Reminiscence therapy for dementia: an abridged Cochrane systematic review of the evidence from randomized controlled trials

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Abstract

Introduction: Reminiscence therapy (RT) is a popular psychosocial intervention widely used in dementia care. It involves discussion of past events and experiences, using tangible prompts to evoke memories or stimulate conversation.

Areas covered: The aim of this review is to evaluate the effectiveness of RT for people with dementia. It includes studies from the specialized register of the Cochrane Dementia and Cognitive Improvement Group (ALOIS). Searches yielded 185 records of which 22 (n=1972) were eligible for inclusion. The meta-analysis comprised of data from 16 studies (n=1,749 participants). The review included four large multicentre high-quality studies and several smaller studies of reasonable quality. Outcomes of interest were quality of life, communication, depression, and cognition at post-treatment and later follow-up.

Expert Commentary: RT has the potential to improve psychosocial outcomes for people with dementia. Effects are small and can be inconsistent, varying across intervention modality and setting. Individual approaches were associated with improved cognition and mood. Group approaches were linked to improved communication. The impact on quality of life appeared most promising in care home settings. Diversity in reminiscence approaches makes it difficult to compare them, and the field would benefit from the development, evaluation, use, and sharing of standardized approaches.

Keywords:
Reminiscence therapy, Dementia, Alzheimer's, Psychosocial, life review, non-pharmacological

1. Introduction

Reminiscence therapy (RT) is one of the most popular psychosocial interventions for people living with dementia. Although there are many conceptualizations of RT, it is typically described as the discussion of past activities, events, and experiences, usually

with the aid of tangible prompts from the past such as photographs, music, or familiar objects [1]. Digital RT has also become popular in recent years, taking advantage of multimedia resources, archives, and apps [2].

RT is often traced back to the work of Butler in the 1960s [3], who introduced the concept of life review – the reflection on one's life experiences, and promoting adjustment and integrity. The first identified study of RT for people with dementia was almost 40 years ago [4]. Soon after, it was introduced into dementia care by Norris [5] and implemented widely. RT soon became popular in practice, though research did not progress with the same momentum. However, reminiscence has consistently been found to have positive effects on older people with depressed mood [6, 7] including those living in long-term care environments [8]. Similarly, life review has been found to be helpful in preventing depression and improving quality of life in older adults [9, 10]. From a cognitive standpoint, reminiscence may be valuable for people with dementia as there is an emphasis on long-term memories, which people with dementia (like all older adults) recall more often than recent memories [11]. Similarly, earlier memories often represent well-rehearsed anecdotes, meaning that RT may be a useful tool for communication because the person with dementia can speak confidently about these memories.

Previous reviews of RT for people with dementia have yielded some positive results, though the quality of included studies has been an ongoing concern. In the previous Cochrane Review of this topic, Woods and colleagues [1] identified a positive effect of RT on cognition scores at later follow-up time points, but not post-treatment. Just five studies were included, the authors stressed the need for large, high-quality studies, and the use of detailed intervention protocols to ensure transparency regarding the nature of RT used. Two reviews found that reminiscence benefitted cognitive function and depressed mood, though review authors highlighted the poor quality of included studies and absence of intervention protocols [12, 13]. Testad and colleagues [13] also found that reminiscence was consistently associated with improved mood, but highlighted the variation in intervention length and frequency among the six included studies. In a review of ten studies, Kwon and colleagues [15] found that reminiscence was associated with improved cognitive function and quality of life, though the included studies were not referenced. A review focusing on individual reminiscence found that structured life review resulting in the production of a life storybook had positive

psychosocial outcomes for people with dementia, while less structured simple reminiscence interventions were not as effective [16]. Kim and colleagues [17] focused on group RT and identified a significant benefit to communication and cognition.

Both the volume and quality of reminiscence research has advanced significantly in recent years, particularly with the recent completion of new large, multicentre randomized controlled trials (RCTs; e.g. [18, 19]). Therefore, a new review of RT for dementia is timely and needed.

This review was carried out with the Cochrane Collaboration Cognitive Impairment and Dementia Group [20]. The aim was to review the quality and nature of evidence from studies of RT for dementia, and evaluate its effectiveness in the domains of quality of life, communication, depressed mood, and cognitive function.

2. Methods

2.1. Search Method

A systematic search for RCTs evaluating the effects of RT for people with dementia was carried out. The search term 'reminiscence' was used to search the ALOIS database four times between October 2015 and April 2017. Studies were identified from the following sources:

1.   Major healthcare databases: Medline, Embase, Cinahl, PsycINFO, and Lilacs
2.   Trial registers: ISRCTN; UMIN (Japan's Trial Register); the WHO portal (which covers ClinicalTrials.gov; ISRCTN; the Chinese Clinical Trials Register; the German Clinical Trials Register; the Iranian Registry of Clinical Trials and the Netherlands National Trials Register, plus others)
3.   *The Cochrane Library*'s Central Register of Controlled Trials (CENTRAL)
4.   Grey literature sources: ISI Web of Knowledge Conference Proceedings; Index to Theses; Australasian Digital Theses
5.   Additional resources: The Alzheimer's Society library, published letters in the BPS (British Psychological Society) magazine, personal contact with various specialists in the field.

