with dementia: A review of the literature. *British Journal of Medical Psychology*, 71, 211–231. doi:10.1111/j.2044-8341.1998.tb00987.x
- Clark, D. A., & Beck, A. T. (2011). *Cognitive therapy of anxiety disorders: Science and practice*. New York: Guilford Press.
- Cohen, C., Kessler, R. C., Underwood-Gordon, L. (Eds.). (1997). *Measuring stress: A guide for health and social scientists*. Oxford: Oxford University Press
- Cooke, M. L., Moyle, W., Shum, D. H. K., Harrison, S. D., & Murfield, J. E. (2010). A randomized controlled trial exploring the effect of music on agitated behaviours and

- anxiety in older people with dementia. *Aging and Mental Health*, 14, 905-916. doi: 10.1080/13607861003713190
- Davidson, J. W., & Almeida, R. A. (2014). An exploratory study of the impact of group singing activities on lucidity, energy, focus, mood and relaxation for persons with dementia and their caregivers. *Psychology of Well-Being*, 4. doi: 10.1186/s13612-014-0024-5
- Dewing, J. (2007). Participatory research: A method of process consent with persons who have dementia. *Dementia*, 6, 11-25. doi: 10.1177/1471301207075625
- Dodge, R., Daly, A., Huyton, J., & Sanders, L. (2012). The challenge of defining wellbeing. *International Journal of Wellbeing*, 2, 222-235. doi:10.5502/ijw.v2i3.4
- Eekelaar, C., Camic, P. M., & Springham, N. (2012). Art galleries, episodic memory and verbal fluency in dementia: An exploratory study. *Psychology of Aesthetics, Creativity, and the Arts*, 6, 262–272. doi:10.1037/a0027499
- Empatica. (2017). *E4 wristband*. Retrieved from www.empatica.com/research/e4/
- Everly, G. S., & Lating, J. M. (2013). *A clinical guide to the treatment of the human stress response*. New York, NY: Springer.
- Fancourt, D. (2014). An introduction to the psychoneuroimmunology of music: History, future collaboration and a research agenda. *Psychology of Music*, 44, 168-182. doi:10.1177/0305735614558901
- Fancourt, D., Auffeger, L., & Williamon, A. (2015). Low-stress and high-stress singing have contrasting effects on glucocorticoid response. *Frontiers in Psychology*, 6. doi:10.3389/fpsyg.2015.01242

CHORAL SINGING, DEMENTIA, STRESS AND WELLBEING

Fancourt, D., Perkins, R., Ascenso, S., Atkins, L., Kilfeather, S., Carvalho, L, ... Williamon,

A. (2016). Group drumming modulates cytokine response in mental health service users: A preliminary study. *Psychotherapy and Psychosomatics*, 85, 53-55.

doi:10.1159/000431257

Fancourt, D., & Williamon, A. (2016). Attending a concert reduces glucocorticoids, progesterone and the cortisol/DHEA ratio. *Public Health*, 132, 101-104.

doi:10.1016/j.puhe.2015.12.005

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41, 1149-1160. doi: 10.3758/brm.41.4.1149

doi: 10.3758/brm.41.4.1149

Fields, A. (2013). *Discovering statistics using IBM SPSS statistics* (4th ed.). London: Sage.

Folkman, S. (2013). Stress: Appraisal and Coping. In: M. D. Gellman & J. R. Turner (Eds.), *Encyclopedia of Behavioral Medicine* (p. 123). doi: 10.1007/978-1-4419-1005-9_215

Groene, R. W. (1993). Effectiveness of music therapy 1:1 intervention with individuals having senile dementia of the Alzheimer's type. *Journal of Music Therapy*, 30, 138-157. doi: 10.1093/jmt/30.3.138

Hulme, C., Wright, J., Crocker, T., Oluboyede, Y., & House, A. (2010). Non-pharmacological approaches for dementia that informal caregivers might try or access: a systematic review. *International Journal of Geriatric Psychiatry*, 25, 756-763. doi:10.1002/gps.2429

Ice, G. H. (2005). Factors influencing cortisol level and slope among community dwelling older adults in Minnesota. *Journal of Cross-Cultural Gerontology*, 20, 91-108.

doi:10.1007/s10823-005-9085-5

CHORAL SINGING, DEMENTIA, STRESS AND WELLBEING

Johnson, J., Culverwell, A., Hulbert, S., Robertson, M., & Camic, P. M. (2017). Museum activities in dementia care: Using visual analog scales to measure subjective wellbeing. *Dementia, 16*, 591-610. doi: 10.1177/1471301215611763

Kitwood, T. (1997). *Dementia reconsidered: The person comes first*. Buckingham, UK: Open University Press

Lazarus, R. S., & Folkman, S. (1986). Cognitive theories of stress and the issue of circularity. In M. H. Appley & R. A. Trumbull (Eds.), *Dynamics of stress: Physiological, psychological, and social perspectives* (pp. 63–80). New York: Plenum.

Ledger, A. J., & Baker, F. A. (2007). An investigation of long-term effects of group music therapy on agitation levels of people with Alzheimer's Disease. *Aging and Mental Health, 11*, 330-338. doi: 10.1080/13607860600963406

Lesage, F. X., Berjot, S., & Deschamps, F. (2012). Clinical stress assessment using a visual analogue scale. *Occupational Medicine, 62*, 600-605. doi: 10.1093/occmed/kqs140

Lewis, F., Karlsberg Schaffer, S., Sussex, J., O'Neill, P., & Cockcroft, L. (2014). *The trajectory of dementia in the UK – Making a difference*. Retrieved from <http://www.alzheimersresearchuk.org/wp-content/uploads/2015/01/OHE-report-Full.pdf>

MacPherson, S., Bird, M., Anderson, K., Davis, T., & Blair, A. (2009). An art gallery access programme for people with dementia: “You do it for the moment”. *Aging & Mental Health, 13*, 744–752. doi:10.1080/13607860902918207

McCorry, L. K. (2007). Physiology of the autonomic nervous system. *American Journal of Pharmaceutical Education, 71*, 1-11. doi: 10.5688/aj710478

CHORAL SINGING, DEMENTIA, STRESS AND WELLBEING

- McDermott, O., Crellin, N., Ridder, H. M., & Orrell, M. (2013). Music therapy in dementia: a narrative synthesis systematic review. *International Journal of Geriatric Psychiatry*, 28, 781-794. doi: 10.1002/gps.3895
- Mittelman, M. S., & Papayannopoulou, P. M. (2018). The Unforgettables: a chorus for people with dementia with their family members and friends. *International Psychogeriatrics*. Advance online publication. doi: 10.1017/S1041610217001867
- NICE. (2006). *Dementia: supporting people with dementia and their caregivers in health and social care*. Retrieved from <https://www.nice.org.uk/guidance/cg42?unlid=13608378720158241495>
- NICE. (2007). *Dementia: A NICE-SCIE guideline on supporting people with dementia and their carers in health and social care*. Retrieved from <https://www.nice.org.uk/guidance/cg42/evidence>
- NICE. (2013). *Dementia: independence and wellbeing. NICE quality standard 30*. Retrieved from <https://www.nice.org.uk/guidance/qs30>
- Osman, S. E., Tischler, V., & Schneider, J. (2016). 'Singing for the Brain': A qualitative study exploring the health and well-being benefits of singing for people with dementia and their caregivers. *Dementia*, 15, 1326-1339. doi:10.1177/1471301214556291
- Petrovsky, D., Cacchione, P. Z., & George, M. (2015). Review of the effect of music interventions on symptoms of anxiety and depression in older adults with mild dementia. *International Psychogeriatrics*, 27, 1661-1670. doi: 10.1017/S1041610215000393

- Pinquart, M., & Sörensen, S. (2003). Differences between caregivers and noncaregivers in psychological health and physical health: A meta-analysis. *Psychology and Aging, 18*, 250–267. doi:10.1037/0882-7974.18.2.250
- Prince, M., Knapp, M., Guerchet, M., McCrone, P., Prina, M., Comas-Herrera, A., ... Salimkumar, D. (2014). *Dementia UK: Update*. Alzheimer's Society: London.
- QSR. (2015). NVivo qualitative data analysis software (Version 11) [Computer software]. Retrieved from <http://www.qsrinternational.com/nvivo/nvivo-products/nvivo11-for-windows>
- Raglio, A., Bellandi, D., Baiardi, P., Gianotti, M., Ubezio, M. C., Zancchi, E., ... Strambadia, M. (2015). Effect of active music therapy and individualized listening to music on dementia: A multicenter randomized controlled trial. *Journal of the American Geriatrics Society, 63*, 1534–1539. doi:10.1111/jgs.13558
- Raglio, A., Bellelli, G., Mazzola, P., Bellandi, D., Giovagnoli, A. R., Farina, E., ... & Zanetti, O. (2012). Music, music therapy and dementia: a review of literature and the recommendations of the Italian Psychogeriatric Association. *Maturitas, 72*, 305-310. doi: 10.1016/j.maturitas.2012.05.016
- Raglio, A., Bellelli, G., Traficante, D., Gianotti, M., Ubezio, M. C., Villani, D., & Trabucchi, M. (2008). Efficacy of music therapy in the treatment of behavioral and psychiatric symptoms of dementia. *Alzheimer Disease & Associated Disorders, 22*, 158–162. doi:10.1097/wad.0b013e3181630b6f
- Sakamoto, M., Ando, H., & Tsutou, A. (2013). Comparing the effects of different individualized music interventions for elderly individuals with severe dementia. *International Psychogeriatrics, 25*, 775–784. doi:10.1017/s1041610212002256

