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ORIGINAL ARTICLE

A reminiscence program intervention to improve the quality of life of long-term care residents with Alzheimer's disease. A randomized controlled trial

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DESCRIPTORS:
Dementia;
Reminiscence;
Life-Story Book;
Randomized Controlled Trial;
Nursing Home Care.

Abstract
Objective: A single-blinded, parallel-groups (intervention, active and passive control groups) randomized controlled trial (RCT) was chosen to investigate whether a specific reminiscence program is associated with higher levels of quality of life in nursing home residents with dementia. *Methods*: The intervention used a life-story approach, while the control groups participated in casual discussions. The Social Engagement Scale (SES) and Self Reported Quality of Life Scale (SRQoL) were used as the outcome measures, which were examined at baseline (T0), 12 weeks (T1), and six months (T2) after the intervention. The final sample had 135 subjects (active control group = 45; passive control group = 45; intervention group = 45). *Results*: The Wilcoxon test showed significant differences in the intervention group between T_2 and T_0, and between T_1 and T_0 in the SES, and there were significant differences between T_0 and T_1 (intervention effect size = 0.267) and T_1 and T_2 (intervention effect size = 0.450) in the SRQoL. The univariate logistic regression scores showed that predictors of change in the SRQoL were associated with fewer baseline anxiety symptoms and lower depression scores. *Conclusions*: The intervention led to significant differences between the three groups over time, showing a significant improvement in the quality of life and engagement of the residents in the intervention group.

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DESCRITORES:
Demência;
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Ensaio controlado randomizado;
Cuidados prolongados.

Intervenção com um programa de reminiscência para melhorar qualidade de vida de residentes com Alzheimer com cuidados prolongados. Ensaio controlado randomizado

Resumo
Objetivo: Elegeu-se um ensaio randomizado controlado simples cego, com grupos paralelos (intervenção, comparação e controle) para pesquisar se um programa específico de reminiscência associa-se com maiores níveis de qualidade de vida em residentes com demência com cuidados prolongados. *Método*: No grupo de intervenção usou-se o enfoque da história de vida, enquanto o grupo controle recebeu conversas amistosas. A Escala de Compromisso Social (SES) e a escala auto-referida de qualidade de vida (SRQoL) foram as medidas de resultados, examinados na linha de base, doze semanas, e seis meses após a intervenção. A mostra final teve 135 sujeitos (controle *n = 45*; comparação *n = 45*; intervenção *n = 45*). *Resultados*: Wilcoxon test no grupo intervencional comparando os resultados entre T_1 e T_0, T_2 e T_1, e T_2 e T_0 mostraram diferenças significativas entre T_2 e T_0 (tamanho do efeito de intervenção = 0,460) e T_1 e T_0 (tamanho do efeito de intervenção = 0,486) em o SES; e entre T_0 e T_1 (tamanho do efeito de intervenção = 0,267) e T_1 e T_2 (tamanho do efeito de intervenção = 0,450) em o SRQoL no grupo de intervenção. As pontuações de regressão logística univariada mostraram que os predictores de mudança estavam associados com menores níveis de ansiedade basal e menores níveis de depresión. *Conclusões*: A intervenção produziu diferenças significativas entre os três grupos ao longo do tempo, mostrando uma melhoria significativa na qualidade de vida e compromisso dos residentes no grupo de intervenção.

Introduction

Among the several psychosocial treatments developed for people with Alzheimer's disease (AD), one of the most cited and conspicuous is reminiscence therapy.[1] However, results are inconclusive regarding its effectiveness, alternatively favoring behavior improvement over cognition,[2] increased occupation,[3] maintaining relationships,[4] or cognition improvement as a mediator of enhanced mood.[5] In a recent Cochrane review of reminiscence therapy, the authors found that most studies were small, had low quality, or examined different types of reminiscence work with confounding and statistically non-significant results. In view of this situation, authors have highlighted the urgent need for more and better designed trials to draw more robust conclusions.[6] In a more recent Cochrane meta-analysis review,[7] four controlled trials were found to be suitable for analysis, examining different types of reminiscence work. Taken together, this review noted that caregivers reported less strain, patients with dementia showed improved functional ability to a limited extent, and no harmful events were identified. However, limitations of these studies partly compromised the reliability of the results, prompting an urgent need for higher quality research in the field. Another review of five randomized individual reminiscence therapy programs for inpatients with dementia[8] reported improved mood, well-being and cognitive function after 4 to 6 weeks, but no psychosocial benefits were observed. In a meta-analysis of the integrated results from six randomized trials of reminiscence therapy,[9] no differences in the therapeutic or preventive effects were observed compared to other frequently used interventions. In another meta-analysis on prevention in thirty prospective controlled trials, reminiscence interventions had no effect on depressive symptoms, warranting further trials.[10] In a meta-analysis assessing the effects of reminiscence therapy on the well-being of demented patients, the effects were small (d = 0.54) based on 15 studies.[11] Investigations using more rigorous procedures are needed to determine the benefits of reminiscence programs before definite conclusions can be drawn. In view of the lack of efficacy of pharmacological treatments for dementia, non-pharmacological attempts should be investigated.[12] The potential limitations of the studies that have failed to reveal a beneficial effect of treatments for AD residents need to be addressed, including the limited number of randomized controlled trials (RCT), the small size of the samples, the variable degree of precision of the interventions and the heterogeneous composition of the groups.[13,14] Reminiscence is defined as the process of thinking or telling someone about past experiences that are personally significant. Another definition states that Reminiscence Therapy involves the discussion of past activities, events and experiences, with another person or group of people. This is often assisted by aids such as videos, pictures, archives and life story books. Based on the suggestion of Erikson and Butler that reviewing one's life is a central task of old age, reminiscence has increasingly been used in older adults as a therapeutic mode for promoting self-acceptance and psychological health. Simple reminiscence, life review and life-review therapy are distinguished based on the idea that simple reminiscence is a form of unstructured autobiographical storytelling used to communicate with others, remembering past events and enhancing positive feelings, while life review is more structured, covering the complete life span and applying therapeutic approaches as a stand-alone proposal or as part of another therapeutic framework such as cognitive therapy, problem-solving therapy or narrative therapy.[15] In the present study, a randomized, controlled trial was designed to assess whether a systematic reminiscence program is consistently

