Spaced Retrieval Training for Memory Enhancement in Adults with Dementia

Lauren Camenzind, MOT/S, Molly Kafader, MOT/S, Rachel Schwam, MOT/S, Mikayla Taylor, MOT/S, Zoie Wilkes, MOT/S, & Madison Williams, MOT/S

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The final portfolio contains 8 research articles from national and international journals. Study designs include one systematic review, one randomized control trial with pretest-posttest design, three small-scale randomized control trials, one quasi-experimental study with no control, one time-series study, and one case study. All studies relate directly to components of the evidence-based practice question and will be used to draft new recommendations for implementation regarding spaced retrieval training for memory enhancement in adults with dementia.

Seven out of the eight articles looked at the effects of SR techniques on functional tasks. Articles looked at eating difficulty (1), independent use of walkers (1), iADL function (3), use of technology (1), and ADL function (1). One out of eight articles looked at benefits of spaced retrieval techniques on episodic memory, which is not necessarily a functional task, but is needed to perform functional tasks.

Evidence-Based Practice Question

Are spaced retrieval training methods effective in facilitating increased memory for functional tasks in individuals with dementia?

Clinical Scenario

There are a growing number of dementia patients in inpatient, outpatient, and acute care settings. Our practitioner-mentor expressed the want and need to improve those patients' quality of life by increasing their ability to learn new things. Our research is intended to focus around the idea of patients being able to relearn functional tasks that they have lost or use new learning techniques to adapt their methods of completing tasks.

Search Methodology and Terms:

PICO Question Categories	Search Terms Used
Population: Individuals with dementia	Dementia, Alzheimer's
Intervention: Spaced retrieval training methods	Space retrieval
Comparison: N/A	N/A
Outcomes: Increased memory for functional tasks	N/A

Search Terms Used

Databass and Sources Searched	Search Terms	Limits Used
Pubmed, CINAHL, and Scopus	(dementia OR Alzheimer's) AND ("spaced retrieval")	2010 - 2021, English

Inclusion Criteria for Articles

● Articles published in English ● Articles published within the last 10 years ● Article's participants had to have a clinical diagnosis or probable diagnosis of Alzheimer's disease

Exclusion Criteria for Articles

● Articles that were concerned with dysphagia ● Articles published more than 10 years ago

Review Process

● After collaborating with our mentor, our group wanted to determine if relearning was possible in dementia patients. ● The search strategy was created to yield broad results regarding SR use and dementia patients. Database selection was made from the UTHSC library popular databases page. ● The search strategy was put into each database. Results were first scanned by title, then by abstract and last by full text to ensure the articles were relevant to the PICO question. ● Each relevant article was distributed to individual team members to appraise the article in depth by completing the CAP Template found in Hissong et al. (2015). ● Our mentor reviewed the selected articles and we gave rationale for our choices. Each CAP was reviewed by fellow team members before being turned into Dr. Mitchell for further review.

Search Results by Level of Evidence

Level of Evidence	Study Design	Number of Articles Included
I	Systematic Review, RCT with Pretest-Posttest Design	2

II	Small-scale RCTs	3
III	Quasi-experimental without control, time-series	2
IV	Case Study	1
		Total Articles Reviewed: 8

Main Findings

Level I	90% - SR training can benefit people with dementia in learning new and previous information, strategies, and can reduce behavioral problems while promoting functional daily activities. 84% - SR and Montessori- based activities are effective for improving eating difficulty
Level II	82% - SR and ELL techniques effective for relearning of iADLs for AD patients and to maintain gains over at least 3 months 78%- Mild to moderately severe Alzheimer's Dementia clients could successfully acquire new information from TE, EL, and SR methods to relearn IADLs 75% - Patients with dementia can acquire new information using both SR and CH procedures and have potential to benefit from rehabilitation services
Level III	86% - SRT effective for improving spontaneous recall and recall with cues event details from a recent target event compared to control event. Gains not sustained by the 1-month follow-up 43% - Early stage AD able to respond, recall, and recognize information on mobile devices using SRT, without experience in technology. Increased workload could cause fatigue and errors.
Level IV	43% - Independent use of walkers increased after the SR technique was implemented. Results varied at 1-week follow-up

Limitations

Level I	90% - Variability in the studies in regards to transparency of results, diversity of patients, differing methods, low ecological validity, testing inconsistency between studies 84% - Single blinding
Level II	82% - Small sample size; completers-only analysis; impossible to assess with inter-rater fidelity measures; restricted possibility of generalization of the findings 78% - Participants tested on different tasks; possible confounding factors to relearning 75% - Precipitous drop in cognitive functioning; participant attrition
Level III	86% - Blinding was not utilized 43% - Limited generalizability
Level IV	43% - Results based on subjective observations, not reported if staff was trained