- Sandstrom, G. M., & Russo, F. A. (2010). Music hath charms: The effects of valence and arousal on recovery following an acute stressor. *Music and Medicine, 2*, 137-143. doi: 10.1177/1943862110371486
- Särkämö, T., Tervaniemi, M., Laitinen, S., Numminen, A., Kurki, M., Johnson, J. K., & Rantanen, P. (2013). Cognitive, emotional, and social benefits of regular musical activities in early dementia: Randomized controlled study. *The Gerontologist, 54*, 634–650. doi:10.1093/geront/gnt100
- Salimetrics. (2015). *Saliva collection and handling advice*. Retrieved from https://www.salimetrics.com/assets/documents/Saliva_Collection_Handbook.pdf
- Salimetrics. (2017). *Collection methods: SalivaBio Oral Swab (SOS)*. Retrieved from <https://www.salimetrics.com/assets/documents/oral-swab-saliva-collection-instructions.pdf>
- Shaffer, F., McCraty, R., & Zerr, C. L. (2014). A healthy heart is not a metronome: an integrative review of the heart's anatomy and heart rate variability. *Frontiers in Psychology, 5*. doi: 10.3389/fpsyg.2014.01040
- Shi, H., Yang, L., Zhao, L., Su, Z., Mao, X., Zhang, L., & Liu, C. (2017). Differences of heart rate variability between happiness and sadness emotion states: A pilot study. *Journal of Medical and Biological Engineering, 37*, 527-539. doi: 10.1007/s40846-017-0238-0
- Smyth, N., Hucklebridge, F., Thorn, L., Evans, P., & Clow, A. (2013). Salivary cortisol as a biomarker in social science research. *Social and Personality Psychology Compass, 7*, 605-625. doi:10.1111/spc3.12057

CHORAL SINGING, DEMENTIA, STRESS AND WELLBEING

- Suzuki, M., Kanamori, M., Watanabe, M., Nagasawa, S., Kojima, E., Ooshiro, H., & Nakahara, D. (2004). Behavioral and endocrinological evaluation of music therapy for elderly patients with dementia. *Nursing and Health Sciences*, *6*, 11-18. doi: 10.1111/j.1442-2018.2003.00168.x
- Tsuji, H., Venditti, F. J. Jr., Manders, E. S., Evans, J. C., Larson, M. G., Feldman, C. L., & Levy, D. (1994). Reduced heart rate variability and mortality risk in an elderly cohort. The Framingham Heart Study. *Circulation*, *90*, 878-83. doi: 10.1161/01.cir.90.2.878
- Ulrich-Lai, Y. M., & Herman, J. P. (2009). Neural regulation of endocrine and autonomic stress responses. *Nature Reviews Neuroscience*, *10*, 397-409. doi: 10.1038/nrn2647
- Unadkat, S., Camic, P., & Vella-Burrows, T. (2017). Understanding the experience of group singing for couples where one partner has a diagnosis of dementia. *Gerontologist*, *57*, 469-478. doi: 10.1093/geront/gnv698
- van der Steen, J. T., van Soest-Poortvliet, M. C., van der Wouden, J. C., Bruinsma, M. S., Scholten, R. J., & Vink, A. C. (2017). Music-based therapeutic interventions for people with dementia. *Cochrane Database of Systematic Reviews*. doi: 10.1002/14651858.cd003477.pub3
- Vink, A. C., Bruinsma, M. S., & Scholten, R. J. (2003). Music therapy for people with dementia. *Cochrane Database of Systematic Reviews*. doi:10.1002/14651858.cd003477.pub2
- Wewers, M. E., & Lowe, N. K. (1990). A critical review of visual analogue scales in the measurement of clinical phenomena. *Research in Nursing & Health*, *13*, 227-236. doi: 10.1002/nur.4770130405

- Wilhelm, F. H., Pfaltz, M. C., Grossman, P., & Roth, W. T. (2006). Distinguishing emotional from physical activation in ambulatory psychophysiological monitoring. *Biomedical Sciences Instrumentation*, 42, 458-463. Retrieved from http://145.250.210.6/fileadmin/unispitalbaselch/Bereiche/Medizin/Psychosomatik/Publicationen/Grossmann_Paul/grossman_wilhelm_rmbs_2006.pdf
- Yaffe, K., Fox, P., Newcomer, R., Sands, L., Lindquist, K., Dane, K., & Covinsky, K. E. (2002). Patient and caregiver characteristics and nursing home placement in patients with dementia. *Journal of the American Medical Association*, 287, 2090–2097. doi: 10.1001/jama.287.16.2090
- Zhai, J., & Barreto, A. (2006). Stress recognition using non-invasive technology. In *Proceedings of FLAIRS Conference*, 395-401. Retrieved from <http://www.aaai.org/Papers/FLAIRS/2006/Flairs06-077.pdf>

Section C: Appendices

Appendix A - Quality assessment criteria for evaluating primary research papers (Kmet et al., 2004)

This has been removed from the electronic copy

Appendix B - Quality assessment criteria scores (Kmet et al., 2004)

Scores for quantitative methodologies

	Camic et al. (2013)	Davidson & Almeida (2014)	Mittelman & Papayannopoulou (2018)	Camic et al. (2014)	Eekelaar et al. (2012)	Johnson et al. (2017)	McGuigan et al. (2015)	Schall et al. (2017)
Question/objective sufficiently described?	2	2	2	2	2	2	2	2
Study design evident and appropriate?	2	2	2	2	2	2	2	2
Method of subject/comparison group selection or source of information/input variables described and appropriate?	1	1	1	1	1	1	2	2
Subject (and comparison group, if applicable) characteristics sufficiently described?	1	1	1	1	1	2	2	1
If interventional and random allocation was possible, was it described?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2
If interventional and blinding of investigators was possible, was it reported?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
If interventional and blinding of subjects was possible, was it reported?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Outcome and (if applicable) exposure measure(s) well defined and robust to measurement/misclassification bias? Means of assessment reported?	2	2	2	2	2	2	2	2
Sample size appropriate?	2	2	2	1	2	2	1	2
Analytic methods described/justified and appropriate?	1	1	1	2	2	2	N/A	1
Some estimate of variance is reported for the main results?	2	1	2	2	0	2	0	2
Controlled for confounding?	2	1	2	1	1	1	1	1
Results reported in sufficient detail?	2	2	2	2	2	2	2	2
Conclusions supported by the results?	2	2	2	2	2	2	1	2
Total score (%)	19/22 (86)	17/22 (77)	19/22 (86)	18/22 (82)	17/22 (77)	20/22 (91)	15/20 (75)	21/24 (88)

Scores for qualitative methodologies

	Camic et al. (2013)	Mittelman & Papayannopoulou (2018)	Osman et al. (2016)	Unadkat et al. (2017)	Camic et al. (2014)	Camic et al. (2016)	Eekelaar et al. (2012)	Flatt et al. (2015)	McGuigan et al. (2015)
Question/objective sufficiently described?	2	2	2	2	2	2	2	2	2
Study design evident and appropriate?	2	2	2	2	2	2	2	2	2
Context for the study clear?	2	2	2	1	2	2	2	2	2
Connection to a theoretical framework/wider body of knowledge?	2	2	2	2	2	2	2	2	2
Sampling strategy described, relevant and justified?	1	1	2	2	1	2	1	1	2
Data collection methods clearly described and systematic?	2	1	2	2	2	1	1	2	2
Data analysis clearly described and systematic?	2	0	1	2	2	2	1	2	2
Use of verification procedure(s) to establish credibility?	2	0	2	2	2	2	2	2	2
Conclusions supported by the results?	2	2	2	2	2	2	2	2	1
Reflexivity of the account?	0	0	0	2	1	2	0	0	0
Total score (%)	17/20 (85)	12/20 (60)	17/20 (85)	19/20 (95)	18/20 (90)	19/20 (95)	15/20 (75)	17/20 (85)	16/20 (80)

Appendix C – Ethical approval

This has been removed from the electronic copy

Appendix D – Consent form



Venue 1 and 2 logos

Consent Form (page 1 of 2)

Participant ID: _____

Title of Project: Impact of choral singing

Name of Researchers: Philippa Bourne and Professor Paul Camic

Please initial each box if you agree

1. I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason.

3. I will complete brief questionnaires and give a sample of my saliva before and after one singing group and one activity at the [Venue 2]. I give my permission for both of these to be done. I also agree to wear a wristband to measure some of my body's activities.

4. I agree to be contacted to take part in a brief telephone follow up interview (approx. 15 minutes) to be asked questions about the singing group and for anonymous quotes from the interviews to be used in published reports of the study findings.

6. I understand that anonymous data from this project will be available to Canterbury Christ Church University and University College London researchers and that results from this project will be submitted as part of a doctoral thesis and for journal publication and that information from the study may be used in future research projects.

7. I agree to take part in the above study.

Title of Project: Impact of choral singing (page 2 of 2)

Participant ID: _____

Name of Participant _____

Signature _____

Date _____

Name of Person taking consent _____

Signature _____

Date _____

Appendix E – Participant information sheet



Venue 1 and 2 logos

Information about the Choral Singing Research Project

Hello. Our names are Philippa Bourne and Professor Paul Camic and we are researchers at Canterbury Christ Church University; Philippa is completing her doctoral degree in clinical psychology and Paul is the Research Director. We would like to invite you to take part in a research project about how singing may help people with memory problems and their family members or friends.

Before you decide, it is important that you understand why the research is being done and what it would involve for you. You are welcome to tell others about the study if you wish.

Part 1 of this sheet tells you the purpose of this study and what will happen if you take part.

Part 2 gives you more detailed information about how the study will be conducted.

Part 1

What is the purpose of the study?

The purpose of the study is to obtain information from you on how a choral singing group might help people with memory problems and their family members or friends.

Why have I been invited?

You have been invited to take part in the study because you are attending the choral singing group at [Venue 1].

Do I have to take part?

No, you do not have to take part. It is entirely up to you to decide to join the research. If you agree to take part, we will then ask you to sign a consent form. You can withdraw at any time and you do not have to give a reason. This would not affect your ability to take part in the singing group or any other programme at [Venue 1].

What will I have to do?

Attend the singing groups as you have planned.

1. At your singing session on [Date 1] we will give you a brief questionnaire to complete before and after the session.
2. We will also take a sample of your saliva before and after the session. We will ask you to hold a small piece of hygienic sponge in your mouth for just 60 seconds and chew it. We will then take the sponge and put it in a bottle.
3. You may also be asked to wear a wristband that looks like a watch to measure some of your body's activities during both sessions.

4. There will also be another activity based at the [Venue 2] on [Date 2] and [Date 3] you will be invited to.

5. On [Date 3] we will ask you to complete the brief questionnaire and give a saliva sample at the beginning and end of this session, just as you will have done on [Date 1].

Please do not have any food in the hour before the session or any beverages for 20 minutes before as this may affect the results of the study. Water will be provided during the singing session and refreshments will be provided after.

