Randomized trial of individual reminiscence therapy for older adults with cognitive impairment: a 3-month responder analysis

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Introduction. Non-pharmacological intervention options, including individual reminiscence therapy (iRT), have been effective in improving cognitive functioning, mood, and quality of life (QoL) in persons with neurocognitive disorders (NCD).

Objectives. A 13-week randomized trial intervention utilizing iRT was conducted on older adults with NCD. We explored predictors of participants with positive and non-positive intervention responses using responder analysis, an analytic strategy that focuses on contributors to intervention response.

Patients and methods. Re-analysis of a published single-blind, multicentre, randomised controlled trial on 251 older adult residents with NCD from residential facilities across Portugal. Participants received 13 weeks of biweekly iRT (26 sessions) or treatment/programming as usual. Outcomes included global cognition (Minimental State Examination), memory (MAT), executive functioning (FAB), depressive symptoms (GDS-15), and QoL (QoL-AD).

Results. There were more responders in the intervention than the control group on all five criteria, with significant differences for cognition (p = 0.001; ϕ = 0.202; NNT = 5) and memory (p = 0.004; ϕ = 0.184; NNT = 6). At baseline, intervention responders *vs* non-responders had: higher QoL-AD scores (30.23 *vs* 25.57; p < 0.001; d = –0.774) for cognition; lower FAB scores (1.41 *vs* –2.12; p < 0.001; d = 0.928) for executive functioning; higher GDS-15 scores for the depressive symptoms (7.57 *vs* 4.91; p < 0.001; d = –0.845), and for QoL (6.81 *vs* 5.33; p = 0.013; d = –0.443).

Conclusions. The iRT intervention showed high response rates for cognition and memory. Those with worse executive dysfunction, mood, and QoL, benefitted most from the intervention for those respective outcomes. Therefore, the presented iRT has beneficial effects for people with NCD, with mood and QoL as important influential factors.

Key words. Dementia. Depressive symptoms. Executive function. Memory. Neurocognitive disorders. QoL.

Introduction

Neurocognitive disorders (NCD) are estimated to affect 50 million people worldwide, with an expected increase to 150 million by 2050 [1]. NCD in older adults are often neurodegenerative and can present with various etiologies, including Alzheimer's disease (AD), vascular dementia, frontotemporal dementia, and dementia with Lewy bodies, among others [2]. Major NCD is defined by evidence of significant cognitive impairment compared to a prior level of individual performance in one or more cognitive domains, with interference in the ability to perform daily life activities [2].

Treatment options for most NCDs are limited. For example, in AD, common pharmacologic options have limited efficacy [3-5], are costly, and can present with undesirable side-effects. The limited efficacy of current pharmacological treatments has generated interest in non-pharmacological interventions that do not aim to modify the underlying pathophysiological mechanisms, but rather to treat the symptoms and, ideally, improve the quality of life (QoL) of people living with NCD [6].

Cognitive stimulation (CS) is typically designed for older adults with NCD, an intervention that seeks to provide an enriching and engaging environment to improve cognitive and social functioning and QoL [7,8]. CS is a recommended therapy by the National Institute for Health and Clinical Excellence (NICE) for NCD patients [9].

Reminiscence therapy (RT), a CS-based intervention, involves discussing past activities, events, and experiences, with the participant. RT uses discussion of past events and cues from the past such as photographs, objects, or music, that seeks to promote recollection in NCD patients [10]. Since RT focuses on preserved memories and abilities,

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and can be individualized, it is a less distressing and engaging strategy that promotes communication and enables participants to connect with their past and regain their sense of personal identity [11,12]. RTs effects have been relatively positive in mixed dementia samples. Woods et al showed positive effects of RT on cognitive functioning in cognitively impaired persons [10]. Gonzalez et al found improvements in depressive symptoms, self-acceptance, and interpersonal relationships [13]. RT in older adults with AD revealed improvements in cognitive functioning, depression, and QoL [14]. Review articles have supported improvements in QoL, mood, and cognition in RT [15,16]. Factors that may predict or influence response to a cognitive intervention include female gender and having lower depressive symptoms and cognitive functioning [17].

A recent randomized clinical trial (RCT) using an individual RT (iRT) CS protocol detailed elsewhere [18] found significant positive effects on cognitive screening, memory, and QoL in a Portuguese mixed NCD sample after 13 weeks compared to those who did not receive the iRT [19]. Similarly, this protocol has shown positive effects on memory, executive functioning, and QoL in a sample of AD and vascular dementia patients, though the effects did not extend to reducing depressive symptoms in this sample [20]. Using the same iRT, the current study seeks to explore and understand the characteristics of those who did and did not respond positively to this intervention.