Bottom Line and Recommendations

Spaced Retrieval Training methods are effective for increasing memory in order to relearn functional tasks in mild to moderate dementia patients. The results varied based on follow-up time and maintenance of SR techniques. Our team recommends the use of SR training methods based on the proven effectiveness from the studies.
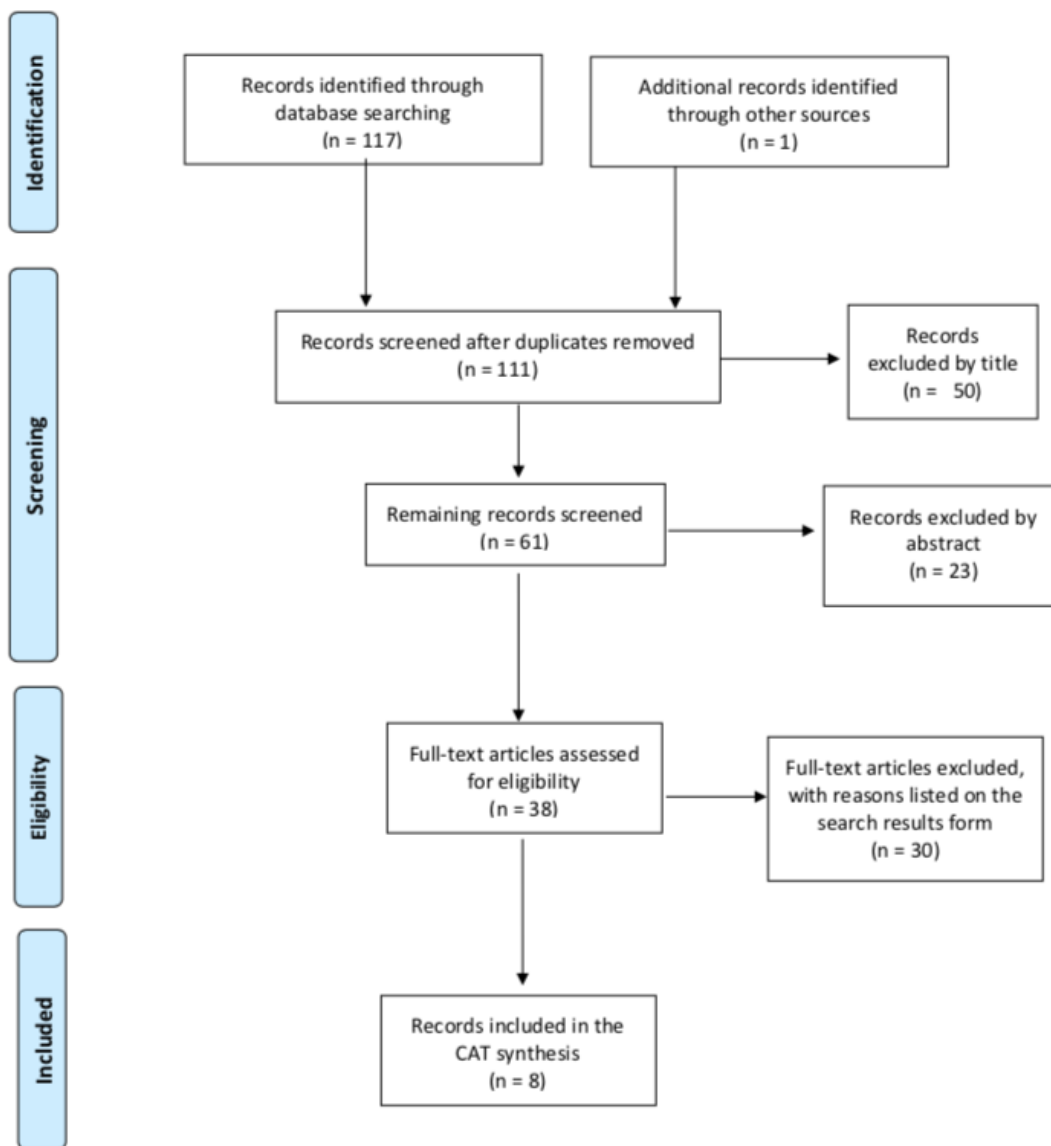
Name of Appraiser(s): Lauren Camenzind, MOT/S, Molly Kafader, MOT/S, Rachel Schwam, MOT/S, Mikayla Taylor, MOT/S, Zoie Wilkes, MOT/S, & Madison Williams, MOT/S	**Date Completed:** 4/14/21

Appendix A

Modified PRISMA 2009 Flow Diagram (awm 2018)

Identification

Records identified through database searching (n = 117)

Additional records identified through other sources (n = 1)

Screening

Records screened after duplicates removed (n = 111)