What are the possible disadvantages and risks of taking part?

When holding the sponge in your mouth it is important not to swallow it as it could be a choking hazard. There will be a member of the research team available to guide you through this process.

What are the possible benefits of taking part?

The results of this study may be used to help find funding for similar programmes in the future and to better understand the impact of choral singing.

Will my taking part in this study be kept confidential?

Your confidentiality will be safeguarded during and after the study. You will be given a participant number which will be on all questionnaires and the sample of your saliva. They will be kept in a safe place during and after the study.

Who has approved the study?

All research involving people, including this study, is looked at by an independent group of people called a Research Ethics Committee, to protect your interests. This study has been reviewed and given approval by Canterbury Christ Church University Research Ethics Committee on 22 February 2017.

Who is organising and funding the research?

Canterbury Christ Church University and the Created Out of Mind Hub at the Wellcome Collection are funding the research. [Partner organisation] and [Venue 1] are helping organise the singing groups and are partners in this research.

Part 2

What will happen if I don't want to carry on with the study?

If you change your mind about participating in the research, but still want to come to the singing groups, that is absolutely fine to do. You can simply let us know at the beginning of the group. You do not have to give a reason.

What if there is a problem?

If there is a problem during the session, you can ask one of the facilitators to help you or to give you more information.

Concerns and Complaints

If you have any *concerns* about the research, please contact the lead researcher: Philippa Bourne, Salomons Centre for Applied Psychology, Canterbury Christ Church University, p.bourne366@canterbury.ac.uk. You can also leave a message on the 24-hour voicemail 01892 507673 with your name and number, please say you are leaving the message for Philippa and she will get back to you.

If you would like to make a *complaint* about any aspect of the research please contact: Professor Margie Callanan, Chair, university ethics panel at Salomons Centre for Applied Psychology, Canterbury Christ Church University at margie.callanan@canterbury.ac.uk or telephone 03330 117 094.

What will happen to the results of the research study?

We will send you an information sheet at the end of the study letting you know what we have learnt from it. Please inform the researchers if you do not wish to receive this. It is hoped that the results of the study will be published in a journal. We may use some anonymous quotes from interviews, but if your quotes are used, we will ensure that it will not be possible to identify you from the quotes. An anonymous write-up of the results will be published on the Canterbury Christ Church University website. The data will also be anonymously shared with University College London researchers.

Further information and contact details

If you would like to speak to us and find out more about the study or have questions, you can leave a message for Philippa on a 24-hour voicemail phone line at 01892 507673. If she is not available, please leave a contact number so that she can get back to you. You can also email her at p.bourne366@canterbury.ac.uk.

Thank you

Appendix F – Demographic questionnaire



Venue 1 and 2 logos

Participant Information Sheet

1. Age: _____
2. Gender: Male Female Other (please specify) _____
3. Ethnicity: White British Other (please specify) _____
4. Dementia Diagnosis (if applicable, please circle all that apply):
 Alzheimer's Vascular Lewy Body Frontotemporal
 Other (please specify) _____ Not applicable
5. List of any medications:

6. Phone number (if you agree to be called for a short follow up phone interview):

Appendix G - Canterbury Wellbeing Scales and stress VAS scale

This has been removed from the electronic copy

Appendix H - Further details of Empatica® procedure and data analysis

Initial HRV data analysis was completed by Rachel Hughes (University College London).

The information below is directly quoted from her MSc thesis (Hughes, 2016/2017).

“Background: This study used the Empatica E4 wristband which contains a photoplethysmography (PPG) sensor which is able to calculate HR, HRV and blood volume pulse, an accelerometer and an EDA sensor to measure galvanic skin response (or skin conductance) (Empatica, 2017). Interest lies within HR monitoring and how PPG sensors works. The wristband contains a light emitting diode (LED) which is shone directly onto the skin and determines HR using the theory that arterial blood flow is inversely proportionate to the amount of reflected light (Spierer et al., 2015, Stahl et al., 2016). This means that if more light is reflected the arteries are dilated resulting in lower blood pressure and HR (Siddiqui, 2011), with the opposite being true for less light reflection”.

Procedure

“Empaticas were turned on, placed on a table and synchronised by filming the table being banged twice, with the Unix time stamp visible. The table bang produced a simultaneous event which caused rapid increases in acceleration in multiple directions, visible across all devices.

The Unix time stamp was noted when each session started and at various points throughout”.

Data Analysis

“This used PPG sensors to generate the blood volume pulse. Peaks were then detected from the PPG and the lengths of the intervals between each peak, or beat, was generated. This found the inter-beat interval. From this, instantaneous HR could be estimated. This process

was computer generated and resulted in a HR measurement each second (Empatica Support, 2016).

Data from all Empatica wristbands were uploaded onto Empatica Connect (<https://www.empatica.com/connect/login.php>). Individual excel files were downloaded. The files were sorted into those from the singing session and those from the art viewing session.

To synchronise the data, the first peak in the accelerometer data caused by the table banging was identified and a record was made of what time this occurred on the device. Any HR measures before the recorded time were deleted. This ensured that all Empatica E4 wristbands had the same start time.

A typed transcript was made of each session to identify what happened at major time points. This was done by listening to the audio recordings of each session and making a note of the major events. Using the audio time log, the Unix time stamp for each second was able to be produced”.

Statistics

“Mean HR variance was calculated for each participant. The mean and standard deviation (SD) of patients and controls was calculated for each subdivision. Data was then baselined for each participant individually to calculate HR (variance) change by subtracting their mean HR (variance) before from their mean HR (variance) during and after each session”.

Retrieved from: Hughes, R. (2016/2017). *The effects of arts interventions on the heart rate of patients with dementia compared to controls* (Unpublished master’s thesis). UCL: London.

Appendix I - Interview schedule

Hi, my name is [interviewer name]. I am one of the researchers doing the study at the singing group at [Venue 1]. Is now a good time to have a short conversation about the singing group? It should take no more than 15 minutes. Great! Just to let you know that I will be recording our call so that I don't miss any of the information but the recording will be destroyed after I have typed it up.

First I would like to ask you about your experiences of the group...

1. Do you enjoy coming to the singing group at [Venue 1]?
 - 1a. Can you describe what it is about the group that you enjoy?
2. Do you notice any differences in yourself whilst you are at the group or afterwards?
If mood is not covered go to question 3
3. Does it have any impact on your mood either positively or negatively?
 - 3a. Why do you think it has an impact?

Thank you, now I would like to ask you your opinion of (insert name)'s experience of the group...

4. Do you think (insert name) enjoys coming to the singing group at [Venue 1]?
 - 4a. Can you tell me in a few words why you think (name) enjoys coming to the singing group?
5. Do you notice any differences in (insert name) whilst (s)he is at the group or afterwards?
6. Why do you think it is the singing group which causes these differences?
(Is there anything in particular about the singing sessions which you feel may have this effect?/ do they seem different or behave differently at [Venue 1] compared to other times in the week)
If mood is not covered go to question 6
6. Does it seem to have any impact on (insert name)'s mood either positively or negatively?
And in what way?
7. Anything else about your experiences or PWD's experiences that are important for me to know?

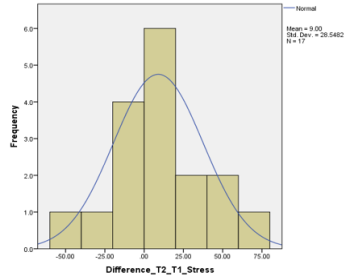
Thank you

Appendix J - List of medications taken by participants

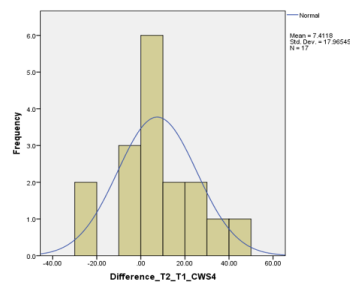
This has been removed from the electronic copy