2.2. Inclusion criteria

2.2.1. Types of studies

RCTs (including cluster randomized trials and crossover trials) with a 'treatment as usual' control group that investigated the effects of RT as an intervention for dementia were considered for this review. Studies needed to be published in a peer-reviewed journal, and be available in English. There were no specific criteria relating to study settings.

2.2.2. Participants

Participants with a diagnosis of dementia (of any type or severity) were included. Those with mild cognitive impairment (MCI) were not included. Family or professional caregivers were included where studies recruited dyads.

2.2.3. Interventions

Interventions needed to meet the definition of RT described in Section 1 [1] and be aimed at people with dementia. The minimum intervention duration was four weeks or six reminiscence sessions. Studies were included if a comparison was made to 'no treatment', 'treatment-as-usual' or passive control conditions such as 'social contact'. Comparisons with other types of activities or therapies were not considered for this review as they could have a positive or negative impact on the outcome, making the specific effect of RT unclear.

2.2.4. Outcome measures

Studies that assessed the effects of a RT intervention on people with dementia were included, provided that standardized assessments, rating scales, or questionnaires were used. Outcomes that were measured at post-treatment (typically immediately after, or within one month of the intervention) and follow-up (typically one month to six months post-intervention) were considered. Outcomes of interest were:

- Quality of life
- Communication and interaction
- Depressed mood
- Cognition

Adverse outcomes were also considered. Possible adverse outcomes were identified through negative responses in the quality of life or mood of participants.

2.3. Data extraction and management

Two reviewers (LOP & EF) worked independently to extract descriptive study characteristics, quality information, and results of the analyses from published reports. Where necessary, additional information was requested from study authors. The mean, standard deviation, and number of participants for each treatment group at each time point were extracted. The required summary statistics from baseline were calculated by hand. A zero correlation between baseline and later assessments was assumed. This is a conservative method which overestimates the standard deviation of the change from baseline but is considered to be preferable in a meta-analysis. Reviewers (LOP & EF) compared and reached consensus on the extracted data and calculated summary statistics. The information was recorded and entered into Review Manager (RevMan) 5.3 software.

The review authors sought to obtain data from intention to treat analyses. Where this was not available, they extracted the data reported on those who completed the trials. In cross-over trials, only data from the first intervention phase were included. Where studies used cluster randomization, this was adjusted for, if the study was of a sufficient size.

Two review authors independently assessed the quality of each study and rated it using the methods and guidelines in the Cochrane Handbook of Systematic Reviews of Interventions [21]. Cluster trials were also assessed for additional biases (see section 3.4.6).

2.4. Data analysis

RevMan 5.3 software (2014) was used. The meta-analyses presented overall estimates of the treatment difference from a fixed-effects model. Heterogeneity was

assessed using a standard Chi-square statistic and an i² statistic. To interpret heterogeneity, review authors followed Cochrane guidance ([21]; i.e. 0% to 40% might not be important; 30% to 60% may represent moderate heterogeneity, 50% to 90% may represent substantial heterogeneity; and 75% to 100% is considerable heterogeneity). Where there were high levels of heterogeneity of the treatment effect between studies, a random-effects model was used. This produces wider confidence intervals than a fixed-effects model. Where pooled trials used the same measure to assess an outcome, the mean difference (MD) was used. Where pooled trials used different measures to assess the same outcome, the standardized mean difference (SMD) was used. Where studies used more than one instrument to measure the same outcome, the analysis was conducted using the most common or comprehensive measure.

3. Results

3.1. Trials

From the initial set of references identified by the updated systematic searches since the previous review [1], 185 additional records were identified across four searches. Records were independently screened by reviewers who then reached a consensus. The original review [1] included five studies. 16 new studies met the review inclusion criteria [18, 19, 22-36]. One recruited participants with Alzheimer's disease (AD) and Vascular Dementia (VD) but analyzed the two participant groups separately with a different control group for each disease type [32, 33]. For the purposes of this review, the review authors considered the report to be two separate studies: Tadaka & Kanagawa [32] including participants with AD, and Tadaka and Kanagawa [33] including participants with VD. Therefore, a total of 22 studies were included in the review (Table 1). Six were excluded from the meta-analyses as they were rated as having an unclear risk of selection bias for randomisation [22, 24, 26, 36, 37, 46]. This process of elimination is depicted in Figure 1. The review authors attempted to contact the authors of the more recently published excluded studies for clarification on randomization methods but did not receive a response.

3.2. Participants, settings, dementia type and severity

Data from 1,972 participants (or dyads) are included in this review. The average participant was over 75 years old. 14 studies recruited participants from residential/hospital care settings, while eight recruited community-dwelling participants (See Table 1). Interventions took place in the care homes where participants resided, or community locations such as day centres.

All studies recruited participants with dementia. Although most did not describe a specific diagnosis type in recruitment, three specifically recruited people with a diagnosis of AD [23, 24, 28] and one specified a diagnosis of VD [27]. Most studies sought to recruit participants in the mild to/or moderate stages of dementia, typically using the CDR, GDS, or MMSE to screen potential participants. In most cases it was not possible to extract data for participants at each individual 'stage' for subgroup analysis.