associated with a positive change in the quality of life of long-term care residents with Alzheimer's disease. We used an appropriate method of randomization with adequate concealment of the participant allocation to treatment groups, which were comparable at baseline and followed up for an equal length of time. The outcome was precisely defined, and the investigators remained 'blind' to the participants' exposure to the intervention and to other confounding and prognostic factors. The theoretical framework of the use of reminiscence therapy with Alzheimer's disease aligns with person-centered principles incorporating the subjective viewpoint of the person with dementia, thereby promoting a collaborative and inclusive approach to the treatment of these patients.[16] Reminiscence therapy for people with dementia has a long history of engendering increased communication and well-being between patients and caregivers.[17] It relies on the fact that early, remote memories are often well preserved, even in mild dementia, so recalling them during joined activities enhances the preserved skills of the patient, rather than the impaired ones. The present study offers good homogeneity of the samples and recruitment facilities, both active and passive control groups and a follow-up period sufficiently long to validate the initial results and outcome measures reflecting the changes in the emotional as well as the social realms. Moreover, this research on the efficacy of reminiscence therapy to improve the quality of life of demented patients would also contribute to reducing the caregiver and health services burden.[18]

Subjects

A total of 135 residents were recruited from two privately funded long-term nursing homes, which shared equal structural and functional characteristics. The subjects were randomly assigned to one of the three groups (intervention, active control and passive control). The subjects admitted for the study were diagnosed as having Alzheimer's disease according to the DSM-IV.[19] They were able to communicate with a Holden Communication Scale score > 25[20] and had a Folstein Minimental Exam score[21] above 10. The exclusion criteria were active major psychiatric disorders (schizophrenia, major affective disorders); acute or unstable chronic medical conditions, including cardiac or lung diseases; and blindness and deafness, even with hearing aids, as assessed using the RAI blindness and deafness scales.[22] Demographic data regarding the participants are presented in Table 1.

Table 1 Demographic characteristics of the total sample of residents

Characteristics	Intervention group (N = 44)	Active control group (N = 44)	Passive control group (N = 44)	F	p
Age (years) (SD)	85.3 (5.6)	86.4 (4.9)	85.8 (5.1)	2.45	0.22
Gender (n%)					
Male	16 (34.5%)	18 (40%)	15 (33.5%)[a]	0.67	0.34
Female	30 (66.5%)	27 (60%)	29 (65.5%)		
Marital status					
Married	4 (9%)	3 (7%)	5 (10.5%)[b]	0.97	0.91
Widowed	33 (73%)	33 (73%)	34 (75.5%)		
Single	8 (18%)	9 (20%)	6 (14%)		
Education (years/SD)	8.6 (1.2)	9.1 (2.3)	8.7 (2.1)	1.56	0.45
Religion (N%)	34 (75.5%)	36 (80%)	37 (82%)	5.3	0.22
Length of stay (years/SD)	2.6 (0.5)	2.1 (0.2)	2.3 (0.6)	4.98	0.34
CDR (score/SD)	1 (0.35)	1 (0.49)	1 (0.67)	7.25	0.18
Length of illness (years/SD)	4.5 (1.1)	4.2 (1.2)	4.4 (0.9)	5.36	0.22
CPS (level)	2.84 (0.65)	3.25 (0.87)	2.92 (0.50)	4.56	0.09
Depression (score/SD)	2.34 (0.87)	2.45 (0.75)	2.83 (0.47)	5.82	0.08
Other diagnosis (N/SD)	3.5 (1.2)	3.9 (1.6)	4.1 (1.1)	4.76	0.21
Psychotropic medication	1.0 (0.2)	0.9 (0.1)	1.5 (0.7)	5.12	0.35
Total of visits/month (N/SD)	12.3 (4.3)	9.8 (3.2)	11.3 (4.2)	4.32	0.74
Physical disability (SD)	1.33 (0.9)	1.47 (0.5)	1.62 (0.6)	3.44	0.09
Fitness programs (N%)	32	30	35[c]	3.44	0.81
RAID (SD)	5.82 (2.7)	6.1 (2.8)	5.1 (3.1)	4.87	0.08
Physical restraints (N%)	3 (7%)	2 (4.5%)	4 (9%)[a]	5.67	0.34
MMSE (SD)	13.2 (1.2)	14.1 (1.4)	14.6 (1.4)	4.54	0.32
ZBI (SD)	13.4 (3.5)	14.2 (5.1)	12.9 (6.1)	3.47	0.04
WIB (SD)	1.5 (0.8)	1.5 (0.4)	1.4 (0.76)	5.57	0.08
ADL (SD)	0.53 (0.3)	0.75 (0.4)	0.63 (0.4)	4.52	0.09
SES (SD)	3.4 (1.9)	3.7 (1.7)	3.9 (1.2)	3.16	0.28
SRQoL (SD)	23.3 (4.2)	22.7 (4.5)	25.3 (2.1)	4.68	0.21

[a].X^2 test.

[b].Significant difference between the control and comparison group. Wilcoxon Signed-Ranks test statistic = 334.5, p = 0.016.

[c].Significant difference between the control and comparison group. X^2 statistic = 2.21, p = 0.011.