Responder analysis is an analytic strategy to investigate the proportion and demographics of participants who demonstrated improvement on a specific intervention or measured outcome by exploring outcomes that differ between responders and non-responders. This technique has been conducted on comparing and identifying treatment responders in a cognitive and behavioural based therapy in older adults; higher baseline daily living scores and behavioural and psychological functioning was associated with greater treatment response [21]. We used responder analysis in our mixed NCD randomized trial intervention sample to better understand the factors that predict response and characterize responders *vs* non-responders in our aforementioned iRT CS protocol.

Patients and methods

We present a re-analysis of a published trial about a clinical trial of RT for people with NCD (clinicaltrials.gov ID: NCT04047238), a multicentre, single-blind, randomised, parallel two-arm (RT vs. treatment as usual, 1:1 ratio), controlled trial. Participants in the intervention group received two 50-min weekly iRT sessions for 13 weeks in addition to their treatment as usual. Participants in the control group only received their usual treatment. Participants were aware that participation in the study was voluntary and were assessed at baseline (T0) and after the RT intervention (T1).

A public invitation was made to social care institutions in Portugal to participate, with 24 institutions agreeing to collaborate. The institutions, in turn, invited their users to participate, resulting in 271 participants completing the eligibility assessment. A total of 251 participants were selected for the RCT: 131 participants in the intervention group and 120 participants in the control group (1:1 ratio), which was sufficiently powered for the purposes of this study. No participant discontinued participation through the course of the study.

Inclusion criteria were: a diagnosis of a NCD according to DSM-5 criteria; completed and signed informed consent form; being able to communicate and understand; possibility of gathering information about the participant's life history through family members or usual caregivers, using the socio-family questionnaire designed for that purpose; 65 years of age or older; being a native Portuguese speaker; regularly attending an institution that provides social care and support services for older adults.

Exclusion criteria were: suffering from an acute or severe illness that prevent participation in the intervention sessions; severe sensory and physical limitations that prevent participation; severe disconnection from the environment and minimal attention span; presence of severe neuropsychiatric symptoms (e.g., hyperactivity, psychosis, severe depressive and anxiety symptoms), apathy, or uncontrolled delirium that prevent participation in the sessions; traumatic life history or marked by adverse events that discourage participation in RT sessions; history of adverse reactions during RT sessions or similar activities.

Participants who met the inclusion criteria were enrolled, baseline assessments were completed, and they were randomly allocated to either the control or experimental group. As a multicenter study, each institution had two groups: intervention group and one control group, with a 1:1 ratio. A non-stratified permuted block randomization process (with a variable block size) was carried out using the software DatInf© RandList by one of the study principal investigators blinded to baseline scores and demo-

graphics of the participants. Participants in each institution ranged from 4 to 20. Participants, therapists and institution staff were blinded to group placement until the intervention started. Evaluators remained blinded through the study. The researchers responsible for communicating with the institutions conducted enrollment.

The individual RT (iRT) CS protocol is detailed specifically in the intervention protocol [18]. Each session lasted 50 minutes; the first 7 minutes welcoming the patient and orienting to person, using an orientation board, the participant was asked to fill in the chart with the elements related to the temporal elements, place, and to time (e.g. day of the week, month, day of the month, year, season, time of year, weather); the next 40 minutes the main activity of RT based on the activities and goals established for each session, mainly using image cards and stories from the *Book of the Past and the Present* [22] and some complementary material (e.g., worksheets, audio files, digital presentations); the last 3 minutes included review of session challenges, interests, and benefits, and reminders of the next session. The activity book included activities and cards with images, divided into nine RT topics (e.g., means of transportation, appliances, housing, media, professions, clothing, actors and TV hosts, politics, regional and local references). The cards in the regional/local references were personalized according to the region where each institution was located by the institution therapist. Other materials included music, riddles, and theme worksheets [18]. There were no harmful nor unintended effects in either group.

All iRT sessions were held at each institution and conducted by 26 therapists (psychologists, occupational therapists, or gerontologists) who received a 6-hour training on the protocol and principles of the therapy by two of the principal investigators facilitate standardized administration. The intervention lasted 13 weeks, from September 2019 to December 2019.