3.3. Reminiscence Interventions

Most studies implemented simple reminiscence interventions whereby participants took part in discussions about specific themes of the past in small groups [18, 19, 22, 24, 26-33, 35-37, 38]. In one study, care staff were trained to deliver simple reminiscence in small groups following a structured education programme [29]. Five studies implemented the more structured approach of life review [23, 25, 31, 39, 41]. One trial [34] used a standardized reminiscence intervention based on the SolCos model (a transformational reminiscence model [42]), while another implemented a music reminiscence intervention [30]. Three studies implemented joint reminiscence interventions, following the Remembering Yesterday Caring Today (RYCT [44]) program which is a large group based approach, bringing together people with dementia and family caregivers with a focus on active reminiscence [18, 35, 38].

The length of the reminiscence interventions ranged from four weeks (the minimum number for inclusion in the review) to 24 months. Three studies held monthly or six-weekly maintenance sessions after the initial interview [18, 19, 35]. The total median possible reminiscence exposure time was 11.5 hours (3-39 hours), while the median

individual session length was approximately 53 minutes (30 minutes-2 hours). The session lengths of two studies were unclear [29, 38].

3.4. Quality of Studies

Studies were rated as having a low risk (+), unclear risk (?), or high risk (-) of bias in each quality domain. Ratings are reported in Table 1.

3.4.1. Randomisation (selection bias)

All studies randomized participants to treatment or control groups. This was a criterion for inclusion in the review. Many used computerized randomization, though some used more basic methods, such as sealed envelopes. Three studies used cluster randomization [24, 28, 29], and three used an accredited trials unit [18, 31, 35]. As mentioned previously (section 3.1), six studies did not detail the method of randomization and were excluded from the meta-analyses.

3.4.2. Allocation concealment (selection bias)

Allocation concealment details were rarely reported in detail, even when further information was requested. Replies generally stated that there had been adequate allocation concealment, and in these cases, good practice has been assumed. Low-risk methods included the use of independent researchers, remote services, and sealed envelopes.

3.4.3. Blinding procedure

As with most psychosocial interventions, participants cannot be blinded to the experience of taking part in an intervention (or not taking part in the case of control groups) making performance bias challenging to evaluate.

The majority of studies used independent researchers who were blinded to group allocation to complete the outcome assessments. Proxy-rated measures were typically completed by a person who knew the participant and could reliably comment.

Contamination was a risk in care-home based studies in which control and intervention participants resided and socialized together. Two studies seemed to have at least one person who worked in the care home implement the intervention, meaning

that themes of reminiscence could have possibly been carried over into daily care and contaminate control conditions [25, 40]. However, close adherence to the study protocol would have minimized this risk.

3.4.4. Incomplete outcome data (attrition bias).

Five small studies reported zero attrition [22, 25, 37, 38, 41]. The highest attrition rate was 28% (23% from the intervention group and 34% from the control group) which was reported by one of the larger community-based studies [35]. Data extracted from several studies were from intention to treat analyses [18, 19, 23, 28, 29, 35, 39], while others carried out the analyses without data drop outs [26, 30-34, 36]. One study reported results from both a per protocol and ITT analysis, but only data from the per-protocol analysis was extractable [27]. In an older study, one participant dropped out and the authors randomly excluded one participant from each of the two other groups [40]. The most common reported reasons for attrition were the health of the person with dementia, death, the health of the caregiver, and the person with dementia moving into residential care. One trial did not report attrition rates [24].

3.4.5. Selective reporting

There was no evidence of selective reporting in any of the included studies. Studies that had a protocol [18, 29, 34, 35] detailed the same outcome measures in the protocol as the published papers, while other studies reported results on all outcome measures detailed in the methods section.

3.4.6. Other bias

Cluster trials were also assessed for other biases associated with clustering such as recruitment bias, baseline imbalance, loss of clusters, and comparability with individually randomized trials.

3.4.7. Facilitator training and supervision

O' Shea and colleagues [29] provided the most training to reminiscence facilitators. They ran a structured education-based reminiscence program in which care home staff received three days of training. This was augmented by telephone support and site

visits. Five studies did not report details on facilitator training or reminiscence experience [22, 24, 26, 27, 40]. Others did not specify the number of training hours but reported that the intervention was delivered by appropriate facilitators, such as psychologists or gerontologists [28, 30-33, 41]. The remainder provided between 4 hours and one day of training to facilitators.

3.4.8. Treatment Protocol.

The use of a protocol or structure in RT interventions is vital to ensure that the intervention is delivered as intended, and reflects true RT. All studies reported using a protocol or structure, though the level of detail varied considerably. Some studies outlined session structures while others used standardized reminiscence interventions, the most popular of which were Haight's Life Review Model and Life Review Experiencing Form [25, 31, 41, 43] and the RYCT program [18, 35, 38, 44].