Appendix K - Histograms showing normality

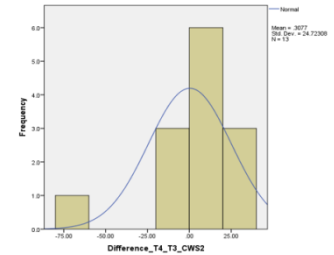
Stress VAS measure – singing session



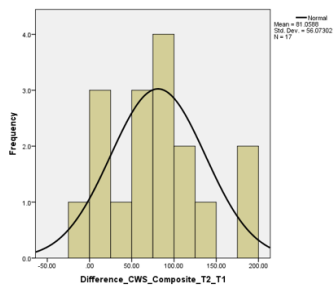
CWS scale 4 – singing session



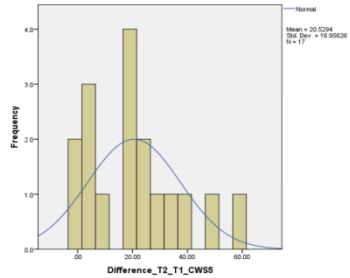
CWS Scale 2 - control session



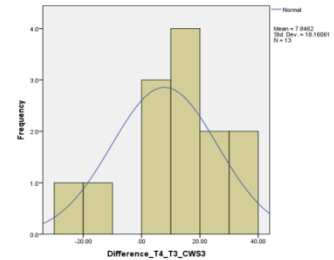
CWS Composite score – Singing session



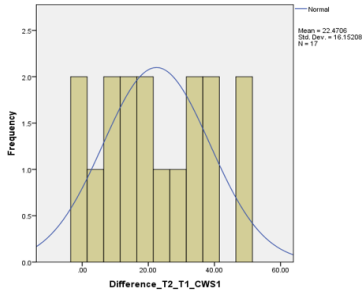
CWS scale 5 – singing session



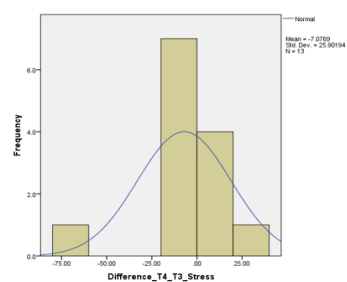
CWS Scale 3 - control session



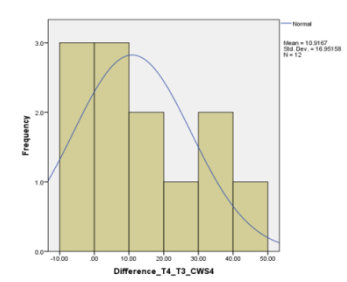
CWS scale 1 – singing session



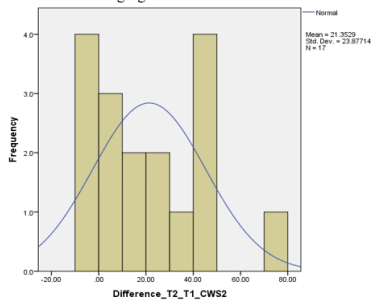
Stress VAS measure – control session



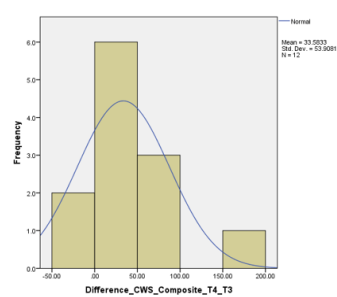
CWS Scale 4 - control session



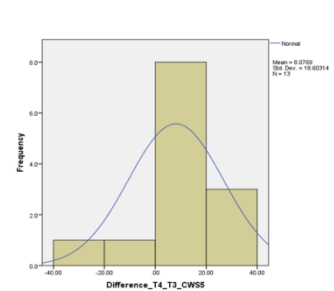
CWS scale 2 – singing session



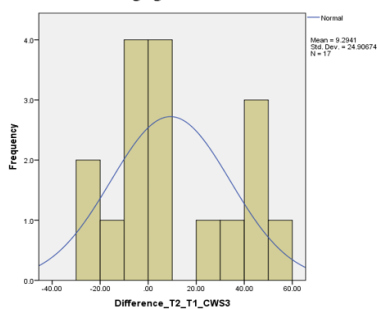
CWS Composite score- control session



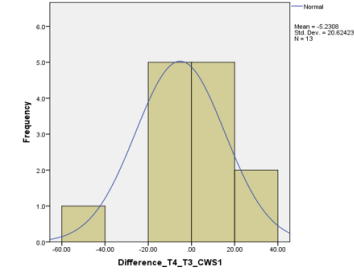
CWS Scale 5 - control session



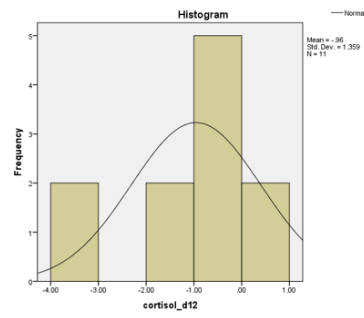
CWS scale 3 – singing session



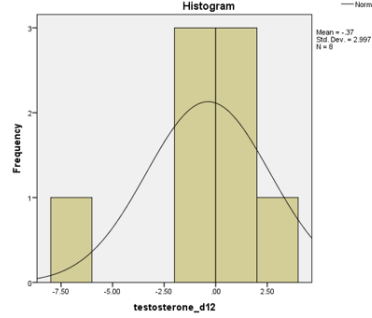
CWS Scale 1 - control session



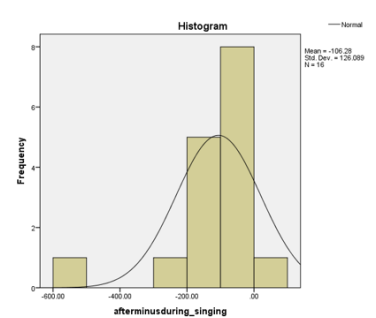
Cortisol – singing session



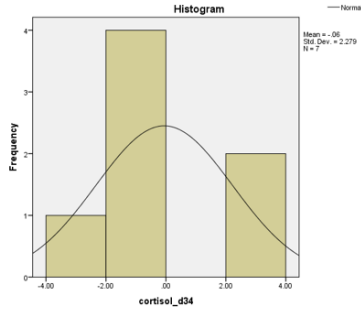
Testosterone – singing session



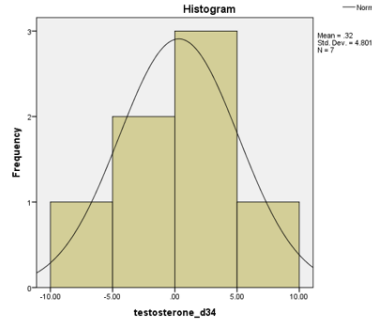
HRV – after-during singing session



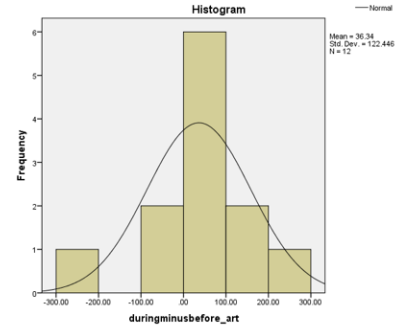
Cortisol – control session



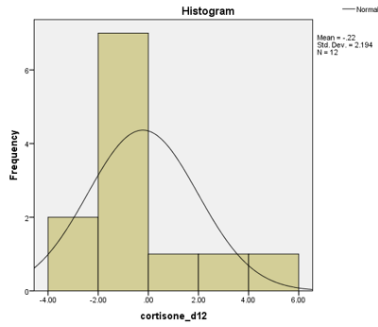
Testosterone – control session



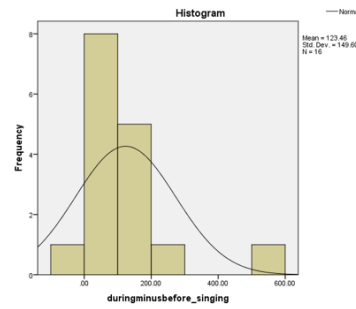
HRV – during-before control session



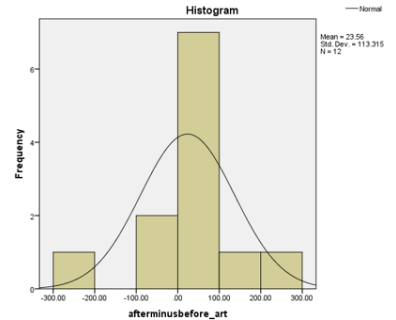
Cortisone – singing session



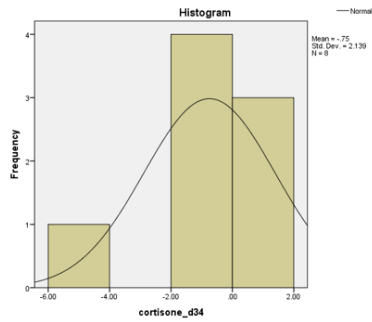
HRV – during-before singing session



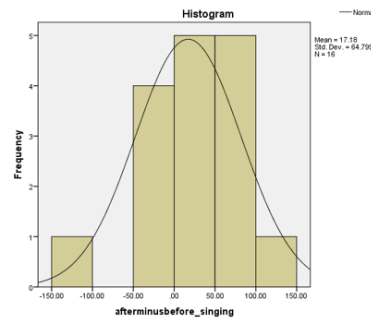
HRV – after-before control session



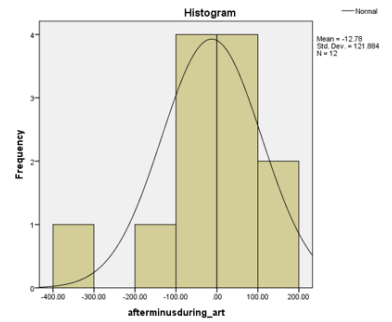
Cortisone - control session



HRV – after-before singing session



HRV – after-during control session



Appendix L - Wilcoxon signed-rank tests for all participants combined

Results from Wilcoxon signed-rank analyses combined for PWD and caregivers

Measure	Singing session	Session Control	Comparison between singing and control ^a
<i>Self-report questionnaires</i>			
Stress	Pre 70.71 (27.29) Post 79.71 (21.64) n=17, z=-1.37, p=.171, r=-.23	Pre 75.38 (24.01) Post 68.31 (26.50) n=13, z= -0.99, p=.325, r= -.19	Singing 8.00 (29.44) Control -7.08 (25.90) n=13, z=-1.64, p=.100, r= -.32
CWS*** Composite	Pre 337.53 (81.63) Post 418.59 (54.53) n=17, z=-3.57, p=.000**, r= -.61	Pre 364.25 (91.07) Post 397.83 (72.08) n=12, z=-2.04, p=.041, r= -.42	Singing 67.67 (55.72) Control 33.58 (53.91) n=12, z=-1.42, p=.155, r= -.29
CWS 1 – happy	Pre 59.18 (25.38) Post 81.65 (21.33) n=17, z=-3.47, p=.001**, r= -.60	Pre 75.46 (23.47) Post 70.23 (21.75) n=13, z=-.67, p=.503, r= -.13	Singing 21.54 (16.58) Control -5.23 (20.62) n=13, z=-2.76, p=.006**, r= -.54
CWS 2 – well	Pre 62.65 (29.80) Post 84.00 (14.34) n=17, z=-2.95, p=.003**, r= -.51	Pre 71.31 (25.61) Post 71.62 (22.82) n=13, z=-.63, p=.530, r= -.12	Singing 19.00 (26.53) Control 0.31 (24.72) n=13, z=-1.40, p=.162, r= -.27
CWS 3 - interested	Pre 76.06 (19.64) Post 85.35 (10.62) n=17, z=-1.25, p=.211, r= -.21	Pre 74.00 (18.80) Post 81.85 (23.46) n=13, z=-1.65, p=.099, r= -.32	Singing 3.23 (23.86) Control 7.85 (18.16) n=13, z=-0.91, p=.363, r= -.18
CWS 4 – confident	Pre 75.71 (19.75) Post 83.12 (12.51) n=17, z=-1.71, p=.088, r= -.29	Pre 73.00 (22.45) Post 83.92 (13.24) n=12, z=-1.79, p=.074, r= -.37	Singing 5.75 (21.06) Control 10.92 (16.95) n=12, z=-1.02, p=.308, r= -.21
CWS 5 - optimistic	Pre 63.94 (23.86) Post 84.47 (18.09) n=17, z=-3.47, p=.001**, r= -.60	Pre 69.62 (22.19) Post 77.69 (27.89) n=13, z=-1.79, p=.075, r= -.35	Singing 19.23 (17.64) Control 8.08 (18.60) n=13, z=-1.68, p=.093, r= -.33
<i>Physiological</i>			
Cortisol	Pre 3.40 (2.02)	Pre 3.20 (1.55)	Singing -1.64 (1.39)