Participants in the control group did not receive the iRT intervention but received their typical treatment and programming at the institution, which varied by institution but included social interaction activities, stimulation of personal skills, and any prescribed dementia-specific medication.

The protocol was administered to all participants (intervention and control groups) by trained evaluators blinded to participant allocation. Data were collected at baseline (T0) and 15 weeks post-baseline (endpoint assessment T1). The outcome measures included as follows.

The Minimental State Examination (MMSE; Cronbach's alpha = 0.89) assessed global cognitive function. Scores range from 0 to 30, with higher scores indicating better cognitive functioning [23-25].

The Memory Alteration Test (MAT; Cronbach's alpha = 0.93) assessed memory function. It is an easy and quick instrument that assesses five memory domains: temporal orientation, encoding, semantic memory, free recall, and cued recall. Total scores range from 0 to 50, with higher scores indicating better memory [26,27].

The Frontal Assessment Battery (FAB; Cronbach's alpha = 0.83) evaluated executive function in several subtests: conceptualization, mental flexibility, motor programming, sensitivity to interference, inhibitory control, and environmental autonomy. Scores range from 0 to 18, with higher scores indicating better executive functioning [28,29].

The Geriatric Depression Scale-15 (GDS-15; Cronbach's alpha = 0.83) measured mood. It is considered a reliable tool to screen depressive symptoms in older adults, in a dichotomous format (yes/no answers). Scores range from 0 to 15, with higher scores indicating more severe depressive symptoms [30-32].

The Quality of Life in Alzheimer's Disease scale (QoL-AD; Cronbach's alpha = 0.87) evaluated QoL. This 13-item scale assesses the QoL in people diagnosed with dementia, gathering information from the patient about: perceived health, mood, physical condition, interpersonal relationships, hobbies, decision-making skills, and life as a whole. Scores range from 13 to 52, with higher scores indicating better QoL [33,34].

Because a deterioration of three MMSE points per year can be expected in untreated dementia patients [35,36], we formed three groups that reflected different levels of MMSE change: responders (improvement or no deterioration in 3 months), expected deteriorators (deterioration ≤ 1 MMSE points in 3 months), and pronounced deteriorators (deterioration > 1 MMSE points in 3 months). Furthermore, five response criteria were assessed: a) cognition (MMSE score); b) executive function (FAB score); c) memory (MAT score); d) depressive symptoms (GDS-15); e) QoL (QoL-AD). For all five criteria, response was defined as improvement or no deterioration according to the NICE [37] guidelines.

Chi-square tests for categorical variables and t-tests for continuous variables were performed to determine whether the groups were homogenous prior to treatment. Group differences regarding the

numbers of responders in the intervention group (IG) and in the control group (CG) were calculated using χ^2/Fisher's exact test. A net gain analysis was computed for the MMSE, defined as (% respondersIG – % respondersCG – [% deterioratorsIG – % deterioratorsCG]). The number needed to treat (NNT) for all response criteria was calculated according to the formula NNT=1/absolute risk reduction.

Due to the sample size per group, and according to the central limit theorem, parametric tests were used when necessary [38]. Differences between responders and non-responders in the IG were calculated using t-tests for continuous variables and chi^2/Fisher's exact test for categorical variables. Binary logistic regression analyses with the variables that differed significantly between responders and non-responders as predictors and response *vs* non-response as the outcome variable were performed for all response criteria. The Forward LR method was used to develop the logit model.

A p-value cut-off of 0.05 was used for hypothesis testing. Data analysis was performed through IBM SPSS Statistics for Windows, version 27.0 (Armonk, NY: IBM Corp). Written informed consent was obtained from all subjects or their legally authorised representatives prior to the intervention. The authors attest that all procedures in this study complied with the ethical standards of the relevant national and institutional committees on human experimentation and with the Declaration of Helsinki of 1975, as revised in 2008. The Health Sciences Research Unit: Nursing of Coimbra approved all procedures involving human subjects/patients, with the approval number 599/06-2019.

Results

No significant differences were found between the intervention and control groups regarding age, gender, educational level, marital status, and type of social care institution attended (Table I). Overall, the majority of the individuals were women, over 80 years old, and with education between 3-4 years. Probable AD was the clinical diagnosis most present in the sample, with the majority living in long-term care. There were no significant differences between the IG and CG at baseline regarding cognition, executive function, memory, depressive symptoms, and QoL.