3.5. Meta-analysis

3.5.1. Self-reported quality of life - overall

(See Fig. 2). For the overall evaluation of the effects of reminiscence on quality of life post-treatment, eight studies (1,060 participants) were included in the meta-analysis. No significant differences between reminiscence and control groups were observed at post-treatment (random effects, SMD 0.11, 95% CI -0.12 to 0.33; Z = 0.95, P = 0.34).

Five studies, with 874 participants, also measured at follow-up [18, 19, 23, 30, 35]. All five implemented group reminiscence interventions. Again, the SMD was not statistically significant (random effects, SMD 0.35, 95% CI -0.11 to 0.80; Z = 1.50, P = 0.13).

3.5.1.1. Self-reported quality of life - modality

One small study of 23 participants measured self-reported quality of life at post-treatment following an individual life review intervention, involving life story work [31]. Results indicated that life story work had a significant positive effect on self-reported quality of life (MD 7.0 points, 95% CI -0.14 to 14.13, Z = 1.92, P = 0.05.

Seven studies implemented group interventions, of which six used the QoL-AD [18, 19, 23, 29, 30, 35, 38]. The analysis included 1,037 participants in total, and no significant effect was identified (SMD 0.06, 95% CI -0.15 to 0.28, Z = 0.59, P = 0.55). The

findings for group reminiscence at follow-up time points have been detailed above (Section 3.5.2).

3.5.1.2. Self-reported quality of life - setting

Three care home studies were included in the meta-analysis (See Fig. 2). A fixed effects analysis of data from 193 participants showed a statistically significant SMD of 0.46 (95% CI 0.18 to 0.75, Z = 3.17, P= 0.002) in favor of reminiscence interventions. At follow-up, one care-home study with 88 participants [23] reported significant effect on the SRQOL (MD 9.8 points, 95% CI 7.05 to 12.55, Z = 6.98, P < 0.00001).

Five studies were community-based and included a total of 867 participants (See Fig. 2). All five used the QoL-AD scale, and the mean difference between reminiscence and control groups was not statistically significant (fixed effects, MD = -0.57 points, 95% CI -1.37 to 0.22; Z = 1.41, P = 0.16). In contrast, the mean difference across the two care home studies [29, 31] that used the QoL-AD was significant, and much larger at 3.58 points (n = 105; 95% CI 0.66 to 6.51, Z = 2.40, P = 0.02). Four studies [18, 19, 30, 35] measured the effects of reminiscence on the quality of life of 786 community-dwelling participants at follow up. The mean difference (QoL-AD, fixed effects) was 0.17 points (95% CI -0.79 to 1.13), which was not statistically significant (Z = 0.35, P = 0.73).

3.5.2. Proxy rated quality of life

Five studies with 763 participants used the proxy version of the QoL-AD, in which a family carer or care staff member rated the person's quality of life [18, 29, 30, 35, 38]. All five implemented group reminiscence interventions. A random-effects model revealed a MD of 0.35 points (95% CI -1.23 to 1.94) which was not statistically significant (Z = 0.44, P = 0.66). Three also measured at follow-up time points [18, 30, 35] and again, no significant difference was identified (MD -0.15 points; 95% CI -1.14 to 0.83, Z = 0.30, P= 0.76).

3.5.3. Observed quality of life

Two studies used the WIB, which is an observational measure of quality of life [23, 39]. It is completed during a minimum of six hours observation of the person undertaking their usual activities. There was no indication of an effect on WIB scores at post-treatment across 154 care home residents (MD 0.00 points, 95% CI -0.17 to 0.18, Z

= 0.06, P = 0.95) or at follow-up (random effects, MD -0.40 points, 95% CI -1.34 to 0.54, Z= 0.83, P = 0.41).

3.5.4. Communication and interaction - overall

(See Fig. 3). Six studies using an assortment of communication and interaction measures were included in the post-treatment analysis (in this analysis, negative scores indicate *improved* communication). Data from 249 participants were included. A statistically significant difference favouring reminiscence was identified at post-treatment (SMD = -0.51, 95% CI -0.97 to -0.05; Z = 2.18, P = 0.03).

At follow up, four studies including 204 participants reported communication outcome data [23; 32, 33, 39]. Again, a significant effect favouring reminiscence was identified (SMD = -0.49, 95% CI -0.77 to -0.21; Z = 3.40, P = 0.0007).

3.5.4.1. Communication and interaction - modality

Two studies of individual reminiscence reported post-treatment data on communication and interaction, including 96 participants [25, 39]. The overall effect size (SMD, random effects) was -0.74 (95% CI -2.38 to 0.89) which was not statistically significant (Z=0.89, P = 0.37). In contrast, the post-treatment analysis of four studies of group reminiscence, including 153 participants [23, 32, 33, 38], did indicate a statistically significant benefit of reminiscence in relation to communication and interaction (SMD = -0.39, 95% CI -0.71 to -0.06; Z = 2.34, P = 0.02).

Longer-term follow-up data were available from one study of individual reminiscence, with no evidence of an effect [39]. Data from three studies (N = 138) of group reminiscence were available [23, 32, 33]. Similar to post-treatment, a significant benefit was identified (SMD -0.63 points, 95% CI -0.97 to -0.29; Z=3.60, p= 0.0003).