Records excluded by title (n = 50)

Remaining records screened (n = 61)

Records excluded by abstract (n = 23)

Eligibility

Full-text articles assessed for eligibility (n = 38)

Full-text articles excluded, with reasons listed on the search results form (n = 30)

Included

Records included in the CAT synthesis (n = 8)

Appendix B

References

Bourgeois, J., Laye, M., Lemaire, J., Leone, E., Deudon, A., Darmon, N., Giaume, C., Lafont, V.,Brinck-Jensen, S., Dechamps, A., König, A., & Robert, P. (2016). Relearning of activities of daily living: A comparison of the effectiveness of three learning methods in patients with dementia of the Alzheimer type. *The Journal of Nutrition, Health & Aging, 20*(1), 48–55. https://doi.org/10.1007/s12603-016-0675-4

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Creighton, A. S., Davison, T. C., van der Ploeg, E. S., Camp, C. J., & O'Connor, D. W. (2015). Using spaced retrieval training to teach people with dementia to independently use their walking aids: Two case studies, *Clinical Gerontologist, 38*(2), 170-178. doi: 10.1080/07317115.2014.988899

Creighton, A. S., van der Ploeg, E. S., & O'Connor, D. W. (2013). A literature review of spaced-retrieval interventions: A direct memory intervention for people with dementia. *International Psychogeriatrics*, *25*(11), 1743–1763. https://doi.org/10.1017/S1041610213001233

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Name of Appraisers:

Lauren Camenzind, MOT/S

Molly Kafader, MOT/S

Rachel Schwam, MOT/S

Mikayla Taylor, MOT/S

Zoie Wilkes, MOT/S

Madison Williams, MOT/S

Appendix C

	Critically Appraised Paper #1
	Are spaced retrieval training methods effective in facilitating increased memory for functional tasks in individuals with dementia?
	Bourgeois, J., Laye, M., Lemaire, J., Leone, E., Deudon, A., Darmon, N., Giaume, C., Lafont, V., Brinck-Jensen, S., Dechamps, A., König, A., & Robert, P. (2016). Relearning of activities of daily living: A comparison of the effectiveness of three learning methods in patients with dementia of the Alzheimer type. *The Journal of Nutrition, Health & Aging*, *20*(1), 48–55. https://doi.org/10.1007/s12603-016-0675-4
Purpose of the study:	● To examine how well trial and error learning, errorless learning, and modeling with spaced retrieval works on relearning skills for instrumental activities of daily living in individuals that have mild to moderately severe levels of Alzheimer's Dementia.
Setting:	● Nursing home, personal home, extended care facility center
Participants or Sample:	● 52 participants recruited by the Nice research Memory Center, 60+ years of age, diagnosed with mild or moderately severe Alzheimer's Dementia ● Subjects were excluded from the study if they had schizophrenia or depressive disorders, agitation, euphoria, disinhibition, irritability, or aberrant motor behavior. ● The mean age of participants was 84.71 years (*SD* = 7.67). Females made up 69.23% of the participants, while males were 30.77%.
Study Design and Methodology:	● Randomized control trial ● Participants were randomly assigned to one of the three intervention methods by the researchers ● The recruiters who found the participants had no role in the intervention, there was an independent researcher who randomly assigned participants to an intervention, and medical staff and therapists were kept blind to the study design, outcomes, and group assignments ● The only professionals who were not kept blind to the data were the statisticians and data monitor, however, they did not have any contact with the participants.
Level of Evidence:	● Level II – a single RCT
Outcomes and Main Findings:	● Those with mild to moderately severe Alzheimer's Dementia could successfully relearn IADLs ● All three intervention methods showed improvements in performance among the individuals ● No significant difference observed in overall performances between the one-month delayed evaluation and post-intervention evaluation ● One thing that could have altered the outcomes was whether the individuals practiced on their own time without a therapist present.
Intervention Highlighted Through the Research:	● Use of three learning methods (trial and error learning, errorless learning, and learning by modeling with spaced retrieval) to increase the relearning of ADLs. ● Participants were trained in their own sessions two times a week over six weeks and each session lasted for two hours ● All the participants were reassessed at one week for post-intervention evaluation and again at 4 weeks for delayed evaluation ● The IADLs the participants worked on were chosen from a set of 50 activities that come from an Alzheimer's website. Materials used in each intervention were cue cards that had the instructions for the IADLs written on them and pictures to go along with it.
No idea Im looking at this groupsLimitations:	● Relatively small sample size ● Not all participants were relearning the same skills (had different numbers of steps) Possible confounding factors of relearning (participants could have practiced the tasks by themselves without the therapist between sessions)
This Study Was Identified as the "Best" Evidence and Selected for the Portfolio for the Following Reasons:	● This study was included because it was a RCT and compared spaced retrieval to other techniques for relearning skills ● This study is important because it is relevant to our PICO question and it shows that spaced retrieval can be effective in relearning functional tasks for someone who has dementia, and also shows other effective interventions that can yield the same outcome

Quality Score:	• 78% - High Quality Study

Critically Appraised Paper #2

Are spaced retrieval training methods effective in facilitating increased memory for functional tasks in individuals with dementia?