Mean MMSE change from baseline for the IG was an improvement (+1.34 MMSE points), whereas for the CG the mean MMSE score slightly decreased (–0.08) (Table II). This difference was significant (t = –3.782, p < 0.001, d = –0.478). Comparison of the IG with the CG regarding the expected cognition change (Table III), evidences a percentage of responders significantly higher in the IG (p = 0.001; ϕ = 0.202), with the percentage of pronounced deteriorators being significantly lower in the same group (p = 0.003; ϕ = –0.191). Percentages of expected deteriorators were very similar between both groups (p = 0.311; ϕ = –0.064). Overall, the net gain analysis [(%-responders$_{IG}$ – %-responders$_{CG}$) – (%–deteriorators$_{IG}$ - %–deteriorators$_{CG}$)] evidenced an advantage of 32.9% for the IG.

The percentage of responders was higher in the IG for all the response criteria. However, apart from cognition (p = 0.001; ϕ = 0.202) and memory (p = 0.004; ϕ = 0.184), no other response criteria evidenced a significant difference (Table IV). Differences in the responders between the IG and CG ranged from 7.0 to 18.6% (depending on the criterion), with NNT ranging from 5 (cognition) to 14 (executive function and depressive symptoms).

With the exception of the memory criterion, all response criteria had at least one statistically significant difference between responders and non-responders in the IG (p < 0.05) (Table V). According to the cognition criterion, responders had higher QoL-AD scores (30.23 *versus* 25.57 points), and according to the executive function criterion, responders had more females than expected, and lower FAB scores at baseline (7.18 *versus* 10.17 points). On the basis of the depressive symptoms criterion, responders had higher GDS-15 scores at baseline (7.57 *versus* 4.91 points). In the context of QoL, responders had higher GDS-15 scores at baseline (6.81 *versus* 5.33 points), and lower QoL-AD scores at baseline (27.75 *versus* 31.10 points).

As no significant differences between responders and non-responders for the memory criterion were found, binary logistic regressions were only performed for the cognition, executive function, depressive symptoms, and QoL criteria. For each criterion, one variable fitted the logistic regression models. Goodness of fit was analyzed through the Hosmer-Lemeshow test, with all data fitting the binary logistic regression models tested (p > 0.05). According to the cognition criterion, only the QoL-AD score at baseline entered the model, explaining 9.8% of the variance, with a rate of correct classification of 77.9%. An increase of one point in the QoL-AD score at baseline represented an increase of 15.5% chance of belonging to the responder group. Based on the executive function criterion,

only the FAB score at baseline entered the model, explaining 15.3% of the variance, with a rate of correct classification of 69.5%. An increase of one point on the FAB score at baseline represented an increase of 31.92% chance of belonging to the non-responder group. In consideration of the depressive symptoms criterion, only the GDS-15 at baseline entered the model, explaining 14.9% of the variance, with a rate of correct classification of 67.2%. An increase of one point in the GDS-15 score at baseline represented an increase of 29.7% chance of belonging to the responder group. Finally, for the QoL criterion, only the QoL-AD at baseline entered the model, explaining 7.0% of the variance, with a rate of correct classification of 65.6%. An increase of one point in the QoL-AD score at baseline represented an increase of 9.5% chance of belonging to the non-responder group.

Table I. Baseline characteristics of the sample.

		CG (n = 120) n (%)	IG (n = 131) n (%)	(χ^2) p
Gender	Male	36 (30)	33 (25.2)	(0.727) 0.394
	Female	84 (70)	98 (74.8)	
Clinical Diagnosis	Alzheimer's disease	41 (34.2)	45 (34.4)	(2.667) 0.615
	Vascular dementia	33 (27.5)	29 (22.1)	
	Frontotemporal degeneration	12 (10)	20 (15.3)	
	Parkinson' disease	13 (10.8)	11 (8.4)	
	Other or unspecified neurocognitive disorder	21 (17.5)	26 (19.8)	
Educational level	None/Illiterate	24 (20)	22 (16.8)	(0.844) 0.974
	1-2 years	12 (10)	11 (8.4)	
	3-4 years	61 (50.8)	73 (55.7)	
	5-6 years	9 (7.5)	10 (7.6)	
	7-11 years	7 (5.8)	7 (5.3)	
	> 11 years	7 (5.8)	8 (6.1)	
Type of institution attended	Long-term care	83 (69.2)	88 (67.2)	(0.114) 0.735
	Day care/Home support services	37 (30.8)	43 (32.8)	
		Mean (SD)	Mean (SD)	(t) p
Age		82.94 (7.19)	82.58 (7.18)	(0.398) 0.362
MMSE		21.41 (3.51)	21.27 (3.73)	(0.292) 0.771
FAB		8.42 (3.09)	8.11 (3.5)	(0.722) 0.471
MAT		23.04 (9.18)	24.25 (9.72)	(–1.012) 0.313
GDS-15		6.28 (3.41)	6.15 (3.41)	(0.284) 0.777
QoL-AD		29.93 (5.9)	29.24 (6.3)	(0.891) 0.374

