


# Keeping Your Glass Half Full: Cognitive Strategy Intervention for Older Adults

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## Abstract

When older adults experience memory dysfunction it often compromises their confidence. Older adults' confidence in their memory can be improved through interventions designed to teach strategies for improving everyday memory functioning. The present study examines the efficacy of a five-session cognitive strategy program designed to be optimistic and inclusive for older adults living in a residential community. The memory self-efficacy of participants in the intervention group improved significantly relative to a control group. Additionally, participants' knowledge of memory strategies improved overall after completion of this program. Such findings highlight the benefits of practical cognitive-behavioral interventions for bolstering older adults' confidence and knowledge of memory strategies.

## Keywords

aging, cognition, quality of life, education

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## Introduction

Residential care facilities are homes for older adults that provide a safe environment and opportunities for social interaction. Notably, these facilities offer long-term support for older adults with physical or neurological impairments that affect independent living, but do not require the strenuous levels of care associated with nursing homes (Khatutsky et al., 2016). The prevalence of cognitive impairment among residents ranges from around 20%–50%, suggesting a range of cognitive abilities being present within the individuals living in residential care facilities (Caffrey & Sengupta, 2018; Jagger & Lindesay, 1997; Khatutsky et al., 2016; Ravona-Springer et al., 2011). Even older adults with minimal cognitive impairment may still experience memory difficulties, which can negatively affect their daily functioning, as well as their confidence regarding their memory (i.e., memory self-efficacy). Through increasing older adults' "toolbox" of memory strategies, the present study tested the benefits of an educational, cognitive strategy intervention for residents' memory performance and memory self-efficacy.

## Cognitive-Based Interventions

Cognitive interventions use a method of teaching memory strategies and modeling their usage in everyday situations to assist older adults in completing activities of daily living (Schmitter-Edgecombe et al., 2008). The strategies are most effective when taught and practiced under a variety of everyday conditions and situations, are easy to remember, and are realistic and useful to carry out in everyday life (Cavallini et al., 2010; McDaniel & Bugg, 2012).

A 4-week cognitive intervention that included lessons on problem-solving and memory training was conducted for individuals with mild cognitive impairment (Kurz et al., 2009). An informant interview after the intervention suggested participants improved on their ability to complete activities of daily living. After completing a 6-week cognitive

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intervention, experimental participants in Greenaway et al. (2013) also had higher outcome scores on a measure of everyday functional ability compared to controls (Greenaway et al., 2013). In a post-test for a cognitive intervention focused on planning aids for future intentions, participants were significantly more likely to carry out the planning strategy taught in the program at the appropriate time than a control group (Kliegel et al., 2007). These strategies can result in improvements to independence and ability to complete everyday tasks, which can be significantly impactful to older adults' memory self-efficacy (Berry et al., 2010).

In addition to everyday functioning, the memory self-efficacy of older adults can also improve following memory-training intervention studies (Hudes et al., 2019). Memory self-efficacy is vital for the memory functioning of older adults, as memory self-efficacy is positively related to memory performance (Beaudoin & Desrichard, 2016). According to the Self-Efficacy Theory (Bandura, 2003), lower scores of memory self-efficacy lead to lower effort, less persistence, and higher anxiety, all of which can impair memory performance. Indeed, in a study examining memory self-efficacy scores and persistence, measured by study time for a memory task, older adults with higher confidence demonstrated greater persistence, resulting in better performance (Beaudoin & Desrichard, 2016). It is speculated that many memory concerns of older adults are related to their memory self-efficacy, and not an actual change in objective memory performance (Hudes et al., 2019). Thus, memory interventions should strive to foster confidence in memory abilities and encourage persistence in completing difficult tasks in a non-stigmatizing environment, rather than aiming to improve objective measures of memory performance.

## Present Study

The aim of the present study was to encourage independence and confidence in older adults living in a residential community. To accomplish this, we developed a cognitive intervention to improve older adults' memory self-efficacy and knowledge of memory strategies that avoided the use of stigmatizing language and cognitive screenings that create barriers which deter residents from engaging in the intervention program (Hellström et al., 2007; Krohne et al., 2011). Furthermore, the intervention was designed to be easily administered by activity directors with minimal training. The program included methods of improving memory to complete everyday tasks, unlike many other intervention studies, which instead focus on improving laboratory-based task performance. Such a difference is critical for creating an environment that promotes inclusion and confidence-building. We hypothesized, following completion of the cognitive intervention, older adult participants would report higher memory self-efficacy, as well as improve performance on relevant assessments of memory strategy knowledge.