Bourgeois, M. S., Camp, C., Rose, M., White, B., Malone, M., Carr, J., & Rovine, M. (2003). A comparison of training strategies to enhance use of external aids by persons with dementia. *Journal of Communication Disorders*, *36*(5), 361–378. https://doi.org/10.1016/s0021-9924(03)00051-0

Purpose of the Study:	• To compare the effectiveness of two training approaches, Spaced Retrieval (SR) and Cueing Hierarchy (CH), for teaching individuals with dementia a strategy goal involving an external memory aid. The purpose applies to my PICO question because it deals with the dementia population and the effectiveness of SR in regard to increasing memory and ability to learn new things.
Setting:	• Long-term care facilities and an adult day care facilities
Participants or Sample:	• 25 individuals diagnosed with dementia were recruited from long-term care and adult day care facilities. • Participants were drawn from a larger study of goal attainment in speech pathology • Each training site identified potential participants with dementia that exhibited a variety of memory and other problem behaviors • Average age of the participants was 83.8 years, 16% were black and 84% were white, 35% were male and 64% were female.
Study Design and Methodology:	• RCT • Treatment began with one of the identified goals (5 total). Treatment sessions were 30 minutes long and consisted of as many training trials as necessary to demonstrate progress towards the goal or goal mastery.
Level of Evidence:	• Level II
Outcomes and Main Findings:	• Both SR and CH procedures were effective • SR mastered more goals (p <.035) • The average number of sessions required for goal mastery between SR & CH techniques were not statistically significant (M = 10.3 for SR and M = 11 CH) • The ability to maintain goals at 4 months post-test, between SR & CH techniques were statistically significant (SR maintaining more) (p > .05) • Outcome measures: the ability to remember which memory aid to use and then ability to complete the activity/answer the question.

Intervention Highlighted Through the Research:	● 30-minute treatment sessions consisting of as many training trials as necessary to demonstrate progress towards the goal or goal mastery ● SR Training: Clinicians would ask "what can you do to know what activity you should do?" The correct response is "Look at my activity list". If a correct response was given, they would talk about an unrelated topic for designated interval (30 seconds, 1 minutes, 2 minutes) for the entire 30-minute session. The goal was mastered when the correct response was given to the first prompt of the next 3 sessions with a minimum of 24 hours in between them. ● CH Training: Clinicians would ask "what can you do to know what activity you should do?" The correct response is "Look at my activity list". However, if the client did not respond immediately or answered incorrectly, the clinician would hierarchy of cues for the 30-minute treatment session.
Limitations:	● Participants having a precipitous drop in cognitive functioning (MMSE = 19 to MMSE =4) and leaving the facility shortly after starting and had only 8 sessions of CH and 3 sessions of SR
This Study Was Identified as the "Best" Evidence and Selected for the Portfolio for the Following Reasons:	● This study was included because it was an RCT and it compared SR to another technique commonly used (CH) which gives us good evidence and results. It was clear with the treatment, participants and way of scoring and gave multiple examples and pictures of external aids. ● It shows that each technique is effective, but that SR would be more effective which can be applied in our mentor's setting and will help give them evidence for the interventions they choose with their clients.
Quality of Study:	● 75% High Quality Study

Critically Appraised Paper #3

Are spaced retrieval training methods effective in facilitating increased memory for functional tasks in individuals with dementia?

Creighton, A. S., Davison, T. C., van der Ploeg, E. S., Camp, C. J., & O'Connor, D. W. (2015). Using spaced retrieval training to teach people with dementia to independently use their walking aids: Two case studies, *Clinical Gerontologist, 38*(2), 170-178. doi: 10.1080/07317115.2014.988899

Purpose of the Study:	● Using spaced retrieval (SR) to teach 2 participants diagnosed with dementia to independently use their walking aids. This article also highlights clinical aspects to consider when using SR with people with dementia. It is related to our PICO question because it looks at the effectiveness of SR with functional activities (using a walker) and the participants both had dementia which is the same as our PICO questions.
Setting:	● Nursing home (7 months and 5 years residing)
Participants or Sample:	● 2 participants. Nursing Home Residents who failed to use their walker. ● Participant 1 (Rose): 91-year-old Caucasian female, chart diagnosis of dementia, score of 17 on MMSE (moderate cognitive impairment), resided in nursing home for 5 years ● Participant 2 (Heather): 85-year-old Caucasian female, chart diagnosis of dementia, score of 8 on MMSE (severe cognitive impairment), resided in nursing home for 7 months