	Post 2.44 (1.50) n=11, z=-2.05, p=.041*, r= -.44	Post 3.15 (1.53) n=7, z=-0.34, p=.735, r= -.09	Control .50 (1.91) n=6, z=-1.99, p=.046*, r= -.57
Cortisone	Pre 6.37 (1.99) Post 6.15 (3.40) n=12, z=-0.86, p=.388, r=-.18	Pre 6.70 (2.72) Post 5.95 (1.47) n=8, z=-0.84, p=.401, r= -.21	Singing -0.52 (2.55) Control -0.78 (2.31) n=7, z=-0.85, p=.398, r=-.23
Testosterone	Pre 12.67 (11.99) Post 12.31 (12.22) n=8, z=-0.00, p=1.000, r= .00	Pre 10.97 (10.16) Post 11.29 (11.45) n=7, z=-0.51, p=.612, r=-.14	Singing -1.66 (3.67) Control -0.52 (4.65) n=4, z=-1.46, p=.144, r= -.52

* p<.05

**p<.008 (Bonferroni corrected significance level)

*** CWS = Canterbury Wellbeing Scales

^aThese figures refer to change in mean scores

Appendix M - Extracts from research diary

This has been removed from the electronic copy

Appendix N - Coded interview transcript

This has been removed from the electronic copy

Appendix O - Themes not associated with research questions

Theme	Quotation(s)
Recommendations about the singing group	<p>“I don’t think that anything needs to be improved” 64</p> <p>“Only thing I think can be a problem is all the biscuits, because [he] will absolutely have as many as there are – it’s a little bit of a challenge” 83</p>
Impact of dementia illness	<p>“I’m doing another singing group where we sit in a circle and that’s nicer, I think” 84</p> <p>“Before the choir you have to remind her to do things, she’s down. Sometimes when I say...“let’s go out”, she doesn’t want to go... She’s down...she doesn’t want to do things” 64</p> <p>“If I see him the next day and... say...“can you remember yesterday when we went to the choir practice”, “oh where was that?” sort of thing... All I’ve got to do is sing a bit of one of the songs and he’ll join in!” 76</p>
Impact of caring responsibilities	<p>“It’s...quite lonely care-giving” 66</p> <p>“I was actually very tearful because I’d had a very restless night, up and down, we really were very sleep deprived the two of us, and so it makes me feel much more vulnerable [and singing] does lighten your mood” 83</p>
Comments on control activity	<p>“Different surroundings and usually when he’s at the museum he’s not happy at all and he was okay that day!” 72</p> <p>“It wasn’t engaging enough and it wasn’t...there wasn’t enough body movement. Even going up and looking at the actual pictures might have been better, I don’t know? There’s something about looking at those...we were looking at slides and it was semi-dark and...it just didn’t really engage him” 83</p>
Comments on research process	<p>“It was good. A new experience, I would say...And it was nice” 64</p> <p>“I’m really glad you’re doing some subjective responses because my problem with a lot of this work is that is it all statistics? ...it doesn’t...get to the subjectivity and there’s just as much...authenticity in a subjective experience” 83</p>

Appendix P - Letter to ethics panel

This has been removed from the electronic copy

Appendix Q – Submission guidelines for intended journals

Section A: Psychogeriatrics

Edited By: Toshihisa Tanaka

Impact Factor: 1.693

ISI Journal Citation Reports © Ranking: 2016: 37/49 (Geriatrics & Gerontology); 94/142 (Psychiatry)

Online ISSN: 1479-8301

Author Guidelines

1. MANUSCRIPT SUBMISSION

Please read the complete Author Guidelines carefully, including the section on copyright, before submitting your manuscript. Please note page charges apply if articles are longer than the specified page lengths.

Once you have prepared your submission in accordance with the Guidelines, manuscripts should be submitted online at: <http://mc.manuscriptcentral.com/psy>.

For assistance, please contact the Psychogeriatrics Editorial Office at the address below:

Psychogeriatrics Editorial Office

c/o John Wiley & Sons Australia

155 Cremorne Street Richmond, VIC 3121, Australia

E-mail: psyg.eo@wiley.com

Tel: 03 3830 1263 (Residents in Japan), +61 3 9274 3129 (Residents outside Japan)

Fax: +61 3 9274 3101

2. EDITORIAL AND CONTENT CONSIDERATIONS

Aims and scope

Psychogeriatrics is an international journal sponsored by the Japanese Psychogeriatric Society that publishes peer-reviewed original papers dealing with all aspects of psychogeriatrics and related fields. The Journal encourages articles with gerontopsychiatric, neurobiological, genetic, diagnostic, sociopsychiatric, psychological, or psychotherapeutic content, as well as content related to health policy. Themes can be illuminated through basic science, clinical (human and animal) studies, case studies, epidemiological research, and humanistic research.

Editorial review and acceptance

Manuscripts are accepted regardless of whether the author is a member of the Japanese Psychogeriatric Society.

Submission implies that the content has not been published or submitted for publication elsewhere except as a brief abstract in the proceedings of a scientific meeting or symposium. The acceptance criteria for all papers are the quality and originality of the research and its significance to our readership. Except where otherwise stated, manuscripts are double-blind peer reviewed by two anonymous reviewers and the editor.

Once contributions have been judged as acceptable for publication on the basis of content, the editor and the publisher reserve the right to modify manuscripts to eliminate ambiguity and repetition and to improve communication between author and reader. Final acceptance or rejection rests with the editorial board, which reserves the right to refuse any material for publication.

3. MANUSCRIPT CATEGORIES AND REQUIREMENTS

(1) Original Article

Word limit: approximately 4000 words

Abstract: 300 words or fewer, structured

(2) Review Article

Word limit: approximately 6500 words

Abstract: 300 words or fewer, unstructured

(3) Case Report

Word limit: approximately 1500 words

Abstract: 300 words or fewer, unstructured

References: up to 5

Figures/tables: up to 5

(4) Psychogeriatric Note

Word limit: approximately 800 words

Abstract: none

References: up to 7

Figures/tables: up to 1

Psychogeriatric Notes are concise reports, in particular, focusing on techniques used to overcome problems as well as on skills or problems that may be of great interest. It should not include a detailed report or discussion. The text is unstructured (i.e. no subheadings).

(5) Letter to the Editor

Word limit: approximately 500 words

Abstract: none

References: up to 5

Figures/tables: up to 1

4. ETHICAL CONSIDERATIONS

Psychogeriatrics is committed to integrity in scientific research and recognizes the importance of maintaining the highest ethical standards.

Committee on Publication Ethics

The journal is a member of, and subscribes to, the principles of the Committee on Publication Ethics (COPE) (<http://publicationethics.org/>).

Authorship and acknowledgements

The journal adheres to the definition of authorship established by the International Committee of Medical Journal Editors (ICMJE). The ICMJE recommends that authorship be based on the following four criteria: (i) substantial contributions to the conception or design of the work or to the acquisition, analysis, or interpretation of data for the work; (ii) drafting the work or revising it critically for important intellectual content; (iii) final approval of the version to be published; and (iv) agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Contributors who do not qualify as authors should be mentioned under ‘Acknowledgments’.

Declaration of Helsinki

Manuscripts must contain a statement to the effect that all human studies have been reviewed by the appropriate ethics committee and have been performed in accordance with the ethical standards laid down in an appropriate version of the Declaration of Helsinki (as revised in Brazil, 2013), available at <http://www.wma.net/en/30publications/10policies/b3/index.html>. The text should also clearly state that all persons gave informed consent before their inclusion in the study. Details that might disclose the identity of the subjects under the study should be omitted.

Use of animals in research

Reports of animal experiments must state that the ‘Revised guide for the care and use of laboratory animals’ (NIH Publication Vol 25, No. 28 revised 1996; http://grants.nih.gov/grants/guide/notice_files/not96-208.html) were followed and, where applicable, indicate that specific national laws (e.g. the current version of the German Law on the Protection of Animals) were followed.

Conflict of interest

Authors must declare any financial support or relationships that may pose conflict of interest. At the time of submission, authors must disclose any financial arrangements with a company whose product figures prominently in the submitted manuscript or with a company making a competing product. Such information will be requested on the ScholarOne submission site and will be included in a Disclosure statement between the Acknowledgments and References sections of their manuscript.

Data Sharing and Data Accessibility

The journal encourages authors to share the data and other artefacts supporting the results in the paper by archiving it in an appropriate public repository. Authors should include a data accessibility statement, including a link to the repository they have used, in order that this statement can be published alongside their paper.

5. PREPARATION OF THE MANUSCRIPT

Pre-acceptance English-language editing

Authors for whom English is a foreign language may choose to have their manuscript professionally edited before submission. Visit the Wiley Editing Services site to learn about the options offered. All services are paid for and arranged by the author. Please note using Wiley Editing Services does not guarantee that a paper will be accepted by the Journal.

Optimizing your article for search engines

Many students and researchers looking for information online will use search engines such as Google or Yahoo. By optimizing your article for search engines, you will increase the chance of someone finding it. In turn, this will make it more likely to be viewed and/or cited in another work. We have compiled these guidelines to enable you to maximize the Web-friendliness of the most public part of your article.

Manuscript format and style

Manuscripts should follow the ICMJE's Recommendation for the Conduct, Reporting, Editing and Publication of Scholarly Work in Medical Journals (formerly known as the 'Uniform Requirements for Manuscripts').

Journal style

Spelling. Psychogeriatrics publishes in British English. For word usage and word division, please refer to the latest edition of the Oxford Concise English Dictionary.

Abbreviations. In general, terms should not be abbreviated unless they are used at least three times after the abbreviation is introduced and the abbreviation is helpful to the reader. Initially, use the word in full and present the abbreviation in parentheses after the term. Thereafter, use the abbreviation only.

Quotations. Use single quotation marks for citations (‘’).

Asterisks. Please note that asterisks must not be used (**).

Units of measurement. All measurements must be given in SI or SI-derived units. Visit the Bureau International des Poids et Mesures (BIPM) website at <http://www.bipm.fr> for more information about SI units.