Power and sample size calculation

The sample size was estimated taking into account that the study had to test a null hypothesis of whether the different participating groups were similar or different. It was assumed that a significant change in dementia from baseline using the nursing home resident Self Reported Quality of Life (SRQoL) would be indicated by a change of half of a standard deviation, which is equal to 3 points, as found in a previous longitudinal study.[23] With this predicted effect size for the SRQoL, a power of 80% and a type I error for independent groups of 0.01, the estimated sample size was 143 participants in the total study population.[24]

Methods

The intervention was designed as an individual treatment condition in which each participating subject received 24 bi-weekly sessions of reminiscence therapy, lasting one hour each, over a period of 12 weeks. Reminiscence therapy refers to the use of images, sentences or memorabilia that help the subject to focus on specific segments of the life history and stimulates the emergence of affect-laden personal recalls, which are later verbalized in the context of guided conversations.[25] The term story life is intended to highlight samples of meaningful events of the subject's life rather than a historically structured biography.[26] The reminiscence intervention used in the present study was as follows: the patients joined a peer group where the coordinators offered memory triggers, such as photographs, recordings and newspaper clippings used to promote personal and shared memories. Sometimes, caregivers or family members were allowed to be included alongside their relatives with dementia. Then, a general discussion followed, fostering the emergence of shared concepts and reframing the patient's initiative to improve both cognitive capacities and relationship abilities. This in turn increased the likelihood of improving the quality of life, social engagement and adaptation to the facility environment.[27] Three main variables contributed to successful reminiscing: individuality (one-on-one reminiscing), evaluation (a personal evaluation of events), and structure (covering the whole life span).[28] The control group was administered counseling and informal social contacts in bi-weekly sessions of one hour, but these subjects did not participate in reminiscence sessions. This was intended to rule out the possibility that the improvement in quality of life was due only to attention received and social stimulation. The comparison group received unstructured social contact, again in bi-weekly sessions of one hour each. The remaining features in the design of the three arms were similar with the only exception being the participation in the structured reminiscence program. Common themes tapped by the intervention group included childhood, working roles, illnesses, marriages, parenthood, deaths and lifestyles in past times. On the other hand, common subjects addressed by the comparison group were social security income, diet and family visits. The main differences between the three groups are summarized in Table 2.

The study was approved by the local Ethics Review Committee. This study adopted a single-blinded, parallel-group (one intervention, one comparison, and one control [no-intervention] group) design to address the following hypotheses: a) residents with Alzheimer's disease submitted to a reminiscence program intervention will show a better quality of life as a consequence of a greater sense of self identity regarding groups with no specific therapeutic intervention, b) this quality of life improvement will be sustained beyond the actual therapeutic intervention due to consolidation of self-identity and the reinforcing effects of increased competence, efficacy and personal involvement in everyday activities, associated with a higher sense of self. The data were collected at baseline (T_0), twelve weeks (T_1), and six months post-intervention (T_2).

Table 2 Comparative activities developed in the three experimental groups

	Groups		
	Intervention	Active control	Passive control
Social interaction and enjoyment	Yes	Yes	Yes
Planned work	Yes	Yes	No
Turn taking roll	Yes	Yes	No
Open ended questions	Yes	No	No
Ordered topics	Yes	No	No
Painful memories avoided	Yes	No	No
Prompt for recall	Yes	No	No
Aftermath discussion	Yes	No	No

Measures

The demographic and clinical data of the residents, including age, gender, marital status, level of education, religion, duration of dementia, length of stay in the nursing home, associated medical problems, Mini-mental State Examination (MMSE) score, Cognitive Performance Scale level (CPS),[29] ability to communicate, functional abilities, use of psychotropic medications, fitness programs, physical restrictions, number of visits per month from families and friends, and caregiver burden based on the Zarit Burden Interview (*short version*), were collected. The severity of dementia was determined using the CDR.[30] The functional performance of the residents was assessed using an index of physical function for the level of independence in eating, dressing, toileting, transferring, and walking using magnitude estimation weights.[31] Each level of disability for each activity is given a weight, rather than a simple count. The resulting score ranges from 0 (no limitation) to 3.77 (completely disabled on five activities of daily living) and has ratio-scaled properties. To assess physical restraints, we used an indicator of the daily use of full bed rails, trunk or limb restraints, or a chair that prevents rising. Physical restraints are not an aspect of the individual resident, but they are a clinical care process that is modifiable by the facility. Restraint use is considered an indicator of poor quality of care and an infringement on individual autonomy that diminishes the QoL. Cognitive performance was assessed with the CPS. This is a clinically derived scale used to predict the MMSE and Test for Severe Impairment scores.[32] While the MMSE has a floor effect with minimal scores suggesting questionable validity for more cognitively impaired elders, the TSI achieves meaningful variations, minimizes the reliance on language skills and permits subjects to answer

correctly through nonverbal as well as verbal responses. It is composed of twenty-one items covering six cognitive areas: well-learned motor performance, language comprehension, language production, immediate and delayed memory, conceptualization, and general knowledge. The best score is 24, and the lowest is zero. Persons with an MMSE score of 11 or more will have TSI scores of 22 or higher. The CPS is composed of five items: 1-short-term memory, 2-cognitive skills for daily decision making, 3-coma (or persistent vegetative state), 4-making self understood and 5-eating. The scale has an average inter-rater reliability of 0.85, a sensitivity of 0.92 and a specificity of 0.87. The CPS classifies residents into seven cognitive performance levels, from level 0 (Intact) with a mean MMSE score of 25, to Level 6 (Very Severe Impairment) with a score near zero. CPS Levels 2 and 3 (Mild and Moderate Impairment) correspond to MMSE scores of 10 or higher, averaging 10.3 and 13.8, and to a TPI of 21 (SD = 3.6). The Social Engagement Scale (SES)[33] rates the resident status during the last seven days in areas such as ease of interaction with others and performing planned or structured activities. Each item is ranked on a binary basis as yes (1) or no (0) by the caregiver. The highest score is 6, and the lowest is 0. This scale has high internal consistency (intraclass correlation: 0.51–0.64), and the items show reliability across different groups of residents with variable levels of functional and cognitive status. The resident self-reported SRQoL was measured using a multidimensional self-report instrument.[34] It measures 11 dimensions of QoL relative to a resident's experience: comfort, functional competence, privacy, dignity, autonomy, meaningful activities, relationships, food enjoyment, spiritual well-being, security, and individuality. Each dimension is scored on a 4-point Likert scale, with 4 meaning often, 3 corresponding to sometimes, 2 corresponding to rarely and 1 corresponding to never. Residents who were unable to use the 4-point scale could answer ''generally yes'' or ''generally no.'' These responses were scored as 3.8 and 1.5, respectively, based on a z score approximation method. The reliability scores ranged between Cronbach's alpha values of 0.78 and 0.85.[35] Anxiety was assessed using the Rating of Anxiety in Dementia (RAID), which is an 18-item scale with scores >11 indicating significant anxiety symptoms.[36] Depression was ruled out using the Minimum Data Set Depression Rating Scale.[37] This is a standardized screening instrument for detecting depression among nursing home residents. It is composed of seven core Minimum Data Set mood items with a specificity of 69%, a sensitivity of 91%, and a Cronbach's α measure of internal consistency of 0.75. It has a score range of 0-14 with a cut-off point of 3. The Zarit Burden Interview *short version* (ZBI)[38] was used to measure the strain and burden experienced by caregivers on a 12-item scale. Each item is scored on a 5-point Likert scale from 0 (never) to 4 (always). It has a range of results from 0 to 48, a Cronbach's alpha of 0.88, and a cutoff score of 17. The wellbeing of the residents was assessed using the Well-being/Ill-being Scale (WIB),[39] which includes positive components, such as "being able to express wishes in an acceptable way," "bodily relaxation," and "creative self-expression" (such as singing, dancing or painting), as well as negative components, such as "unattended sadness or grief," "sustained anger" or "anxiety." The WIB scale rates each category of behavior observed every five minutes for a minimum of six hours. After five minutes, the rater quantifies the nature of the observed behavior category by assigning a WIB value to it. The six-point WIB scale ranges from very negative to very positive (5, 3, 1, +1, +3, +5). The values are calculated at the end of the observation period to extract a mean score.