Study Design and Methodology:	- Case Study. - Each participant received 5 individually administered 1-hour sessions of SR training, occurring once a day for 5 consecutive days inside the participant's room. To determine changes observations were conducted for 8 hours over 2 consecutive days, before and after SR and at a 1-week follow-up.
Level of Evidence:	Level IV
Outcomes and Main Findings:	- Rose: - Independent use of her walker increased by 15% to account for 30% of her observed walking behavior - At 1-week follow up it increased by 16% to a total of 46% - Staff reported that they noticed Rose remembering to use her walker more and required less prompting. - Heather: - Independent use of her walker increased by 11% to account for 15% of her observed walking behavior - At 1-week follow up it decreased to only represent 3% of observed walking behavior - Staff reported no perceived improvement in the use of the walker - The outcome measures were the staff's observations - No adverse events or complications
Intervention Highlighted Through the Research:	- Use of Spaced Retrieval to capitalize on the implicit and procedural memory systems in order to improve and learn new functional skills and tasks. 5 individually administered 1-hour sessions of SR training, occurring once a day for 5 consecutive days inside the participant's room. Prompt question: "When you walk, what should you use?", a correct response was the participant getting up from the chair and grabbing the walker, or saying, "my walker" and then showing the tester how they would get up and use the walker. - If the correct response was given, then the time until recall was doubled as follows: 30 seconds, 1 minutes, 2 minutes, 4 minutes, 8 minutes, 16 minutes, 32 minutes.
Limitations:	- It was not reported how staff was trained - Results were only based on observations (subjective), not a standardized test (objective) - It was not documented if the staff was trained on what was and what was not considered independent use and it was not documented if outcome measures were valid and reliable.
This Study Was Identified as the "Best" Evidence and Selected for the Portfolio for the Following Reasons:	- This study was included because it looked at the effectives of SR when used with functional skills/activities like walker use which was consistent with our PICO question - It had clear methods of how they used SR for intervention and could easily be replicated - There is little research done regarding SR and the functional activity of walker use, so the study helped address the gap in literature and highlight important clinical aspects to consider when working with this technique with client's with dementia. It was a low level of evidence (IV) but that is because this specific activity has little research and this study is exploring the effectiveness of SR on improving independent walker use.
Quality of Study:	43% Low Quality Score

Critically Appraised Paper #4

Are spaced retrieval training methods effective in facilitating increased memory for functional tasks in individuals with dementia?

Creighton, A. S., van der Ploeg, E. S., & O'Connor, D. W. (2013). A literature review of spaced-retrieval interventions: A direct memory intervention for people with dementia. *International Psychogeriatrics*, *25*(11), 1743–1763. https://doi.org/10.1017/S1041610213001233

Purpose of the study	● The purpose of this systematic review is to review the use of spaced-retrieval methods across various studies to determine whether or no spaced-retrieval is beneficial for people with dementia in prolonging independence in functional everyday activities and reducing behavioral problems.
Setting	● The settings in each of the studies varied from adult day care centers, memory or research clinics, residential facilities, over the telephone, and private homes.
Participants or Sample	● Individuals with dementia. Sample sizes ranged from 1 to 87 across the 34 studies.
Study Design and Methodology	● 34 studies were chosen for this systematic review and the study design and methodology varied throughout the studies ● Spaced-retrieval was the commonality. ● The researchers made sure articles were primary, peer-reviewed research studies in English. ● The levels of evidence that were used included: II (3) III(13) IV(18)
Level of Evidence	● Level I
Outcomes and Main Findings	● Previous studies show that spaced-retrieval training can help individuals with dementia with face- and object- name associations and cue-behavior associations that focus on reducing problem behaviors while promoting functional performance. ● Spaced-retrieval has also shown to help individuals with dementia in recollecting past events. Overall, it was seen throughout the studies that SR training can benefit people with dementia with learning new and previous information, strategies, and can reduce behavioral problems while promoting functional daily activities.
Intervention Highlighted Through Research	● The 34 studies found were further divided into four types of SR training: name-face associations, object-name associations, cue-behavior associations, and mixed goals/other.
Limitations	● The variability found in the 34 studies created a limitation in regards to transparency of the results, outcome measures, study design, and presentation of findings. ● Patient diversity created challenges for the audience. ● 11 out of 34 studies had a control group, so the differing methods created difficulty when drawing conclusions ● Low ecological validity of the goals in the face- and object-name association studies ● 11 studies used SR training along with other memory training activities, so there was inconsistency in testing. ● 23 studies did not compare the statistics of pre- and post-intervention data
This Study Was Identified as the "Best" Evidence and Selected for the Portfolio for the Following Reasons:	● This is a systematic review, so it is considered level 1 evidence which is very high. Each article chosen in this review had the same intervention known as spaced-retrieval training which was the intervention we are focusing on for our PICO question.
Quality Score	● Score of 9 High Quality Study (90%)

Critically Appraised Paper #5

Are spaced retrieval training methods effective in facilitating increased memory for functional tasks in individuals with dementia?