3.5.4.2. Communication and interaction - setting

Three studies that measured communication were community-based and involved participants. A significant effect on communication and interaction was identified (SMD -0.57, 95% CI -1.08 to -0.06; Z = 2.21, P = 0.03). Two studies, including 50 participants, also reported communication and interaction outcomes at follow up [32, 33]. Both used the withdrawal subscale of the MOSES. The mean difference was -3.64 points (95% CI -7.21 to -0.06), which was statistically significant (Z = 2.00, P = 0.05).

Three studies took place in care homes, with 184 participants (See Fig. 3). Here, no significant effect was identified (random effects, SMD -0.52, 95% CI -1.29 to 0.24; Z = 1.34, P = 0.18). Two care home studies [23, 39], both using the SES, also reported data from 154 participants at follow up and found a statistically significant MD of -0.93 points (random effects, 95% CI -1.77 to -0.09; Z = 2.16, P = 0.03).

3.5.5. Depressed mood - overall

(See Fig. 4)**.** In mood analyses, negative scores were indicative of improvements in mood. Ten studies, including 973 participants, included a measure of depressed mood in post-treatment evaluation. A non-significant SMD favouring reminiscence interventions was identified (SMD -0.03, 95% CI -0.15 to 0.10; Z = 0.40, P = 0.69). At follow-up, data from 747 participants across six studies were included. Again, the SMD was not statistically significant (random effects, SMD -0.16, 95% CI -0.43 to 0.11; Z = 1.15, P = 0.25).

3.5.5.1 Depressed mood - modality

Four studies, involving 131 participants, used an individual reminiscence approach [25, 31, 34, 41]. The effect on depressed mood was statistically significant in favour of reminiscence (SMD -0.41, 95% CI -0.76 to -0.06, Z = 2.32, P = 0.02). On the other hand, a significant difference was not identified in the analysis of the six studies (N=842) that used a group approach (SMD 0.03, 95% CI -0.10 to 0.17, Z = 0.49, P = 0.63).

One small study of individual reminiscence measured depression at follow-up using the GDS-SF [41], and reported a significant benefit of reminiscence (MD = -3.70, 95% CI -5.74 to -1.66, Z = 3.56, P = 0.0004). Five studies of group reminiscence reported measures of depressed mood at follow-up, though all were community-based meaning that the results were confounded with the intervention setting. The SMD was -0.04 (95% CI -0.19 to 0.11) which was not statistically significant (Z = 0.52, P= 0.60).

3.5.5.2. Depressed mood - setting

No effect was identified in the five care-home based studies at post-treatment (See Fig. 4; SMD -0.19, 95% CI -0.48 to 0.10; Z = 1.32, P = 0.19). The five community-based studies (See Fig. 4, N=786) all involved group interventions and also showed no effect on depressed mood (SMD 0.01, 95% CI -0.13 to 0.16, Z = 0.20, P= 0.84). The results for

longer-term follow-up were discussed in section 3.5.6.1 above, as all group studies were based in the community, the single care home study also provided follow-up data.

3.5.6. Cognition - overall

(See Fig. *5*). Where studies used more than one measure of cognition, the analysis was conducted with the most common or extensive assessment. For the AMI and AMI (E) this was the PSS sub-scale. Data from 14 studies involving 1,219 participants were analyzed. The difference in improvement scores between reminiscence and control groups was just statistically significant, in favour of reminiscence (SMD = 0.11, 95% CI 0.00 to 0.23; Z = 1.97; P = 0.05).

The MMSE was the most widely used cognitive measure, employed in nine studies (n = 437). A fixed effects analysis of data taken from this measure yielded a statistically significant MD of 1.87 points (95% CI 0.54 to 3.20; Z = 2.76, P = 0.006). On the other hand, a significant effect of reminiscence was not identified on either sub-scale of the AMI and extended AMI (E), which were used by four studies (n = 456).

Nine studies reported follow-up data from a total of 983 participants. Neither the overall effect size (SMD = 0.04, 95% CI -0.09 to 0.17; Z = 0.61, P = 0.54) nor the differences on individual measures were significant when assessed individually. The MD on the MMSE at follow-up was 1.8 points (95% CI -0.06 to 3.65) which was not statistically significant, though it was close (Z = 1.90, P = 0.06).

3.5.6.1. Cognition - modality

Individual reminiscence interventions were implemented by five studies [25, 31, 34, 39, 41]. Data from 196 participants revealed a significant effect size in favour of reminiscence (SMD = 0.32, 95% CI 0.04 to 0.61; Z = 2.22, P= 0.03).

In contrast, a significant effect was not identified across the nine studies of group reminiscence, involving 1023 participants (SMD 0.07, 95% CI -0.05 to 0.20; Z = 1.17, P = 0.24). However, MMSE data for 281 participants was reported by six studies of group reminiscence at post-treatment. When data from this measure was considered independently, a statistically significant effect in favor of group reminiscence was identified (MD 1.81 points, 95% CI 0.17 to 3.46; Z = 2.16, P = 0.03).

At follow-up, a significant effect was not found in analyses of either modality.