Procedures

Three psychologists who had experience working with elders as well as demented or handicapped residents delivered the reminiscence interventions, the informal contacts with the control group, and the counseling and stimulation contacts with the comparison group. The psychologists were blinded to the outcome measures. The psychologist team was trained by the principal investigator to deliver the corresponding services in a structured manner. The number of training sessions provided was 15, and the total number of training hours was 30.4. To ascertain that the psychologist team would conduct the intervention, the comparison and the control protocols in the same manner, videotaped records were assessed by two experts using a validation process model.[40] According to this evaluation, at the end of the training period, the experts concluded that the psychologist team was conducting the sessions for each group according to the corresponding protocols developed in the training sessions and in a similar fashion regarding the time allotted to each session, the number of interventions, and the prompting cues and emotional tone used in the session. All of the residents participating in the study were thoroughly evaluated by an expert neurologist, and the ADL scale, the MMSE and the other neuropsychological measures were administered by a neuropsychologist blinded to the rest of the study. The rating of the SES and SRQoL was conducted by independent raters composed of three registered nurses and two social workers, while further processing of the data was accomplished by two statistics experts who were blinded to the subject assignment. The rating and data processing groups were also trained during 10 sessions, resulting in a total of 20 training hours. The psychologist teams and raters were scheduled to collect data at different times. Intra-class correlations of the test-retest reliabilities (Cronbach's alpha 0.91) and the inter-rater reliabilities (Cronbach's alpha 0.89) for the SES and SEQoL were high. The staff assisting the residents that participated in the intervention, comparison and control group sessions received a six-hour training module on dementia care prior to participating. At the end of the module, each staff member was evaluated to ensure that their roles in the investigation had been adequately understood, and each staff member was offered an information leaflet before the beginning of the first group session. In-service education programs on dementia care were offered by the main investigator for those who did not meet these requirements. The operative requirements and staff selection were carefully presented by the main investigator to the different levels of staff in the long-term care facilities, taking care not to emphasize a preference for the reminiscence intervention over the comparison and control conditions. All recruited subjects, or their legal family caregiver or proxy, signed the informed consent and were randomly assigned to one of the three groups. Each facility received a fixed and equal allocation of residents to each group.

Forty-five out of 145 (33%) eligible cases were recruited in each facility. During the study, 5 participants dropped out. One died before the fifth session of reminiscence therapy, another resident was moved to another long-term nursing home, and the last two residents refused to participate in the control group because they stated it was useless.

Experimental design and data analysis

Hypothesis

Patients with dementia who were exposed to the reminiscence program sessions were expected to report an increased quality of life and improved interaction patterns compared with the subjects who participated in the active and passive control groups.

Statistical analysis

Data analyses were performed to determine the main effects of intervention, the main effects of the testing occasion, and the interaction effects of group and time. To determine whether the patients in the intervention or control groups experienced changes in their quality of life and social interactions, a within-subjects repeated measures univariate ANOVA was conducted following a Pretest-Posttest Design. The dependent variables were the SRQoL and SES, and the independent variable was the testing occasion [T_0 (pre-test), T_1 (post-test) and T_2 (follow-up)]. To determine whether the patients who were exposed to the reminiscence program reported an increased quality of life and improved social interactions compared to participants in the other two control groups, a between-subjects MANCOVA design was performed on the dependent variables SRQoL and SES scores, while the independent variable was intervention (intervention, active and passive controls). To detect interaction effects between the group and testing occasion, a 3 x 3 mixed-model ANOVA design was used with dependent measures of SRQoL and SES scores as the main outcomes; the ZBI, WIB and ADL scores as the secondary outcomes; the group (intervention, control active, control passive) as the between-subjects independent variable; and the sessions (pre, post and follow-up) as the repeated measures within-subjects independent variable. For pairwise time comparisons, Bonferroni´s test was used. The magnitude of the effect was measured with partial eta-square (η^2). At the same time, according to the APA recommendations,[41] each outcome measure reported in the study was expressed in terms of Cohen's d,[42] which is a standardized measure of the effect size, according to the following formula $d = m_2/s$, where m represents the group means and s is the pooled standard deviation within groups. According to Cohen (1988), the size of an effect can be classified as small (0.01 to 0.04), medium (0.05 to 0.11) or large (0.12 to 1.0). The data were analyzed using the SPSS 15.0 statistical package for Windows using the intention-to-treat principle.[43] Differences between the groups in the clinical and demographical variables were analyzed using the x^2 and Mann-Whitney U test and the Wilcoxon signed rank test. The outcome variables were normally distributed and analyzed with non-parametric tests. A stepwise linear regression model with repeated measures was used to assess the differences within and between groups and to determine the predictors of change in the SRQoL. The level of significance was selected as 0.05. Missing data were replaced with the mean value of the outcome variables for each group. An improvement or deterioration in the SRQoL was considered if scores changed by 3 or more points.