CG: control group; FAB: Frontal Assessment Battery; GDS-15: Geriatric Depression Scale-15; IG: intervention group; MAT: Memory Alteration Test; MMSE: Minimmental State Examination; QoL-AD: Quality of Life in Alzheimer's Disease scale.

Discussion

Results of our responder analysis of a recent randomized clinical trial on iRT for NCD patients shows more responders in the IG compared with the CG on all five response criteria (cognition, executive function, memory, depressive symptoms and QoL), with significant differences for cognition and memory. Regarding the comparison between responders and non-responders, on cognition, responders had higher baseline QoL-AD scores; responders for the executive function, depressive symptoms, and QoL criteria had worse baseline outcome scores. Responders for the QoL criterion had worse baseline GDS-15 scores. Logistic regression analyses predicting the response for the iRT intervention were significant for most of these variables; however its potential to make valid predictions is low because the correct classification rate was under 70% in all cases except for cognition.

Consistent with earlier findings [19,20] our RT intervention group performance was superior to the control group (treatment as usual), as the percentage of responders was higher in the IG in all the response criteria, consistent with other positive RT studies [15,16]. The percentage of responders differed significantly only for MMSE and MAT, consistent with results from the same intervention in older adults with dementia [20] and psychotic disorders [39].

Regarding global cognition, the IG shown a significantly higher percentage of responders and lower percentage of pronounced deteriorators. Thus, the iRT intervention may improve global cognition and delay deterioration in NCD patients. The authors believe that the potential of this iRT is due to its design, inspired by evidence-based programs, with the benefit of the individual format being associated with better outcomes [19,20,40,41]. The

Table II. Mean change and differences between IG and CG for all response criteria.

	CG (*n* = 120) Mean (SD)	IG (*n* = 131) Mean (SD)	(*t*) p	*d* [C.I. 95%]
MMSE	–0.08 (3.38)	1.34 (2.53)	(–3.782) <0.001	–0.478 [–0.729;–0.226]
FAB	–0.26 (2.79)	0.31 (2.28)	(–1.762) 0.079	–0.223 [–0.471;0.026]
MAT	0.78 (6.59)	3.02 (6.28)	(–2.751) 0.006	–0.348 [–0.598;–0.098]
GDS-15	0.08 (2.87)	–0.26 (2.67)	(0.981) 0.328	0.124 [–0.124;0.372]
QoL-AD	–0.88 (4.46)	1.06 (4.87)	(–3.287) 0.001	–0.415 [–0.665;–0.165]

CG: control group; FAB: Frontal Aassessment Bbattery; GDS-15: Geriatric Depression Scale-15; IG: intervention group; MAT: Memory Alteration Test; MMSE: Minimmental State Examination; QoL-AD: Quality of Life in Alzheimer's Disease scale.

Table III. Numbers of responders, expected deteriorators, and pronounced deteriorators regarding MMSE.

	CG (*n* = 120)	IG (*n* = 131)	Delta of the percentage of responders	*p* (χ^2 test, Fisher's exact test)	ϕ
Responders (improvement or no deterioration)	72 (60)	103 (78.6)	18.6	0.001	0.202
Expected deteriorators (deterioration ≤1 MMSE points)	19 (15.8)	15 (11.5)	4.3	0.311	–0.064
Pronounced deteriorators (deterioration >1 MMSE points)	29 (24.2)	13 (9.9)	14.3	0.003	–0.191

CG: control group; IG: intervention group; MMSE: Minimental State Examination.

response rate of 78.6% for the cognition criteria found in this study is higher than the response rate of 58% reported by other trials of non-pharmacological therapies [21] or cholinesterase-inhibitor treatment [42]. Thus, the iRT seems to be more effective than other therapies. However, when interpreting the effect of the intervention, the control group included 60% responders, which could be indicative of factors such as learning effects for the endpoint assessment or the effects of the treatment as usual.