Trade names. Chemical substances should be referred to by the generic name only. Trade names should not be used. Drugs should be referred to by their generic names. If proprietary drugs have been used in the study, refer to these by their generic name, and in parentheses, mention the proprietary name and the manufacturer's name and location (city, state, country).

Genetic nomenclature. Standard genetic nomenclature should be used. For further information, including relevant websites, authors should refer to the genetic nomenclature guide in *Trends in Genetics* (Elsevier Science 1998).

Nucleotide sequence data. Nucleotide sequence data can be submitted in electronic form to any of the three major collaborative databases: DDBJ, EMBL, or GenBank. It is only necessary to submit to one database, as data are exchanged between DDBJ, EMBL, and GenBank on a daily basis. The suggested wording for referring to accession-number information is: ‘These sequence data have been submitted to the DDBJ/EMBL/GenBank databases under accession number U12345’. Addresses are as follows:

- DNA Data Bank of Japan (DDBJ) <http://www.ddbj.nig.ac.jp>
- EMBL Nucleotide Sequence Submissions <http://www.ebi.ac.uk>
- GenBank <http://www.ncbi.nlm.nih.gov>

Parts of the manuscript

Manuscripts should be presented in the following order: (i) title page; (ii) abstract and key words; (iii) main text; (iv) acknowledgements; (v) disclosure statement; (vi) references; (vii) figure legends; (viii) tables (each table complete with title and footnotes); and (ix) figures. Footnotes to the text are not allowed and any such material should be incorporated into the text as parenthetical matter.

Title page

The title should be informative and contain the major key words. Do not use abbreviations in the title. A short running title (less than 40 characters including spaces) should also be provided.

The title page must contain both a descriptive and concise title of the paper; names and affiliations (including institution location) of all authors; information for the contact author including qualifications (e.g. MD, PhD), full mailing address, email address, and a contact telephone number. The present affiliation of any author, if different from that where the work was carried out, should be supplied in a footnote.

A statement should be included to indicate to which of the six available fields of the journal - (Clinical and Basic) Pharmacology and Neurochemistry, Dementia Care and Epidemiology, BPSD and Non-pharmacological Therapy, Neuropsychology, Functional Brain Imaging and Physiology, and Others - the manuscript is being submitted. “Others” should be chosen only when the other fields are not suitable.

Abstract and key words

All manuscripts, except Case Reports, must include a brief but informative abstract that states the purpose, basic procedures, main findings, and principal conclusions of the study in 300 words or fewer. For Original Articles, the abstract should be divided into four sections with the following headings: Background, Methods, Results, and Conclusions. The abstract should not contain references. Abbreviations may be included if they are used more than three times within the abstract.

Key words (between three and six) for the purposes of indexing should be supplied below the abstract in alphabetical order. They should be taken from those recommended by the US National Library of Medicine's Medical Subject Headings (MeSH) browser list: <http://www.nlm.nih.gov/mesh/meshhome.html>

Introduction

This section should include sufficient background information to set the work in context. The aims of the manuscript should be clearly stated.

Methods

This should be concise but provide sufficient detail to allow the work to be repeated by others. The source of materials should be given in detail, where possible. Ethical considerations should be detailed.

Results

Results should be presented in a logical sequence in the text, tables, and figures. Repetitive presentation of the same data in different forms should be avoided.

Discussion

This should consider the results in relation to any hypotheses advanced in the introduction and place the study in the context of other work.

Acknowledgments

This should include sources of support, including federal and industry support. Medical writers, proofreaders, and editors should not be listed as authors but may be acknowledged in the Acknowledgment section.

Disclosure statement

Authors should declare any financial support or relationship that may pose conflicts of interest as a Disclosure statement between the Acknowledgments and References sections of their manuscript. The absence of any interest to disclose must also be stated as, 'The authors have no potential conflicts of interest to disclose'.

References

References follow Vancouver style - that is, they are numbered sequentially as they occur in the text and ordered numerically in the reference list.

- All citations mentioned in the text, tables, or figures must be listed in the reference list.
- If cited in tables or figure legends, number according to the first identification of the table or figure in the text.
- In the reference list, cite the names of all authors when there are six or fewer; when there are seven or more, list the first three followed by et al.
- Do not use *ibid.* or *op cit.*

- Reference to unpublished data and personal communications should not appear in the list but should be cited in the text only (e.g. Smith A, 2000, unpublished data).
- Names of journals should be abbreviated according to the Serial Sources for the Biosis Data Base, which is available in most libraries or from <http://www.biosis.org>
- Authors are responsible for the accuracy of the references.
- Authors can read more about the Vancouver reference style [here](#).

Below are sample references formatted according to Vancouver style:

Journal article

Kyosseva SV, Elbein AD, Hutton TL et al. Increased levels of transcription factors Elk-1, cyclic adenosine monophosphate response element-binding protein, and activating transcription factor 2 in the cerebellar vermis of schizophrenic patients. *Arch Gen Psychiat* 2000; 57: 685–691.

Harada K, Nanno H, Sumi N et al. The interaction of the neurophysiological marker (somatosensory evoked potential, event-related potential), the regional cerebral blood flow and the mental ability in patients with cerebrovascular accident. *Rhonen Seishin Igaku Zasshi* 1999; 10: 573–580 (in Japanese with English abstract).

Online article not yet published in an issue

An online article that has not yet been published in an issue—and therefore has no volume, issue or page numbers—can be cited by its Digital Object Identifier (DOI). The DOI will remain valid and allow an article to be tracked even after its allocation to an issue. Shibata N and Arai H. Alzheimer's disease and mortality in Japan. *Psychogeriatrics* doi:10.1111/j.1479-8301.2009.00273.x

Book

Ringsven MK, Bond D. *Gerontology and Leadership Skills for Nurses*, 2nd edn. Albany: Delmar Publishers, 1996.

Chapter in a book

Kosaka K, Iseki E. Diffuse Lewy body disease and diffuse neurofibrillary tangles with calcification. In: Iqbal K, Winblad B,

Nishimura T, Takeda M, Wisniewski HM (eds). *Alzheimer's Disease: Biology, Diagnosis and Therapeutics*. New York: Wiley, 1997; 179–184.

World Health Organization. *Application of the international classification of disease to neurology: ICD-NA*, 2nd edn. Geneva: WHO Publishing Office, 1997.

Electronic material

Statistics Bureau and Statistics Center. *The Present and Future Condition of the Elderly Population*. [cited 31 October 2001]. Available from: <http://www.stat.go.jp/data/guide/5-3-1.htm>

Tables

Tables should be self-contained and complement, but not duplicate, information contained in the text. Number tables consecutively in the text in Arabic numerals. Type tables on a separate page with the legend above. Legends should be concise but comprehensive—the table, legend, and footnotes must be understandable without reference to the text. Vertical lines should not be used to separate columns. Column headings should be brief, with units of measurement in parentheses; all abbreviations must be defined in footnotes. Footnote symbols: †, ‡, §, ¶, should be used (in that order), and *, **, *** should be reserved for defining P-values. Statistical measures such as SD or SEM should be identified in the column or row headings. If you use a table editor function, ensure that each data point is contained within a unique cell—do not use carriage returns within cells.

Figure legends

Include figure legends on a separate page. Legends should be concise but comprehensive—the figure and its legend must be understandable without reference to the text. Include definitions of any symbols used and define/explain all abbreviations and units of measurement. (If figures have been reproduced from another source, provide a letter stating exclusive licence authorization.)

Figures

All illustrations (line drawings and photographs) are classified as figures. Figures should be numbered using Arabic numerals and cited in consecutive order in the text. Figures should be sized to fit within the column (84 mm) or the text width (175 mm). Magnifications should be indicated using a scale bar on the illustration. Each figure should be supplied as a separate file, with the figure number incorporated in the file name.

Preparation of electronic figures for publication

Although low-quality images are adequate for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word graphics are unsuitable for printed pictures. Do not use pixel-oriented programmes. Scans (TIFF only) should have a resolution of 300 dpi (halftone) or 600–1200 dpi (line drawings) in relation to the reproduction size (see below). EPS files should be saved with fonts embedded (and with a TIFF preview if possible).

For scanned images, the scanning resolution (at final image size) should be as follows to ensure good reproduction: line art, >600 dpi; half-tones (including gel photographs) >300 dpi; and figures containing both halftone and line images, >600 dpi.

Further information on Wiley's guidelines for figures ('Electronic artwork guidelines') can be obtained from: <http://authorservices.wiley.com/bauthor/illustration.asp>

Supporting information

Supporting information is not essential to the article but provides greater depth and background. It may include tables, figures, videos, and/or datasets. This material can be submitted with your manuscript, and will appear online, without editing or typesetting.

Guidelines on how to prepare this material and which formats and files sizes are acceptable can be found at: <http://authorservices.wiley.com/bauthor/suppmat.asp>

Please note that the provision of supporting information is not encouraged as a general rule. It will be assessed critically by reviewers and editors, and will only be accepted if it is essential.

6. SUBMISSION REQUIREMENTS

The main text file should be prepared using Microsoft Word in a doubled-spaced A4 document. The top, bottom, and side margins should be 30 mm each. All pages should be numbered consecutively in the top right corner, beginning with the first page of the main text file. Each figure should be supplied as a separate file, with the figure number incorporated in the file name. Files saved as .ppt are not acceptable at any stage. For submission, low-resolution figures saved as .jpg or .bmp files should be uploaded, for ease of transmission during the review process. Upon acceptance of the article, high-resolution figures (at least 300 dpi) saved as .eps or .tif files should be uploaded. Digital images supplied only as low-resolution files cannot be used

Associate your ScholarOne account with your ORCID iD

ORCID iD is a unique and persistent identifier that distinguishes you from every other researcher and connects you and your research activities. We encourage you to register today for your ORCID iD and then associate it with your ScholarOne account. [Click here to find out how.](#)

7. COPYRIGHT, LICENSING, AND ONLINE OPEN

If your paper is accepted, the author identified as the formal corresponding author for the paper will receive an email prompting them to login into Author Services; where via the Wiley Author Licensing Service (WALS) they will be able to complete the license agreement on behalf of all authors on the paper.