Lin, L. C., Huang, Y. J., Su, S. G., Watson, R., Tsai, B. W., & Wu, S. C. (2010). Using spaced retrieval and Montessori-based activities in improving eating ability for residents with dementia. *International Journal of Geriatric Psychiatry*, *25*(10), 953–959. https://doi.org/10.1002/gps.2433

Purpose of the Study	- Investigate the effectiveness of training of SR and Montessori- based activities in decreasing feeding difficulty and increasing nutritional status for residents with dementia - This applies to our PICO question as it is looking at spaced retrieval training and its impact on improving the functional task of eating
Setting	Dementia special care units at three long- term care facilities in Taiwan
Participants or Sample	85 residents were chosen via a purposive sampling method - Inclusion criteria included a diagnosis of dementia, a score of 2 or higher on the EdFED, the ability to stay in the institution the entire study period, and an MMES result ranged from 10- 23 - The average age of the participants was 81.18 years and there were no significant demographic differences
Study Design and Methodology	- A single evaluator, blind, randomized control trial was used - Three institutes were randomly assigned to either the SR group, Montessori- based activity group, or the control group. After taking baseline measures of eating difficulty, nutritional status, and eating amount, they underwent 8 weeks of either SR training, Montessori- based activity training, or routine activity. - Following intervention, the same type of data that was taken at baseline was taken again.
Level of Evidence	Level I – RCT with pre-test/ post-test design
Outcomes and Main Findings	- This study confirms the efficacy of SR and Montessori- based activities and their positive impacts on eating difficulty and eating ability - Repeated measures analysis was done on eating ability and nutritional status - STR & Montessori- based methods found a decrease in eating difficulty & therefore a decrease for a need for caregiver assistance (EDFED & assisting feeding scores) but Montessori- based methods needed much more physical and verbal assistance - Nutritional status (MNA) was much higher for SR vs control (3.64) compared to Montessori vs control (-2.58)
Intervention Highlighted Through the Research	- In the SR training sessions, they utilized immediate, 1, 2, 4, 8, 16, and 32 minute time interval trials to train the participants on eating procedure and eating behavior - In the Montessori- based sessions, they focused on hand-eye coordination, scooping, pouring, and squeezing skill in behavior activity groups - Sessions were 30- 40 minutes long, 3 times per week, for 8 weeks
Limitations	- Single blinding was used - Insignificant findings are weight and BMI despite significant differences in eating difficulty and feeding ability

This study was identified as the "Best" Evidence and Selected for the Portfolio for the Following Reasons	● This study helps answer our PICO question by providing evidence on the efficacy of spaced retrieval as a method for improving memory for the daily task of eating
Quality of Study	● 84% - High Quality

Critically Appraised Paper #6 Are spaced retrieval training methods effective in facilitating increased memory for functional tasks in individuals with dementia? Small, J. A., & Cochrane, D. (2020). Spaced retrieval and episodic memory training in Alzheimer's disease. *Clinical Interventions in Aging*, *15*, 519–536. https://doi.org/10.2147/CIA.S242113	
Purpose of the Study	● Replicate and extend findings from a pilot study on SR training and short- term and long- term episodic memory ● This applies to our PICO questions because it is looking at the efficacy of SR training for improving memory
Setting	● In the participant's homes
Participants or Sample	● 15 participants who had an AD diagnosis or probable AD diagnosis were recruited via convenience sampling method through advertisements ● 8 participants were male and seven were female between the ages of 57 and 91
Study Design and Methodology	● Quasi- experimental longitudinal study design, with 4 training sessions over a 2-week period (two 90- minute sessions twice a week) to assess cued recall and spontaneous recall of an event ● Participants attended an individualized target event in their homes (which was recorded for future training), then were asked to recall 3 core details from that target event and from a control event immediately and at various intervals of time ● Three follow-up maintenance assessments were done at 1- week post- training, 1-month post-training, and 3 months post-training to assess long term effects of SR training.
Level of Evidence	● Level III
Outcomes and Main Findings	● Outcomes included ability to recall details from recent events ● Secondary outcome measures were the Revised Memory and Behavior Problems Checklist (RMBPC) and the Quality of Life- Alzheimer's Disease (QoL-AD) ● SR training had significant effects on ability to spontaneously recall and recall with cues event details from a recent target event compared to recalling details from a recent (untrained) control event ● These gains were not sustained by the third maintenance session (1- month post-training)
Intervention Highlighted Through the Research	● SRT was the intervention used at each training session ● After the target event, the participants were asked prompted questions and expected to give the correct target answer at specified time intervals (immediately, 1, 2, 4, 8, and 16 minutes) ● After each successful cued recall response, they reviewed the video of the target event and continued to the next time interval ● After a successful response but before reviewing the video, the participant was asked if they could spontaneously recall any details from the event