3.5.6.2. Cognition - setting

Six studies, involving 230 participants, were based in care homes (See Fig. 5). A significant effect in favour of reminiscence was identified (SMD 0.29, 95% CI 0.03 to 0.56; Z = 2.19, P = 0.03). Eight studies (n = 989) were carried out in community settings. The benefit to cognitive function in this context was not statistically significant (SMD 0.07, 95% CI -0.05 to 0.20, Z = 1.13, P = 0.26). At follow-up, no significant effects were identified in care home (2 studies, 83 participants) or community settings (7 studies, 900 participants).

3.5.7. Adverse outcomes.

While no adverse events were observed on the outcome measures of interest, two studies reported incidences of adverse outcomes. Charlesworth and colleagues [18] reported three 'serious adverse events' that were attributable to the RYCT intervention. Specific details were not given, though it was reported that these events did not lead to withdrawal from the trial. Woods and colleagues [35] reported one adverse event, in which a participant became upset in one of the intervention sessions relating to marriage. There was a detailed protocol in place for dealing with distressing events, which was implemented. While adverse events are regrettable, it is important to view them in context of the total number of participants and intervention sessions.

4. Discussion

This is the largest review of RT for people with dementia to date, including 22 RCTs and more than 1,900 participants. The results of the meta-analyses, which included 16 studies and data from 1,749 participants, provide the strongest evidence thus far that RT can potentially benefit people with dementia in the domains of quality of life, communication, mood, and cognition. However, these effects are relatively small and inconsistent across reminiscence modalities (group/individual) and settings (care home/community).

Included studies cover various reminiscence activities including simple reminiscence, life review, joint reminiscence work, and music listening reminiscence. However, the variation between interventions was so great that even interventions that are labelled the same (e.g. simple reminiscence) were often implemented in

significantly different ways. Therefore, it was not possible to run sub-group analyses of intervention type. Reporting of reminiscence protocols is becoming more commonplace, but detailed manuals and standardised practices need to be developed in order to reliably compare specific intervention types. Similarly, it was not possible to compare the effects of reminiscence across 'stages' of dementia as studies typically recruited participants with mild to moderate dementia but did not report separate data for each group. Intervention intensities and durations also varied widely across included studies. In addition to treatment-as-usual groups, some studies also compared reminiscence to alternative activities or measured additional outcomes but these were beyond the scope of the current review. Despite growing interest in digital reminiscence, no studies of this type of RT met the inclusion criteria.

The quality and volume of studies have improved since earlier reviews of RT for dementia. Four large multi-center trials are included, in addition to some smaller studies of reasonable quality. The volume of data made it possible to exclude studies at an unclear risk of randomization bias from the meta-analysis, without undermining it. Furthermore, there were sufficient data to carry out subgroup analyses of intervention modalities and settings for the first time. Although most included studies reported using an intervention protocol or structure, several did not report these in sufficient detail. In several cases, additional study information had to be requested as published reports did not include enough detail, particularly in relation to randomization and allocation concealment. Almost 40% of included studies did not report adequate detail regarding allocation concealment. Studies were not excluded from the meta-analysis on this basis as good practice was assumed, which is a limitation of this review.

RT was associated with significantly improved self-reported quality of life, compared to control groups at both post-treatment and follow-up, but only in care home settings. One study of individual reminiscence reported a significant benefit of RT on self-reported quality of life at post-treatment [31]. However, no significant effect was identified in studies of group reminiscence, or community-based studies. No significant benefit was identified on observed, or proxy-rated quality of life.

There was a significant improvement in communication scores of reminiscence groups compared to control groups at both post-treatment and follow-up. However, in sub-group analyses of intervention modality, a benefit was only identified in group

approaches. In the subgroup analysis of setting, there was a significant benefit to communication in community settings at post-treatment, and in both community and care home settings at follow-up.

There was no benefit of reminiscence to depressed mood overall. However, in subgroup analyses, individual reminiscence was associated with improvements in depressed mood at both post-treatment and follow-up. Though it should be noted that just one small study measured depressed mood at follow-up [41]. No significant effects were observed in subgroup analyses of group reminiscence, community-based reminiscence, or care home based reminiscence. There was no significant benefit of reminiscence to anxiety.

In relation to cognitive outcomes, those who received RT exhibited greater improvements than controls at post-treatment. However, in subgroup analyses, a significant effect was identified only when the intervention was individual or based in a care home. At follow-up, no significant effects were identified across any of the subgroup analyses. When MMSE scores are considered independently, results of this review (nine studies, N = 437, MD = 1.87; 95% CI 0.54 to 3.20) bear similarity to the Cochrane Review of Cognitive Stimulation for dementia ([46]; N = 600, MD = 1.74 points; 95% CI 1.13 to 2.36). However, when the overall effect is considered, results of cognitive stimulation (14 studies, N= 658, SMD =0.41, 95% CI 0.25 to 0.57) appear more positive than those of the current review (14 studies, N = 1229, SMD = 0.11, 95% CI 0.00 to 0.23).