For authors signing the copyright transfer agreement

If the OnlineOpen option is not selected the corresponding author will be presented with the copyright transfer agreement (CTA) to sign. The terms and conditions of the CTA can be previewed in the samples associated with the Copyright FAQs below:

CTA Terms and Conditions http://exchanges.wiley.com/authors/faqs---copyright-_301.html

For authors choosing OnlineOpen

If the OnlineOpen option is selected the corresponding author will have a choice of the following Creative Commons License Open Access Agreements (OAA):

Creative Commons Attribution License OAA

Creative Commons Attribution Non-Commercial License OAA

Creative Commons Attribution Non-Commercial -NoDerivs License OAA

To preview the terms and conditions of these open access agreements please visit the Copyright FAQs hosted on Wiley Author Services <http://exchanges.wiley.com/authors/faqs-->

-copyright-_301.html and visit

<http://www.wileyopenaccess.com/details/content/12f25db4c87/Copyright--License.html>.

If you select the OnlineOpen option and your research is funded by certain funders [e.g. The Wellcome Trust and members of the Research Councils UK (RCUK) or the Austrian Science Fund (FWF)] you will be given the opportunity to publish your article under a CC-BY license supporting you in complying with your Funder requirements.

For more information on this policy and the Journal's compliant self-archiving policy please visit: <http://www.wiley.com/go/funderstatement>.

8. PUBLICATION PROCESS AFTER ACCEPTANCE

Wiley's Author Services: tracking your paper's progress

Accepted papers will be passed to Wiley's production team for publication. The author identified as the corresponding author for the paper will receive an email prompting him or her to login into Wiley's Author Services. Author Services enables authors to track their article through the production process, to publication online and in print. Authors can check the status of their articles online and choose to receive automated emails at key stages of production. The corresponding author will receive a unique link that enables him or her to register and have the article automatically added to the system. Please ensure that a complete email address is provided when submitting the manuscript. Visit <http://authorservices.wiley.com/checklist.asp> for more details on online production tracking and for a wealth of resources including FAQs and tips on article preparation and submission.

Proofs

Once the paper has been typeset the corresponding author will receive an e-mail alert containing instructions on how to provide proof corrections to the article. It is therefore essential that a working e-mail address is provided for the corresponding author. Proofs should be corrected carefully; responsibility for detecting errors lies with the author.

Early View

The journal offers rapid speed to publication via Wiley's Early View service. Early View articles are complete full-text articles published online in advance of their publication in a printed issue. Early View articles are complete and final. They have been fully reviewed, revised and edited for publication, and the authors' final corrections have been incorporated. Because they are in final form, no changes can be made after online publication. Early View articles are given a Digital Object Identifier (DOI), which allows the article to be cited and tracked before allocation to an issue. After print publication, the DOI remains valid and can continue to be used to cite and access the article. More information about DOIs can be found at <http://www.doi.org/faq.html>.

9. POST PUBLICATION

Article PDF for authors

A PDF of the article will be made available to the corresponding author via Author Services.

Printed Offprints

Printed offprints may be ordered online for a fee. Please click on the following link and fill in the necessary details and ensure that you type information in all of the required fields: <http://offprint.cosprinters.com/cos>. If you have queries about offprints please e-mail: offprint@cosprinters.com.

Author Marketing Toolkit

The Wiley Author Marketing Toolkit provides authors with support on how to use social media, publicity, conferences, multimedia, email and the web to promote their article.

Psychogeriatrics has adopted CrossCheck plagiarism software. The journal to which you are submitting your manuscript employs a plagiarism detection system.

Section B: Dementia: The International Journal of Social Research and Practice



Dementia

2016 Impact Factor: 1.768

2016 Ranking: 14/32 in Gerontology

Source: 2016 Journal Citation Reports® (Clarivate Analytics, 2017); Indexed in PubMed: MEDLINE

The International Journal of Social Research and Practice

Description

Dementia: The International Journal of Social Research and Practice has proved an exciting step forward for the field of dementia care generally, and social research specifically. Dementia acts as a major forum for social research of direct relevance to improving the quality of life and quality of care for people with dementia and their families.

The Journal has proved an exciting step forward for the field of dementia care generally, and social research specifically. It acts as a major forum for social research of direct relevance to improving the quality of life and quality of care for people with dementia and their families.

"Dementia will be of interest to all clinical disciplines involved in dementia research and the care of individuals with dementia and will be a valuable addition to many libraries and personal collections. It undoubtedly fills a gap among the mass of journals and will make a significant contribution to the

effective dissemination of research and the development of high-quality clinical practice." Times Higher Education Supplement

"There is now increasing attention being given to psycho-social aspects of the dementias, with a better balance with biomedical factors being apparent. The journal *Dementia* has played a key role in developing good quality research in this domain, across a variety of disciplines. It has already contributed to developing and disseminating better practice and quality of care, as we have come to understand better the impact of social and psychological factors on people with dementia and their supporters." Bob Woods, Bangor University

"The field of social research and practice development in dementia care is growing rapidly. There is a compelling need for the key players - people living with dementia, their families and the range of professions supporting them - to work together towards realising the full potential of people living with dementia. The Journal provides just such a forum." Murna Downs, University of Bradford, UK

"Dementia research has come of age and recognizes the value of studying psychosocial aspects related to this disease. *Dementia* serves an important role in the dissemination of studies on how to improve quality of care and thereby quality of life in people with dementia and their informal caregivers. It also offers a forum for studies on care staff, which is increasingly important since many countries struggle with a lack of well-educated staff. *Dementia* helps academics, educators, students, professionals working in dementia care and policy makers in acquiring knowledge and valuation of psychosocial aspects related to dementia. It is a new but well-regarded journal, with an international perspective and a willingness to publish cross-boundary and innovative research which makes it essential reading." Prof. M. Vernooij-Dassen, Radboud University Medical Center Nijmegen, the Netherlands.

This journal is a member of the Committee on Publication Ethics (COPE).

The aim of the journal is to publish original research, or original scholarship contributions, to the existing literature on social research and dementia. The journal will consider all relevant designs, methods and methodologies that meet this aim. The journal will also consider narrative-based and/or other forms of literature review that seek to answer social research questions in dementia studies; however, such reviews need to have a systematic approach to literature collation and reporting. All original research published in the journal must comply with ethical approval processes.

Dementia is hosted on SAGE track; a web based online submission and peer review system powered by ScholarOne™ Manuscripts. Please visit <http://mc.manuscriptcentral.com/dementia> to log in and submit your article online.

All original papers must be submitted to the journal via the online system. The online submission process follows a standard format and contributors will be asked to confirm that all authors have agreed to the submission and that the article is not currently being considered for publication by any other paper-based or electronic journal. All submissions should avoid the use of insensitive or demeaning language. In particular, authors should use 'dementia-friendly' language in positioning people living with dementia in their article and avoid using pejorative terms such as 'demented' or 'suffering from dementia'. We recommend that authors refer to the Dementia Engagement and Empowerment Project (DEEP) guidance [<http://dementivoices.org.uk/resources/deep-guides/>], which was developed by people living with dementia and offers a range of advice and support, including writing dementia-friendly information. Alternatively, Alzheimer's Australia sets out guidelines for dementia-friendly language

[<https://fightdementia.org.au/sites/default/files/NATIONAL/documents/lang....> Please also consider how you are using abbreviations in your submission. Whilst QoL (for quality of life) and MMSE (for Mini-mental State Examination) may have common usage, please try to avoid unnecessary abbreviations in the submission of your manuscript, such as PWD (for people with dementia) and abbreviations that detract from the overall flow of the manuscript.

Special editions of Dementia are commissioned by the journal's Editors and we welcome suggestions for such copy. If you would like to consider being a Guest Editor(s) of Dementia and have a topic in mind, please contact prof John Keady (John.Keady@manchester.ac.uk) and/or prof Penny Harris (pharris@jcu.edu) in the first instance.

Reviews: Books and educational resources for review / requests to review should be sent to Dr Caroline Swarbrick, School of Nursing, Midwifery and Social Work, Jean McFarlane Building (6th floor), The University of Manchester, University Place, Oxford Road, Manchester. M13 9PL, UK (email: caroline.swarbrick@manchester.ac.uk)

Innovative Practice: The journal also welcomes short papers on various aspects of innovative practice in dementia care. Jo Moriarty at King's College London, UK (jo.moriarty@kcl.ac.uk) is the Editor for this section of the journal which is published twice a year. Submissions for Innovative Practice are generally between 2500-3000 words, but longer papers can be received in exceptional circumstances. Please visit <http://mc.manuscriptcentral.com/dementia> to log in and submit your Innovative Practice article online. This section of the journal is not peer reviewed.

For all other original articles, including literature reviews, Dementia operates a strictly anonymous peer review process in which the reviewer's name is withheld from the author and the author's name from the reviewer(s). We aim for each manuscript to be reviewed by two reviewers but the Editors reserve the right to return the decision to the author with more, or less, reviews depending upon the context and circumstances of the submitted article. All manuscripts are reviewed as rapidly as possible and correspondence with the main author will be undertaken electronically. All submitting authors should be mindful that their manuscript may be reviewed by a person living with dementia as part of the journal's Editorial Board.

This Journal is a member of the Committee on Publication Ethics.

Please read the guidelines below then visit the Journal's submission site <http://mc.manuscriptcentral.com/dementia> to upload your manuscript. Please note that manuscripts not conforming to these guidelines may be returned.

Only manuscripts of sufficient quality that meet the aims and scope of Dementia will be reviewed.

There are no fees payable to submit or publish in this journal.

As part of the submission process you will be required to warrant that you are submitting your original work, that you have the rights in the work, that you are submitting the work for first publication in the Journal and that it is not being considered for publication elsewhere and has not already been published elsewhere, and that you have obtained and can supply all necessary permissions for the reproduction of any copyright works not owned by you.

1. What do we publish?

1.1 Aims & Scope

Before submitting your manuscript to Dementia, please ensure you have read the Aims & Scope.

1.2 Article Types

Dementia welcomes original research or original contributions to the existing literature on social research and dementia.

Brief articles should be up to 3000 words and more substantial articles between 5000 and 6000 words (references are not included in this word limit). At their discretion, the Editors will also consider articles of greater length.