Results

The percentage of missing data for the outcome variable at T_0, T_1, and T_2 was 2.5%, and the percentage of missing data for the independent variables was 1.9%. The mean age of the groups (n = 135) was 85.7 years (SD = 4.8), and a mean of 63.3% of the participants in all three groups were female; most were widowed, had a mean of 8.8 years of education, and had a religion (79%). Their mean length of stay at the nursing home was 2.3 years (SD = 0.4). The mean number of medical diagnoses other than dementia was 3.8 (SD = 1.4). Several were receiving psychotropic medications (mean number prescribed 1.2, SD = 0.4) and were put into physical restraints (mean number = 6.83%, SD 1.2). A mean of 71% participated in regular fitness programs. The mean number of visits that the participants received per month from family members, friends or care-givers was 11.2 (SD = 4.1). The mean baseline (T_0) MMSE score was 13.9 (SD = 1.4), and the baseline ZBI score was 13.7 (SD = 5.1). There were no significant differences between the comparison, the control and the treatment groups for any of the clinical and demographic variables. When testing the short-term (12 weeks) and long-term (6 months) intervention effects with the SRQoL and SES as the dependent variables in a 3 (group) x 3 (time) MANCOVA for repeated measures, the interaction effect was significant at T_1 ($F(130,2) = 0.641$, $p < 0.01$, $\eta 2 = 0.10$) and T_2 ($F(130,2) = 0.352$, $p < 0.01$, $\eta^2 = 0.20$), demonstrating that changes in the SRQoL and SES were different in the three groups. When we proceeded with the univariate analysis, it showed that the SRQoL and SES developed differently across the three groups ($F(130,2) = 1.375$, $p < 0.01$, $\eta^2 = 0.08$). When examining the changes in the SRQoL and SES separately in each group, the within-subjects effects showed no significant changes in the active and passive control groups during the 12-week and 6-month period. Instead, in the intervention group, both the SRQoL ($F(130,2) = 0.217$, $p < 0.01$, $\eta^2 = 0.26$) and the SES ($F(130,2) = 0.225$, $p < 0.01$, $\eta^2 = 0.08$) increased. Neither interaction nor main time or group effects were detected for any of the other variables examined in the 3 (group) x 3 (time) ANCOVA for repeated measures. Only one borderline result for ADL showed an interaction effect for time in the active control group (Table 3).

When the groups were examined for between-subject effects, significant interaction effects were found for SRQoL scores ($F(130,2) = 1.275$, $p < 0.01$, $\eta^2 = 0.14$) and SES scores ($F(130,2) = 1.369$, $p < 0.01$, $\eta^2 = 0.11$). A significant difference was observed when comparing the SRQoL scores at T_1 and T_0, ($r_{Y\lambda} = 0.460$), and at T_2 and T_1 ($r_{Y\lambda} = 0.271$), and the same proved true for SES scores at T_1 and T_0, ($r_{Y\lambda} = 0.116$), and at T_2 and T1 ($r_{Y\lambda} = 1.352$) (Table 4).

The Cohen's d effect size for the three groups for the SRQoL, SES, ZBI and WIB is shown in Figure 1. When the three groups were examined separately in the intervention group, the within-subjects effects showed that SRQoL increased during the 12-week and 6-month period, and the same was shown to be true for the SES. Instead when comparing times.

Table 3 Within-subjects time effects and pairwise time comparisons in the intervention and control (passive and active) groups

Measure	T_0 MS (SD)	T_1 MS (SD)	T_2 MS (SD)	Df	Error	F	p
Intervention group (n = 44)							
SRQoL	23.3 (4.2)	27.1 (8.7)	34.6 (5.89)	1	43	7.49	< 0.01
SES	3.4 (1.9)	4.0 (0.87)	4.9 (0.76)	1	43	6.59	< 0.01
ZBI	13.4 (3.5)	11.3 (3.6)	10.5 (3.3)	1	43	5.22	< 0.05
WIB	1.5 (0.8)	1.2 (0.5)	1.1 (0.7)	1	43	2.24	< 0.34
ADL	0.53 (0.3)	0.22 (0.03)	0.12 (0.02)	1	43	8.21	< 0.05
Active control (n = 44)							
SRQoL	22.9 (3.7)	23.6 (5.8)	26.8 (2.7)	1	43	1.81	= 0.22
SES	3.3 (0.7)	3.6 (0.6)	3.9 (0.7)	1	43	2.52	= 0.34
ZBI	14.2 (5.1)	15.2 (4.5)	15.6 (5.7)	1	43	3.62	< 0.45
WIB	1.5 (0.4)	1.5 (0.3)	1.4 (0.7)	1	43	2.11	= 0.52
ADL	0.75 (0.4)	0.99 (0.2)	0.92 (0.2)	1	43	7.23	< 0.03
Passive control (n = 44)							
SRQoL	23.7 (4.1)	23.9 (3.7)	25.2 (4.2)	1	43	1.09	< 0.73
SES	3.4 (1.1)	3.5 (1.3)	3.6 (1.4)	1	43	3.31	= 0.58
ZBI	12.9 (6.1)	15.7 (7.9)	17.9 (6.9)	1	43	6.90	< 0.04
WIB	1.4 (0.76)	1.3 (0.9)	1.9 (0.8)	1	43	5.73	= 0.04
ADL	0.63 (0.4)	1.34 (0.6)	1.16 (0.9)	1	43	6.22	< 0.06

MS: Mean square, SD: standard deviation, Df: degree of freedom.