Results of the current review are in line with previous reviews of RT for dementia. Improvements in cognition and mood reflected have often been cited [1, 12-16]. Similarly, individual reminiscence and RT interventions based in care homes have previously been associated with improved quality of life [16]. Communication has been measured less often in previous reviews, but a significant benefit of group reminiscence to communication seen in the current review has been identified previously [17]. The results of the current study suggest that it is now an important outcome of RT to consider, particularly in group-based RT.

5. Expert Commentary

RT can now be viewed as an eco-psychosocial intervention, with a credible evidence base. There is positive and promising evidence that it can improve quality of life,

communication, depressed mood, and cognition among people with dementia, though effects are small and vary considerably across intervention modalities, settings, and outcomes. It remains unclear which modality of reminiscence is superior as individual reminiscence may benefit cognition and mood, while group reminiscence may have positive outcomes in relation to communication.

Care home settings appear to show the widest range of benefits, and effects on quality of life appear greatest here. Overall, it is unclear which modality of reminiscence is most effective in community settings, but in care home settings individual reminiscence seems most powerful. Perhaps people in care homes are more receptive to positive effects of reminiscence because the person has moved from their home, relinquished their belongings (and memory triggers), and transitioned to communal living, making identity maintenance a particular issue. This may be particularly true when the reminiscence intervention is accompanied by a life storybook. A possible alternative explanation is that care home residents typically find themselves in less stimulating and active environments than their community-dwelling counterparts (or at least those who take part in research studies). Perhaps in care home environments, looking back is more relied upon for stimulation, while those in the community may be surrounded by more current and future activities.

Group-based reminiscence approaches were associated with positive outcomes for communication, possibly due to the nature of social groups. People can use reminiscence to find common ground, and may become more comfortable and confident communicating with one another over the course of the intervention. On the other hand, individual reminiscence appeared to have a positive effect on mood and cognition, which was not identified in data from group interventions. Almost 30 years ago, Haight and Dias [47] examined the key variables in reminiscing and concluded that structured, evaluative Life Review was the most therapeutic reminiscence method. In the current review, individual reminiscence interventions were generally based around Life Review, while group interventions were typically the less structured 'simple reminiscence' which may be a possible explanation for these results. However, the wide range of reminiscence interventions across included studies makes it difficult to compare and contrast results. Studies that implemented individual reminiscence interventions were typically small and took place in care homes, while group interventions were generally much larger and mostly took place in community settings.

Therefore, it is difficult to be certain of what underpins any differences in outcomes between individual and group interventions.

The meta-analyses were heavily influenced by three large community-based studies that implemented group approaches, all of which found no positive effects of reminiscence [18, 19, 35]. Furthermore, these RCTs had high rates of attrition, and data were extracted from ITT analyses (as per the review protocol) making it likely that the intervention effects were underestimated. Similarly, it was not possible to distinguish between simple and integrative RT approaches, or between varying lengths of exposure to RT in the analyses. While the results of this review indicate the potential for reminiscence to improve psychosocial outcomes for people with dementia, it is difficult to translate what these significant differences actually mean in terms of real-life benefit to people with dementia. For the majority of measures, there are currently no international agreed-upon benchmarks to apply in this situation. The benefits observed on the MMSE may however be viewed as approximating to preventing 6 months of cognitive decline [48].

Although no studies of digital reminiscence met the inclusion criteria for the current review, this is an exciting avenue of RT which is growing in popularity. Using multimedia materials may have the ability to make reminiscence and life story work more powerful experiences with potentially greater effects. A recently published protocol outlines a planned RCT of a structured individual life story work intervention, involving digital life storybooks for community-dwelling people with dementia and their caregivers, which should provide a very helpful contribution to the literature [49].

In future research, a large-scale RCT of individual integrative reminiscence work would be helpful to ascertain if the promising results in the current review can be replicated on a larger scale. Efforts should be made to learn more about the characteristics of participants that are associated with better outcomes and levels of engagement, so that interventions can be tailored and targeted effectively and efficiently. The development, reporting, and use of more detailed standardized manuals and protocols is crucial in progressing the field, so that common approaches can be shared and developed.

6. Five-year view

In five years time, we anticipate that reminiscence will be largely augmented by digital multimedia materials. Growing availability and accessibility of ICT, particularly touchscreen devices, will make it possible for individuals and care homes to 'carry' life story books or personalized reminiscence stimuli with them should they move to a care home or need to spend time in acute care settings. Care staff will be able to use this readily accessible wealth of information to devise and implement plans for person-centred care without delay. Currently, the literature on digital reminiscence is developing, but we anticipate it will progressed well over the next five years, beginning with Elfrink and colleagues' RCT mentioned above [49].

Key issues

- Reminiscence Therapy is a popular psychosocial intervention for people with dementia, in which a range of prompts are used to stimulate past memories.

- 22 studies (n=1972) are included in the current review, with 16 (n=1,749) included in the meta-analysis

- Included studies cover various reminiscence activities including simple reminiscence, life review, joint reminiscence work, and music listening reminiscence. Intervention intensities and durations varied widely across included studies

- RT had small but significant, positive effects on quality of life, mood, cognition, and communication, but effects were inconsistent across intervention modality (group/individual) and setting (care home/community).

- It remains unclear which modality of reminiscence is superior as individual reminiscence may benefit cognition and mood, while group reminiscence may have positive outcomes in relation to communication. Effects on quality of life appear greatest in care home settings.