	● In the control sessions, training was not provided, spontaneous recall was assessed, and cues provided were vague
Limitations	● Blinding was not utilized because it was not possible
This study was identified as the "Best" Evidence and Selected for the Portfolio for the Following Reasons	● This study provides evidence for spaced retrieval training as a method to improve individual's ability to recall details from recent events and maintain episodic memory (cued recall and spontaneous recall)
Quality of Study	● 86% - High Quality

Critically Appraised Paper #7

Are spaced retrieval training methods effective in facilitating increased memory for functional tasks in individuals with dementia?

Thivierge, S., Jean, L., & Simard, M., (2014). A randomized cross-over controlled study on cognitive rehabilitation of instrumental activities of daily living in Alzheimer disease. *The American Journal of Geriatric Psychiatry: Official Journal of the American Association for Geriatric Psychiatry*, *22*(11), 1188–1199. https://doi.org/10.1016/j.jagp.2013.03.008

Purpose of the Study	● Investigate the effectiveness of a memory rehabilitation program to re-learn iADLs in patients with Alzheimer disease ● Involved errorless learning and spaced retrieval techniques
Setting	● All evaluation and training sessions were performed at the patient's home.
Participants or Sample	● Twenty patients ● Recruited from the Alzheimer Society (N = 6), at homes for the elderly (N = 5), using public advertisement and local papers (N = 5), at Memory Disorders Clinic (N = 3), and through an ongoing research project (N = 1) ● Participants had to: 1) have a diagnosis of Alzheimer disease, confirmed medical records, history, and results of the neuropsychological evaluation performed at screening; 2) be in mild to moderate stages determined by the MMSE; 3) present an iADL deficit that could be re-learned with cognitive training; 4) psychotropics, nootropics, and other medications stabilized for at least 3 months ● Patients were split into 2 groups and had a total of 17 participants after 3 people withdrew ● Group 1 (N = 9) had a mean age of 80.00 years and 66.7% female ● Group 2 (N = 8) had a mean age of 80.00 years and 75% female
Study Design and Methodology	● Block-randomized crossover controlled study; single-blinded trial ● Examiners of the immediate post-training and follow-up evaluations were blind to the participants' status (trained or untrained) ● Five blocks of 4 participants formed after screening and baseline evaluations; then were individually randomized with 2 participants from each block going into Group 1 or 2 ● Group 1 trained first twice a week for 4 weeks; didn't receive training for the rest of the study ● Group 2 first on waiting list as controls; then received training after the second follow-up evaluation at week 13 ● Each group had an immediate post-training evaluation following training with two follow-up evaluations 4 weeks later each time done by both groups
Level of Evidence	● Level II: Small-scale RCT

Outcomes and Main Findings	● Study showed effectiveness of cognitive rehabilitation techniques to re-learn iADLs in patients with mild to moderate AD ● All patients significantly improved their performances following training compared to their baseline ● SPSS results showed a statistical significance for "Treatment" indicating the superiority of the intervention over the absence of treatment ● P-values included 1.000 for "age in years", 0.490 for "education in years", 0.707 for "sex", and 0.638 for "Mini-Mental State Examination" ● Outcome measures valid and reliable because they were individualized to assess the performance on the iADL chosen by the specific individual in a problem area that they had recognized ● One "spontaneous" improvement in Group 2 while they were still untrained that did not occur at any other time; authors gave many possible explanations for this and none should have an effect on the validity of the study ● Study showed that it is possible for AD patients to relearn significant iADLs with the ELL and SR techniques and to maintain gains over at least 3 months; findings emphasize the need to design individualized intervention tailored on patients' particular needs
Intervention Highlighted Through the Research	● Participants individually trained on one of these tasks for the iADL that they chose: television (remote control, DVD, and video), radio or music devices functioning, computer functioning (email and internet research, games) or leisure activities (Wii game, origami) ● Participants received their training twice a week for 4 weeks at their planned times ● Their caregivers were encouraged to practice the task with them between training sessions ● Training sessions involved ELL, to decrease the degrees of assistance needed to reduce the overall production of errors, along with SR ● SR was used to facilitate the retrieval of information after expanded delays of 30 seconds to 8 minutes inserted between each correct realization of the task
Limitations	● Small sample size ● Completers-only analysis ● Impossible to assess the performance of the trainers/raters with inter-rater fidelity measures ● Restricted possibility of generalization of the present findings
This Study Was Identified as the "Best" Evidence and Selected for the Portfolio for the Following Reasons:	● This study was chosen because it shows the use of SR plus ELL being used as an intervention to increase the participants' memory while doing functional tasks for the iADL that they specifically chose based on their difficulties. ● This study is important information for our research because it looked at follow-up scores that see the long-term effects of the intervention treatment and the techniques of SR and ELL that were used could easily be transferred to different settings.
Quality Score	● 82% (high quality)