The percentage of responders for memory also favored the IG. Both groups improving may be due to learning effects, though the IG showed a higher response to the intervention. Previous studies suggest that the significant effect for MAT was due to improvements in temporal orientation and semantic memory [20], which is expected since the iRT sessions included the discussion of temporal and spatial orientation and used reminiscence materials that may have stimulated semantic memory.

For cognition, no variable differed between responders and non-responders except for QoL-AD, with higher baseline scores for responders. Regarding executive function, responders were most probable women and those with lower baseline FAB scores. For depressive symptoms, responders had worse GDS-15 scores at baseline. Lastly, for QoL, responders had worse QoL-AD and GDS-15 scores at baseline.

Binary logistic regression revealed that for executive function, depressive symptoms, and QoL, those with worse scores at baseline benefitted the most from the iRT intervention. These results could reflect ceiling effects, which together with the low correct classification rates, limits its potential to make predictions. Previous responder analyses for a non-pharmacological therapy [21] yielded similar results. Those with higher QoL had the greatest improvement in cognition. This result is challenging to interpret, since QoL self-reports of people with NCD are usually not related to cognitive function

Table IV. Response to the iRT intervention.

	CG (n = 120)	GI (n = 131)	Delta of the percentage of responders	p (χ^2 test, Fisher's exact test)	ϕ	NNT
Cognition (MMSE)	72 (60)	103 (78.6)	18.6	0.001	0.202	5.4 (5)
Executive function (FAB)	74 (61.7)	90 (68.7)	7	0.242	0.074	14.3 (14)
Memory (MAT)	70 (58.3)	99 (75.6)	17.3	0.004	0.184	5.8 (6)
Depression (GDS-15)	47 (39.2)	61 (46.6)	7.4	0.237	0.075	13.5 (14)
Quality of life (QoL-AD)	55 (45.8)	73 (55.7)	9.9	0.117	0.099	10.1 (10)

CG: control group; FAB: Frontal Assessment Battery; GDS-15: Geriatric Depression Scale-15; IG: intervention group; MAT: Memory Alteration Test; MMSE: Minimmental State Examination; QoL-AD: Quality of Life in Alzheimer's Disease scale.

Table V. Comparison of responders and non-responders in the IG for the response criteria 'cognition', 'executive function', 'memory', 'depressive symptoms' and 'QoL'.

Variables at baseline	p for group differences between responders and non-responders				
	Cognition (MMSE)	Executive function (FAB)	Memory (MAT)	Depressive symptoms (GDS-15)	Quality of life (QoL-AD)
Gender[a]	0.642	0.043	0.66	0.798	0.573
Age[b]	0.631	0.318	0.454	0.338	0.375
Clinical Diagnosis[a]	0.529	0.2	0.177	0.792	0.993
Educational level[a]	0.095	0.067	0.927	0.239	0.884
Type of institution attended[a]	0.713	0.559	0.129	0.993	0.138
Cognition (MMSE)[b]	0.851	0.071	0.379	0.536	0.159
Executive function (FAB)[b]	0.619	<0.001	0.59	0.921	0.867
Memory (MAT)[b]	0.585	0.118	0.678	0.807	0.274
Depressive symptoms (GDS-15)[b]	0.072	0.094	0.491	<0.001	0.013
Quality of life (QoL-AD)[b]	<0.001	0.619	0.488	0.262	0.002

[a] χ^2, Fisher's exact test; [b] Student's t-test.
FAB: Frontal Assessment Battery; GDS-15: Geriatric Depression Scale-15; IG: intervention group; MAT: Memory Alteration Test; MMSE: Minimental State Examination; QoL-AD: Quality of Life in Alzheimer's Disease scale.

[43], though may at least partially reflect personal means and enthusiasm to generalize upon the intervention.

For all criteria there were not differences between responders and non-responders in the IG regarding educational level and baseline MMSE score, which suggests that the iRT intervention was suitable for all levels of education and cognitive impairment. Given the relatively low educational level of Portuguese older adults (illiteracy rate was 19.5% in Statistics National Institute) [44], the evidence for positive effects of the iRT for people with low educational levels is especially relevant. Additionally, the iRT seems suitable for all NCD included in our sample, with clinical diagnosis showing no differences between responders and non-responders.