- Diversity in reminiscence approaches makes it difficult compare them, and the development, evaluation, use, and sharing of standardized approaches would help to progress research and practice in this area.

Disclosure statement
There are no conflicts of interest to disclose

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Papers of special interest have been highlighted as

* of interest

** of considerable interest

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A protocol of a large RCT investigating a digital life story work intervention in community-settings.

Table 1. Description of included studies and bias ratings

Study ID	Participants	Intervention	Duration/Frequency	Randomisation	Allocation concealme	Blinding	Attrition bias	Selective reporting	Other bias	Training & supervisio	Interventio n protocol
Akanuma et al. 2011	24 care home residents with VD	Group RT	1hr/week for 12weeks	?	?	+	+	+	n/a	?	+
Amieva et al. 2016	326 community residents with AD*	Joint Group RT	90min/week for 12weeks + maintenance 90min/6 weeks for 21 months.	+	+	+	?	+	n/a	+	+
Azcurra 2012	90 care home residents with AD*	Individual life review	60mins twice/week for 12weeks	+	+	+	+	+	n/a	+	+
Baines et al. 1987	10 care home residents with mod-severe cognitive impairment*	Group RT	30 mins, 5 times/week for 4weeks	?	?	+	+	+	n/a	+	+
Charlesworth et al. 2016	144 community residents with a dementia diagnosis*	Joint Group RT (RYCT program)	2hrs/week for 12weeks + maintenance 2hrs/month for 7 months.	+	+	+	+	+	n/a	+	+
Goldwasser et al. 1987	20 care home residents with a dementia diagnosis*	Group RT	30 mins, twice/week for 5weeks.	?	?	?	?	+	n/a	?	+
Gonzalez et al. 2015	42 care home residents with AD	Integrative Group RT	60 mins/week for 10weeks.	?	?	?	+	+	?	?	+

Study ID	Participants	Intervention	Duration/Frequency	Randomisation	Allocation concealment	Blinding	Attrition bias	Selective reporting	Other bias	Training & supervision	Intervention protocol
Haight et al. 2006	30 care home residents with a dementia diagnosis	Individual life review with the production of a life storybook	60mins/week for 6weeks	+	?	?	+	+	n/a	+	+
Hsieh et al. 2010	61 care home residents with a dementia diagnosis	Group RT	40-50mins once/week for 12 weeks	?	?	?	?	+	n/a	?	+
Ito et al. 2007	40 care home residents with VD*	Group RT	60mins/week for 12 weeks.	+	+	+	+	+	n/a	?	+
Lai et al. 2004	66 care home residents with a dementia diagnosis*	Individual life review with the production of a life story book	30 mins/week for 6weeks	+	?	+	+	+	n/a	+	+
Melendez et al. 2015	30 community residents with AD	Group RT	30 mins, twice/week for 10weeks	+	+	+	+	+	?	+	+
Morgan & Woods 2012	17 care home residents with a dementia diagnosis	Individual life review (Haight's life review Model).	30-60mins/week for 12weeks	+	?	?	+	+	n/a	+	+
O' Shea et al. 2014	304 care home residents with a dementia diagnosis	Group RT	Duration unspecified. 3-4times/week for 14weeks (range 12 – 17 weeks)	+	+	+	+	+	+	+	+
Subramaniam et al. 2013	24 care home residents with a dementia diagnosis	Individual life review with production of Life Storybook	1hour/week for average of 12weeks.	+	+	+	+	+	n/a	+	+

Study ID	Participants	Intervention	Duration/Frequency	Randomisation	Allocation concealment	Blinding	Attrition bias	Selective reporting	Other bias	Training & supervision	Intervention protocol
Särkamo et al. 2013	59 community residents with a dementia diagnosis (and a caregiver)	Music listening group reminiscence	90min/week for 10weeks	+	+	+	?	+	n/a	+	+
Tadaka & Kanagawa 2007a	24 community residents with AD	Group RT	90min/week for 8weeks	+	+	?	+	+	n/a	+	+
Tadaka & Kanagawa 2007b	36 community residents with VD	Group RT	90min/week for 8weeks	+	+	?	+	+	n/a	+	+
Thorgrimsen et al. 2002	11 community residents with a dementia diagnosis (and a caregiver)	Group RT (RYCT)	Duration unspecified. Once/week for 18weeks	+	+	+	+	+	n/a	+	+
Van Bogaert et al. 2016	72 care home residents with a dementia diagnosis	Individual RT (SolCos model)	45mins, twice/week for 8weeks.	+	+	+	+	+	n/a	+	+
Woods et al. 2012b	488 community residents with a dementia diagnosis (and their caregivers)	Joint Group RT (RYCT)	2hrs/week for 12 weeks + maintenance 2hrs/month for 7months	+	+	+	+	+	n/a	+	+
Yamagami et al. 2012	54 care home residents with a dementia diagnosis.	Group RT	60mins, twice/week for 12weeks	?	?	?	+	+	n/a	+	+

* The number of participants in groups relevant to the current review, rather than the total number of participants in the study