Critically Appraised Paper #8 Are spaced retrieval training methods effective in facilitating increased memory for functional tasks in individuals with dementia? Zmily A, Mowafi Y, Mashal E. (2014). Study of the usability of spaced retrieval exercise using mobile devices for Alzheimer's disease rehabilitation. *JMIR Mhealth and Uhealth, 2*(3), e31. doi: 10.2196/mhealth.3136.

Purpose of the Study	● The purpose of this study was to focus on exploring the use of modern mobile technology to enable people with AD to increase their abilities to carry out activities of daily living and promote independence and social participation.

Setting	● Senior residential care facility and housing.
Participants or Sample	● 10 participants volunteered, four being females and six males. Primarily seniors who had early stages of AD. ● The mean age is 75 years. ● Seven participants were current handheld mobile device owners, three participants had never owned a handheld mobile device. Three participants were familiar with tablets, 7 participants were not familiar with tablets.
Study Design and Methodology	● Quasi-experimental without controls
Level of Evidence	● Level III
Outcomes and Main Findings	● Participants were able to understand, recognize, and recall information from the ADcope app. ● The participants performed better with the graphic-based tasks compared to the text-based tasks with a lower response time and low workload. If the workload was increased, it could bring on fatigue and cause errors. ● Results showed a statistically significant difference (p=.047) between the text-based spaced retrieval tasks and graphic-based spaced retrieval tasks for an average elapsed time per question and post task questionnaire score (p=.02). ● Results also showed a statistically significant difference in text-based space retrieval tasks and graphic-based spaced retrieval tasks for an average response time (p=.001), correct answer scores (p<.001), and NASA-TLX (p<.001).
Intervention Highlighted Throughout the Research	The app ADcope included: ● Quality of Life Improvement – Memory Wallet, a calendar with reminders, and Near Field Communication (NFC) tags. ● Memory Exercise Modules - Audio Assisted Memory Training, Spaced Retrieval. Spaced retrieval tasks have an assessment phase and training phase. The intervention focused on being able to recall the sentences shown with a certain time frame. During the assessment phase, the participant reads a sentence, after a 90 second delay on the first trial, 4 questions pop up that relate to the sentence they have to answer. If answered correctly, then 10 secs are added to the delay. If answered wrong or not within 60 seconds, then 10 seconds are decreased for the next question. It's the same procedures for the training phase but limited to 10 questions with 5 seconds of feedback. Recall time from the assessment phase is used to log information. In addition, there were two types of quizzes used throughout, in which the participants performed both types. The first quiz was the text-based spaced retrieval that looked at increasing the client's ability to recall detailed information. Ten questions consist of 5-9 long words and answers consist of 1-2 words. The second quiz was the graphic-based spaced retrieval that included geometrical shapes, flags, and traffic signs to increase awareness with objects and images. Questions included a shape or image and answers consisted of four multiple-choice images to choose from, based upon that previous image. Data was recorded.
Limitations	● Limited generalizability due to small sample size and the difficulty of finding individuals with early stages of AD.
This Study Was Identified as the "Best" Evidence and Selected for the Portfolio for the Following Reasons	● I feel that this article is important, because it focuses on cognitive functioning such as memory, thinking, and reasoning all in which our PICO question revolves around to promote new learning.
Quality of Study	● 43% - Low quality

Client: E.B.

SR Task or Question: Wheelchair safety

Maximum Time Interval with Accurate Response (min)					
32					
16				✖	
8			✖		✖
4		✖			
2	✖				
1					
	5/17	5/19	5/21	5/24	5/26

Date

- We recommend using SR to teach functional tasks or new techniques to accomplish tasks.
- Further research is needed to set specific guidelines for implementation that yields optimal results.
- Consider duration of 6-8 weeks, 3-4 sessions per week, 1-32 minute intervals between correct responses, & follow-up measures in 1-12 weeks.
- A therapist can use a chart, like the one above, to track the maximum time interval that a client could have in between giving an accurate response to a question after instruction is given. This chart can easily be converted into a graph to measure changes over time.
- Pre and post FIM scores would be used to measure SR intervention effects.