A recent review pointed to better results of RT for QoL in institutionalized patients [10] but in our study, institution does not differ between responders and non-responders for the QoL criteria (or any other), with the categories (Day care centre/home support *vs* long term care) representing patients living in the community and institutionalized. However, lower QoL at baseline, as is usually the case of institutionalized people with NCD [45], was associated with an improvement in QoL. Depressive symptoms seem to be an important factor, with more depressive symptoms at baseline for responders, according to both the depressive symptoms and QoL criteria. Given the high prevalence of depressive symptoms among people with NCD and the contribution of depressive symptoms to self-ratings of QoL [43], these results highlight the importance of treating depressive symptoms to improve the wellbeing and QoL of persons with NCD.

Limitations of the current study include that the responder analysis presented was not included in the pre-registered trial protocol (clinicaltrials.gov ID: NCT04047238). Additionally, we were limited in access to certain predictors of the response, such as measures of severity (e.g. *Clinical Dementia Rating*) or functional impairment, medications, and other treatments received. The diagnostic heterogeneity of the sample and the lack of biomarker confirmation also limits the interpretation of the results. Lastly, the limited time of the intervention and the lack of follow-up may have reduced the capacity to detect the effects of the intervention or the predictors associated.

Conclusions

Overall, the iRT intervention showed high response rates for cognition and memory, comparable with other pharmacological and non-pharmacological treatments. People with better QoL improved on cognitive functioning. People with worse executive function, low QoL, and more depressive symptoms, seem to benefit the most from the intervention for those respective outcomes. The iRT intervention seems suitable for all the NCD, educational, and cognitive impairment levels included in this study. Understanding the factors that contribute to responses to cognitive interventions can help practitioners focus treatments to these areas in order to better prepare patients to undergo the interventions and avoid unnecessary frustration and challenges to those who may be less likely to respond to treatment. Adding to the options among effective non-pharmacologic therapies has clinical benefits such as being more economical, can be easily trained and implemented, and does not cause undesired side effects.

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Ensayo aleatorio de terapia de reminiscencia individual para adultos mayores con deterioro cognitivo: un análisis de respuesta de tres meses

Introducción. La terapia de reminiscencia individual (iTR) ha demostrado mejorar la cognición, el estado de ánimo y la calidad de vida (CdV) de personas con trastornos neurocognitivos (TNC).

Objetivo. Se exploraron los predictores de la respuesta positiva a la iTR utilizando el análisis de respuesta, una estrategia analítica de los factores que contribuyen a una respuesta a la intervención.

Pacientes y métodos. Reanálisis de un ensayo controlado aleatorizado de 251 adultos mayores portugueses con TNC. Los participantes recibieron dos sesiones de iTR durante 13 semanas (26 sesiones) o el tratamiento habitual. Las variables analizadas fueron la cognición global *(Minimental State Examination),* la memoria (test de alteración de la memoria), el

funcionamiento ejecutivo –batería de evaluación frontal (FAB)–, los síntomas depresivos –escala de depresión geriátrica-15 (GDS-15)– y la CdV –escala de calidad de vida en la enfermedad de Alzheimer (QOL-AD)–.

Resultados. Hubo más respondedores en el grupo de intervención que en el de control en los cinco criterios, con diferencias significativas para cognición (p = 0,001; ϕ = 0,202; número necesario para tratar = 5) y memoria (p = 0,004; ϕ = 0,184; número necesario para tratar = 6). En la línea de base, los respondedores tenían: puntuaciones más altas de QOL-AD (30,23 frente a 25,57; p < 0,001; d = –0,774) para la cognición; puntuaciones FAB más bajas (1,41 frente a –2,12; p < 0,001; d = 0,928) para el funcionamiento ejecutivo; y mayores puntuaciones en la GDS-15 para los síntomas depresivos (7,57 **frente a** 4,91; p < 0,001; d = –0,845) y para la CdV (6,81 frente a 5,33; p = 0,013; d = –0,443).

Conclusiones. La iTR mostró altas tasas de respuesta para la cognición y la memoria. Los que tienen peor función ejecutiva, estado de ánimo y CdV se beneficiaron más de la intervención para esas respectivas variables. La iTR tiene efectos beneficiosos en los TNC, con el estado de ánimo y la CdV como factores influyentes.

Palabras clave. Calidad de vida. Demencia. Depresión. Función ejecutiva. Memoria. Trastornos neurocognitivos.