Table 4 Mixed-model 3 x 3 ANOVA source table for main and secondary outcome measures

	Time effect (Within-subjects testing occasion)			Group x Time		
	Df	Mean square	F (p)	df	Mean square	F (p)
SRQoL[1]	1	352.3	34.5 (p < 0.01)	2	148.1	14.7 (p < 0.01)
SES[1]	1	63.2	14.5 (p < 0.01)	2	43.2	7.5 (p < 0.01)
ZBI[2]	1	122.4	23.4 (p = 0.43)	2	72.3	3.5 (p = 0.76)
WIB[2]	1	7.3	11.2 (p = 1.34)	2	8.4	3.4 (p = 0.86)
ADL[2]	1	4.7	8.32 (p < 0.32)	2	9.3	6.54 (p < 0.65)

1: Main outcomes, 2: Secondary outcomes. Group effect was not included in the table.

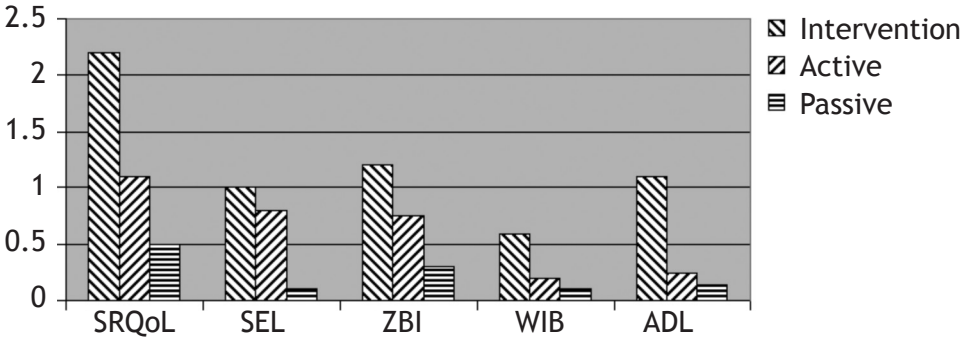

Figure 1 Cohen's d effect for the three groups on SRQoL, SES, ZB, WIB and ADL.

We performed univariate logistic regression analysis on 132 participants who had completed all measures at baseline and follow up. The linear regression model was significant ($F(2,130) = 21.7$, $p < 0.01$, $\eta^2 = 0.18$) and explained almost 50% of the variance in the outcome scores on the SRQoL and SES ($r^2 = 0.304$, adjusted $r^2 = 0.384$, $p < 0.001$) (Table 5). The model satisfied all necessary assumptions of logistic regressions, including normality, homoscedasticity, linearity, and independence of the error terms. A higher SRQoL score at follow up was significantly associated with lower anxiety symptoms (RAID: $p < 0.001$) at baseline in the intervention group, lower depression scores ($p < 0.001$), higher scores at ADL and a negative interaction with CPS. Lower scores were associated with poorer SRQoL ($p < 0.001$). We included interaction terms for each independent variable by group status in the regression, but none entered the final model. This finding suggests that the intervention did not have a differential effect on any subgroups of residents when all other independent variables were controlled, although the power of the study to detect such effects is low. After controlling for the SRQpoL and SES scores at baseline, group status (intervention, passive and active control) had the most significant effect on the SRQoL score at follow up, even after taking into account all other variables thought to affect the SRQoL outcome (Tables 5,6,7).

The measure of the intervention effect after considering the SRQoL score at baseline and the other significant independent variables was a raw average improvement of 11 points in the SRQoL score at follow up compared with the control groups. The final model was rerun with only the

Table 5 Multiple regression analysis (stepwise) for the intervention group and SRQoL as the dependent variable

Predictor variable	R^2	Corrected R^2	ΔR^2	ΔF	ΔP	Standardized ß	*t*	P
Education	0.024	-0.465	0.24	0.322	NS	0.328	-2.445	0.068
Religion	0.43	0.243	0.54	0.356	NS	-0.387	-5.069	0.089
Length of stay	0.013	0.322	0.58	0.432	NS	-0.396	-2.944	0.074
CPS	0.041	0.134	0.62	0.523	0.008	0.008	0.006	0.006
Depression	0.056	0.175	0.46	0.211	0.004	0.004	0.005	0.004
Other diagnosis	0.254	0.153	0.75	0.363	0.122	0.097	0.885	0.043
Psychotropic Medicines	0.132	0.322	0.89	1.093	NS	0.022	0.458	0.068
Total of visits/month	0.254	0.241	0.43	1.034	NS	0.776	0.934	0.033
Physical disability	0.345	0.174	0.59	0.933	NS	-0.034	0.784	0.065
Fitness programs	0.352	0.355	0.17	0.458	0.087	-0.763	0.344	0.054
RAID	0.133	0.214	0.63	0.325	0.001	0.002	0.005	0.001
Physical restraints	0.325	0.266	0.56	0.533	0.093	-0.301	0.934	0.073
MMSE	0.023	0.275	0.77	0.426	0.048	0.923	0.049	0.065
ZBI	0.045	0.192	0.64	0.563	NS	0.877	0.096	0.405
WIB	0.012	0.336	0.37	0.587	NS	0.233	0.093	0.043
ADL	0.32	0.252	0.69	0.214	0.073	0.988	0.076	0.008
SES	0.045	0.437	0.98	0.936	0.002	0.003	0.004	0.003

Table 6 Multiple regression analysis (stepwise) for the active control group and SRQoL as the dependent variable

Predictor variable	R^2	Corrected R^2	ΔR^2	ΔF	ΔP	Standardized ß	*t*	P
Education	0.031	-0.357	0.21	0.235	NS	0.425	-2.465	0.168
Religion	0.355	0.267	0.37	0.298	NS	-0.498	-5.193	0.185
Length of stay	0.056	0.267	0.84	0.544	NS	-0.245	-2.436	0.154
CPS	0.065	0.265	0.37	0.287	0.003	0.013	0.015	0.002
Depression	0.187	0.236	0.66	0.544	0.021	0.001	0.013	0.028
Other diagnosis	0.254	0.152	0.58	0.243	0.122	0.137	0.893	0.143
Psychotropic Medicines	0.156	0.733	0.39	1.098	NS	0.072	0.463	0.196
Total of visits/month	0.263	0.312	0.53	1.322	NS	0.706	0.972	0.334
Physical disability	0.325	0.231	0.51	0.856	NS	-0.134	0.588	0.154
Fitness programs	0.365	0.256	0.23	0.353	0.087	-0.363	0.265	0.165
RAID	0.164	0.321	0.53	0.435	0.001	0.102	0.012	0.006
Physical restraints	0.387	0.342	0.65	0.543	0.093	-0.451	0.952	0.048
MMSE	0.134	0.253	0.17	0.634	0.048	0.983	0.098	0.085
ZBI	0.146	0.183	0.52	0.566	NS	0.817	0.045	0.445
WIB	0.033	0.244	0.38	0.687	NS	0.293	0.084	0.053
ADL	0.211	0.324	0.74	0.342	0.073	0.438	0.038	0.018
SES	0.054	0.426	0.87	0.288	0.002	0.013	0.014	0.013