Dementia also welcomes papers on various aspects of innovative practice in dementia care. Submissions for this part of the journal should be between 2,500-3,000 words. Innovative practice papers should include the words 'Innovative Practice' after the title of their article when submitting to the journal. For further information about innovative practice papers, please refer to the guidelines.

The journal also publishes book reviews.

1.3 Writing your paper

The SAGE Author Gateway has some general advice and on how to get published, plus links to further resources.

1.3.1 Make your article discoverable

When writing up your paper, think about how you can make it discoverable. The title, keywords and abstract are key to ensuring readers find your article through search engines such as Google. For information and guidance on how best to title your article, write your abstract and select your keywords, have a look at this page on the Gateway: [How to Help Readers Find Your Article Online](#).

2. Editorial policies

2.1 Peer review policy

Dementia operates a strictly anonymous peer review process in which the reviewer's name is withheld from the author and, the author's name from the reviewer. Each manuscript is reviewed by at least two referees. All manuscripts are reviewed as rapidly as possible.

As part of the submission process you will be asked to provide the names of peers who could be called upon to review your manuscript. Recommended reviewers should be experts in their fields and should be able to provide an objective assessment of the manuscript. Please be aware of any conflicts of interest when recommending reviewers. Examples of conflicts of interest include (but are not limited to) the below:

The reviewer should have no prior knowledge of your submission,

The reviewer should not have recently collaborated with any of the authors,

Reviewer nominees from the same institution as any of the authors are not permitted.

Please note that the Editors are not obliged to invite any recommended/opposed reviewers to assess your manuscript.

2.2 Authorship

All parties who have made a substantive contribution to the article should be listed as authors.

Principal authorship, authorship order, and other publication credits should be based on the relative

scientific or professional contributions of the individuals involved, regardless of their status. A student is usually listed as principal author on any multiple-authored publication that substantially derives from the student's dissertation or thesis.

2.3 Acknowledgements

All contributors who do not meet the criteria for authorship should be listed in an Acknowledgements section. Examples of those who might be acknowledged include a person who provided purely technical help, or a department chair who provided only general support.

Any acknowledgements should appear first at the end of your article prior to your Declaration of Conflicting Interests (if applicable), any notes and your References.

2.4 Funding

Dementia requires all authors to acknowledge their funding in a consistent fashion under a separate heading. Please visit the Funding Acknowledgements page on the SAGE Journal Author Gateway to confirm the format of the acknowledgment text in the event of funding, or state that: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

2.5 Declaration of conflicting interests

It is the policy of Dementia to require a declaration of conflicting interests from all authors enabling a statement to be carried within the paginated pages of all published articles.

Please ensure that a 'Declaration of Conflicting Interests' statement is included at the end of your manuscript, after any acknowledgements and prior to the references. If no conflict exists, please state that 'The Author(s) declare(s) that there is no conflict of interest'. For guidance on conflict of interest statements, please see the ICMJE recommendations [here](#).

2.6 Research ethics and patient consent

Medical research involving human subjects must be conducted according to the World Medical Association Declaration of Helsinki.

Submitted manuscripts should conform to the ICMJE Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals, and all papers reporting animal and/or human studies must state in the methods section that the relevant Ethics Committee or Institutional Review Board provided (or waived) approval. Please ensure that you have provided the full name and institution of the review committee, in addition to the approval number.

For research articles, authors are also required to state in the methods section whether participants provided informed consent and whether the consent was written or verbal.

Information on informed consent to report individual cases or case series should be included in the manuscript text. A statement is required regarding whether written informed consent for patient information and images to be published was provided by the patient(s) or a legally authorized representative.

Please also refer to the ICMJE Recommendations for the Protection of Research Participants.

3. Publishing Policies

3.1 Publication ethics

SAGE is committed to upholding the integrity of the academic record. We encourage authors to refer to the Committee on Publication Ethics' International Standards for Authors and view the Publication Ethics page on the SAGE Author Gateway.

3.1.1 Plagiarism

Dementia and SAGE take issues of copyright infringement, plagiarism or other breaches of best practice in publication very seriously. We seek to protect the rights of our authors and we always investigate claims of plagiarism or misuse of published articles. Equally, we seek to protect the reputation of the journal against malpractice. Submitted articles may be checked with duplication-checking software. Where an article, for example, is found to have plagiarised other work or included third-party copyright material without permission or with insufficient acknowledgement, or where the authorship of the article is contested, we reserve the right to take action including, but not limited to: publishing an erratum or corrigendum (correction); retracting the article; taking up the matter with the head of department or dean of the author's institution and/or relevant academic bodies or societies; or taking appropriate legal action.

3.1.2 Prior publication

If material has been previously published it is not generally acceptable for publication in a SAGE journal. However, there are certain circumstances where previously published material can be considered for publication. Please refer to the guidance on the SAGE Author Gateway or if in doubt, contact the Editor at the address given below.

3.2 Contributor's publishing agreement

Before publication, SAGE requires the author as the rights holder to sign a Journal Contributor's Publishing Agreement. SAGE's Journal Contributor's Publishing Agreement is an exclusive licence agreement which means that the author retains copyright in the work but grants SAGE the sole and exclusive right and licence to publish for the full legal term of copyright. Exceptions may exist where an assignment of copyright is required or preferred by a proprietor other than SAGE. In this case copyright in the work will be assigned from the author to the society. For more information please visit the SAGE Author Gateway.

3.3 Open access and author archiving

Dementia offers optional open access publishing via the SAGE Choice programme. For more information please visit the SAGE Choice website. For information on funding body compliance, and depositing your article in repositories, please visit SAGE Publishing Policies on our Journal Author Gateway.

4. Preparing your manuscript for submission

4.1 Formatting

The preferred format for your manuscript is Word. LaTeX files are also accepted. Word and (La)Tex templates are available on the Manuscript Submission Guidelines page of our Author Gateway.

Language and terminology. Jargon or unnecessary technical language should be avoided, as should the use of abbreviations (such as coded names for conditions). Please avoid the use of nouns as verbs (e.g. to access), and the use of adjectives as nouns (e.g. demented). Language that might be deemed sexist or racist should not be used.

Abbreviations. As far as possible, please avoid the use of initials, except for terms in common use. Please provide a list, in alphabetical order, of abbreviations used, and spell them out (with the abbreviations in brackets) the first time they are mentioned in the text.

4.2 Artwork, figures and other graphics

For guidance on the preparation of illustrations, pictures and graphs in electronic format, please visit SAGE's Manuscript Submission Guidelines.

Figures supplied in colour will appear in colour online regardless of whether or not these illustrations are reproduced in colour in the printed version. For specifically requested colour reproduction in print, you will receive information regarding the costs from SAGE after receipt of your accepted article.

4.3 Supplementary material

This journal is able to host additional materials online (e.g. datasets, podcasts, videos, images etc) alongside the full-text of the article. For more information please refer to our guidelines on submitting supplementary files.

4.4 Reference style

Dementia adheres to the APA reference style. View the APA guidelines to ensure your manuscript conforms to this reference style.

4.5 English language editing services

Authors seeking assistance with English language editing, translation, or figure and manuscript formatting to fit the journal's specifications should consider using SAGE Language Services. Visit SAGE Language Services on our Journal Author Gateway for further information.

5. Submitting your manuscript

Dementia is hosted on SAGE Track, a web based online submission and peer review system powered by ScholarOne™ Manuscripts. Visit <http://mc.manuscriptcentral.com/dementia> to login and submit your article online.

IMPORTANT: Please check whether you already have an account in the system before trying to create a new one. If you have reviewed or authored for the journal in the past year it is likely that you will have had an account created. For further guidance on submitting your manuscript online please visit ScholarOne Online Help.

Innovative Practice papers must be submitted via the online system. If you would like to discuss your paper prior to submission, please email Jo Moriarty jo.moriarty@kcl.ac.uk.

Books for review should be sent to: Book Review Editor, Dementia, Caroline Swarbrick University of Manchester, UK caroline.swarbrick@manchester.ac.uk

5.1 ORCID

As part of our commitment to ensuring an ethical, transparent and fair peer review process SAGE is a supporting member of ORCID, the Open Researcher and Contributor ID. ORCID provides a persistent digital identifier that distinguishes researchers from every other researcher and, through integration in key research workflows such as manuscript and grant submission, supports automated linkages between researchers and their professional activities ensuring that their work is recognised.

We encourage all authors to add their ORCID IDs to their SAGE Track accounts and include their ORCID IDs as part of the submission process. If you don't already have one you can create one here.

5.2 Information required for completing your submission

You will be asked to provide contact details and academic affiliations for all co-authors via the submission system and identify who is to be the corresponding author. These details must match what appears on your manuscript. At this stage please ensure you have included all the required statements and declarations and uploaded any additional supplementary files (including reporting guidelines where relevant).

5.3 Permissions

Please also ensure that you have obtained any necessary permission from copyright holders for reproducing any illustrations, tables, figures or lengthy quotations previously published elsewhere. For further information including guidance on fair dealing for criticism and review, please see the Copyright and Permissions page on the SAGE Author Gateway.

6. On acceptance and publication

6.1 SAGE Production

Your SAGE Production Editor will keep you informed as to your article's progress throughout the production process. Proofs will be sent by PDF to the corresponding author and should be returned promptly. Authors are reminded to check their proofs carefully to confirm that all author information, including names, affiliations, sequence and contact details are correct, and that Funding and Conflict of Interest statements, if any, are accurate. Please note that if there are any changes to the author list at this stage all authors will be required to complete and sign a form authorising the change.

6.2 Online First publication

Online First allows final articles (completed and approved articles awaiting assignment to a future issue) to be published online prior to their inclusion in a journal issue, which significantly reduces the lead time between submission and publication. Visit the SAGE Journals help page for more details, including how to cite Online First articles.

6.3 Access to your published article

SAGE provides authors with online access to their final article.

6.4 Promoting your article

Publication is not the end of the process! You can help disseminate your paper and ensure it is as widely read and cited as possible. The SAGE Author Gateway has numerous resources to help you promote your work. Visit the Promote Your Article page on the Gateway for tips and advice. In addition, SAGE is partnered with Kudos, a free service that allows authors to explain, enrich, share, and measure the impact of their article. Find out how to maximise your article's impact with Kudos.

7. Further information

Any correspondence, queries or additional requests for information on the manuscript submission process should be sent to the Dementia editorial office as follows: dem.pra@sagepub.com