Table 7 Multiple regression analysis (stepwise) for the passive control group and SRQoL as the dependent variable

Predictor variable	R^2	Corrected R^2	ΔR^2	ΔF	ΔP	Standardized ß	*t*	P
Education	0.015	-0.288	0.22	0.485	NS	-0.985	-2.456	0.864
Religion	0.467	0.285	0.39	0.287	NS	-0.867	-5.986	0.455
Length of stay	0.143	0.395	0.87	0.674	NS	-0.565	-2.776	0.385
CPS	0.157	0.398	0.59	0.295	NS	0.689	0.335	0.022
Depression	0.243	0.294	0.68	0.523	0.375	0.586	0.513	0.148
Other diagnosis	0.348	0.493	0.58	0.475	0.529	0.347	0.356	0.223
Psychotropic medicines	0.112	0.485	0.39	1.857	NS	0.686	0.363	0.956
Total of visits/month	0.453	0.498	0.98	2.957	NS	0.885	0.223	0.134
Physical disability	0.544	0.957	0.48	1.484	NS	-0.586	0.512	0.454
Fitness programs	0.877	0.486	0.48	1.384	NS	-0.876	0.452	0.555
RAID	0.241	0.495	0.85	0.564	1.45	-0.475	0.844	0.246
Physical restraints	0.847	0.598	0.49	0.678	0.373	-0.869	0.962	0.184
MMSE	0.387	0.384	0.13	0.574	0.978	-0.986	0.133	0.185
ZBI	0.329	0.948	0.48	0.384	NS	0.475	0.455	0.556
WIB	0.033	0.244	0.378	0.687	NS	0.293	0.084	0.053
ADL	0.211	0.324	0.74	0.342	0.073	0.438	0.038	0.018
SES	0.054	0.426	0.87	0.288	0.002	0.013	0.014	0.013

three independent variables (namely ZBI, WIB and ADL) for all 132 participants for whom these data were available. All three variables remained non-significant with comparable orders of magnitude, and the conclusions were unchanged, with a univariate multiple estimate of effect likely to be approximately 2.35 (1.99-3.01). Given this result, the evidence of a significant intervention effect is robust. The SES increased significantly in the intervention compared with the control group. The logistic regression showed that the intervention participants were more likely to engage with other residents at follow up than the controls (OR = 3.1, CI 1.8 to 7.4, P = 0.006). We investigated whether the intervention effect was because the residents in the intervention group had undergone an improvement in their wellbeing and/or ADL compared with the control subjects. We used analysis of covariance on the SES score at follow up, with the score at baseline as the covariate. The WIB and ADL at follow up and group membership were entered hierarchically. The WIB by group interaction was not significant ($F(2,130) = 0.09$, $p < 0.01$, $\eta^2 = 0.07$), nor was ADL ($F(2,130) = 0.27$, $p < 0.01$, $\eta^2 = 0.14$), but the group main effect remained significant ($F(2,130) = 1.47$, $p < 0.01$, $\eta^2 = 0.005$). The intervention effect is not simply a consequence of a better fitness status.

Discussion

The intervention brought about significant differences in the outcomes of the participants over time, so the null hypotheses could be rejected. Those significant changes in outcomes in the intervention group were observed when comparing the T_0 and T_1 against T_2 SRQoL and SES scores. The differences in the outcome variables could be related to the type of facts that are used as measures in each one of the instruments. While SES captures changes in the overt relational behavior of the resident over an intermediate time span (past seven days), the SRQoL assesses subjective changes over a longer time span. All residents took part in fitness programs, exhibited a mild caregiver burden, had low depressive ratings and physical disability and were taking psychotropic medication at such a dosage that it did not interfere with their daily activities. This could suggest that the residents were mildly impaired, but they had low MMSE and CPS scores, as well as a length of illness over 4 years, which precludes an initial stage of the illness. The residents were relatively well adjusted to their environment, so the important effect reflected in the scores between the three time points and the ability of the staff and scorers to recognize those results demonstrates the reliability of the program efficacy. The fact that changes were also observed in the active control group to a lesser degree and were worse in the passive control group indicates that some type of activity is better than none. It must be taken into account, however, that ITT analysis usually results in an attenuated, downward-biased estimate of a treatment difference.[44] One possible explanation for the positive outcomes may be that participants completed the intervention program without dropping out due to a favorable health status. Another possibility may be that they had no need to move outside the nursing home to participate in the intervention program, making it easier to complete the program. In fact, the drop outs that did occur were due to death or the participant leaving the facility and not dissatisfaction with the intervention itself. A reminiscence intervention program using a life-story approach is a useful intervention for improving the quality of life in nursing home residents with dementia, as indicated by the results from the scores with repeated measures. There are key issues raised by the study that include measuring changes in the SRQoL and the nature of QoL itself. As such, the study examined changes in the SRQoL for people with dementia in two residential homes. This study had a high response rate, and it used validated instruments and trained raters. The changes in the overall mean SRQoL of the sample population were sufficiently large, achieving an increase of more than 6 points on the SRQoL scale as the outcome score, which is

equivalent to more than 1 SD, suggesting a significant improvement. A better outcome in the residents' SRQoL was predicted by the lower baseline depression and anxiety symptom ratings, length of illness, fitness programs, MMSE and CPS and wellbeing of the residents, but not by the other measures. Other studies have found that changes in the QoL were predicted by increased functional dependency at one year and worsening cognition at two years. Additionally, those treated with cognitive stimulation therapy exhibited improved outcome scores mediated by improved cognition.[45] Furthermore, other studies have found that the SRQoL predicts the baseline mood and social relationships and that well-being during dementia-related adversity remained stable over time. Cognition influenced well-being during adversity, but it was mediated through mood.[46] In the present study, SRQoL improvement was not directly related to higher cognition, and it had a negative association with a depressive mood (higher ratings of depression scores were associated with lower QoL results), which is in concordance with other studies.[47] Concerning the sustained effect of this intervention, there were positive changes and a good effect size for the intervention group. Furthermore, there were improvements in the subjects' level of social engagement as reflected in the SES scores post-intervention at a statistically significant level. Factors that have contributed to produce an improvement in quality of life of AD patients were identified. Improvement in the quality of life relies on several factors, such as the patient and his or her family and therapist, who are committed to patient assistance, with each situation being unique. Improvement in QoL should be attributable not only to the type of treatment employed but to the subtleties of the communication process between the patient and the treatment team, including caregivers, which are associated with increasing empathy. On the other hand, as a result of joining group activities, an enjoyable and accepting atmosphere ensues. Patients are praised and validated during the reminiscence work, and this, in turn, enhances their motivational strengths. During turn-taking activities that give voice to past memories, each patient has to play some type of social role, taking advantage of his or her remaining abilities. As a consequence, patients disseminate these learned social skills to other activities during their daily relationships with peers and staff personnel. Even if the patient fails to give a precise and errorless account of past events, he is prompted to continue and is accepted as if the facts were true as a way to maintain the patient's dignity. It is assumed that the patient's behavior is a reflection not only of cognitive reserve but also of the stimulating environment, which helps to activate social skills and to reinforce self-image, ameliorating dementia symptoms and promoting a renewed attitude toward life. In opposition to other studies that have found that benefits of reminiscence therapy were lost immediately after the intervention,[48] in the present study, the post-intervention improvement extended well beyond that time. One possible reason accounting for the spread of scores may be the innovative and arousing effect of the reminiscence intervention program on residents who were accustomed to the steady routines of nursing home activities. The clinical significance is supported by the wide spread of the scores between the three measurement time points. There have been few RCTs on reminiscence,[49] showing minimal beneficial effects of this intervention on the overall well-being of elderly non-demented nursing home residents who participated in structured life-review group processes compared with those who did not participate. Another study[50] tested an ADL program and a psychosocial activity intervention to determine their efficacy in reducing disruptive behavior and improving affect in demented nursing home residents. The focus was on reducing disruptive behavior rather than on improving the quality of life, with unclear random assignment in the group allocation. The findings suggested more positive affect but not a reduction in disruptive behavior in the treatment groups compared to control groups in association with a better cognitive status. Opposite to that observation, in the present study, the mean MMSE of the subjects in the intervention as well as in the other groups was well below the cutoff value of 18, which corresponds to a severely disrupted cognitive profile, and the mean score of the intervention group on the ADL was 0.53 (0.3), which corresponds to a moderate level of dependence on others for the activities of daily living. The subjects' physical abilities remained stable throughout the pre- and post-intervention periods, and they had no impact on the outcome variables. Among the features of the SRQoL scale, those who exhibited a more remarkable association with the overall improvement in the quality of life were functional competence, autonomy, meaningful activities, security and individuality, suggesting that changes in the outcome measures were related to consolidation of self-identity and a higher sense of self. In fact, reminiscing contributed to maintaining a positive self-belief, strength of self and sense of personhood,[51] counteracting the decrease in feelings of self-efficacy due to the debilitating nature of Alzheimer's disease. On the other hand, relationships appeared to be a key element for sustaining the SRQoL, reinforcing the sense of personal worth, agency, social confidence and hope, but this factor was present in the three groups and could not account by itself for the differences in the outcome measures between the intervention, comparison and control groups. Several factors could have confounded our results. First, the sample size was relatively small for a repeated-measures univariate multiple logistic regression analysis. Only two nursing homes were used as study sites. Indeed, the use of a few study settings facilitated the standardized sampling, data collection, protocol adherence and control for a number of confounding variables; however, it also posed restrictions on the adequate recruitment of subjects. The strength of the intervention program was sufficient to ensure the reliability of the data and results. Regardless of the cautionary steps taken to avoid preconceptions related to the benefits and drawbacks of any treatment program for demented elders, it seemed impossible to prevent people from having those implicit notions. Numerous methodological problems in psychosocial studies have been raised by reviewers,[52] including sampling problems, unclear selection criteria and diagnostic difficulties, lack of rigor, use of instruments without reporting their reliability and validity in the populations of concern, and the inadequate description of interventions and measurement of outcomes. The contribution of the present study is that it was an RCT that addressed many of the methodological issues mentioned in the literature, including the staging of dementia, as this enabled researchers to gain

an understanding of the differential impact on subjects when various therapeutic modalities are being tested. More focused research will be needed to determine which features of reminiscence (such as sensory input or interpersonal communications skills) and what circumstances (such as group size or combination) will have greater or lesser benefits. Another aspect that warrants further consideration is the inclusion of intra-intervention observations. Triangulation of quantitative and qualitative methods for the evaluation of process and outcome will provide valuable insights. Studies that are of longer duration or that are longitudinal in nature are needed. It is important to try treatments that are likely to have an impact on the onset or progression of dementia, as no therapeutic option has been shown to be able to address all of the issues that are associated with a dementing illness. Reminiscence using a life story approach shows some promising effects for the promotion of well-being and quality of life in people with dementia.

Conclusion

Reminiscence therapy using a life story approach seems to be a reliable and effective therapeutic option for patients with dementia, with promising effects on the quality of life and the engagement of those people.

Disclosures

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** Modest*
*** Significant*
**** Significant. Amounts given to the author's institution or to a colleague for research in which the author has participation, not directly to the author.*

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