## Method

### Participants

The present study included older adults living in a continuing care residential community of 110 residents. All residents of the community were eligible to participate in the experimental condition of the study, which included the memory-training intervention. They were informed they could participate in as many educational sessions as desired; however, they were encouraged to complete all five sessions. Additionally, participants who did not wish to enroll in the intervention were informed they could participate in the control condition. Participants in the control condition did not take part in the educational intervention, but completed the pre- and post-session surveys. Individuals in the experimental group received \$5 as compensation for every session they attended, with a bonus \$5 added if participants attended all sessions (up to \$30). Individuals in the control group received \$5 as compensation for each session of surveys they attended (up to \$10). The study was approved by a university Institutional Review Board, and all participants gave written informed consent before beginning the study.

Fifty-one individuals participated in the study (30 in experimental and 21 in control). Of these participants, 21 are included in the analysis for the experimental group, and 17 are included in the analysis for the control group. Participants not included in the final analysis were left out due to missing pre-intervention or post-intervention data. In the experimental group, there were six participants with a diagnosis of neurological impairment and one participant who experienced a brain injury. Of the six participants with neurological impairment, three participants had at least one stroke, two participants had a diagnosis of Alzheimer's, and one participant had a diagnosis of Parkinson's disease. In the control group, there were two participants with a diagnosis of neurological impairment (one participant with a history of at least one stroke, and one participant with a diagnosis of Alzheimer's disease), and no participants who experienced a brain injury.

### Materials

**Assessments.** Participants completed a demographic questionnaire that assessed: age, sex, race, years of education, and current or past occupation. Additionally, de-identified health information of the participants was provided by the residential facility director. De-identified health information included the presence of a neurological impairment, a personal history of a brain injury, and a personal history of a cerebrovascular accident.

**Memory Self-efficacy.** The Satisfaction sub-scale of the Multifactorial Memory Questionnaire was utilized to assess participants' memory self-efficacy (Troyer & Rich, 2018). In

this assessment, participants rate 18 statements regarding their satisfaction, concern, and overall appraisal of their memory on a 1–5 (strongly disagree to strongly agree) Likert scale. The internal consistency, test-retest reliability, and content, convergent, discriminant, and concurrent validity are all strong for this measure (Troyer & Rich, 2018).

**Memory Strategy Assessments.** To gauge potential memory strategy knowledge improvement, we constructed assessments to gauge knowledge of memory strategies covered during each session. Participants received three multiple choice questions at the beginning of each session, consisting of one correct answer and two distractors. A similar, but not identical, set of three questions was answered by participants at the end of each session. Questions covered everyday scenarios in which the memory strategies discussed may be used and prompted participants to identify the most appropriate strategy for a given scenario. The memory strategy assessments used in this study can be found in [supplementary material](#).

## Procedure

Participants were either included in the experimental or control conditions based on their preference. Participants in the experimental condition attended the educational intervention program, which occurred once a week for 5 weeks, with each session lasting approximately 1 hour. Participants in the control condition did not participate in the 5 week intervention. Instead, they were asked to complete the same pre-test and post-test surveys as the experimental group.

During the pre-test phase, participants completed a demographic questionnaire, and the Satisfaction sub-scale of the Multifactorial Memory Questionnaire to assess memory self-efficacy. During the post-test phase, or 5 weeks after pre-test scores were gathered, participants completed the Satisfaction sub-scale of the Multifactorial Memory Questionnaire<sup>1</sup>. Additionally, at the beginning and end of each individual session, participants in the experimental condition completed assessments of participants' knowledge for strategies covered in a given lesson.

Each experimental session included a lesson with relevant activities and discussion prompts regarding how these methods may be useful in everyday life. Participants in the experimental condition were given a lesson-specific packet which contained material regarding the information covered that day for future reference, as well as materials for the relevant activities. Participants in the control condition were provided with the packet of information for the entire intervention upon completion of the post-test assessments. Participants in the experimental condition were also given homework activities to encourage practice of the strategies covered.

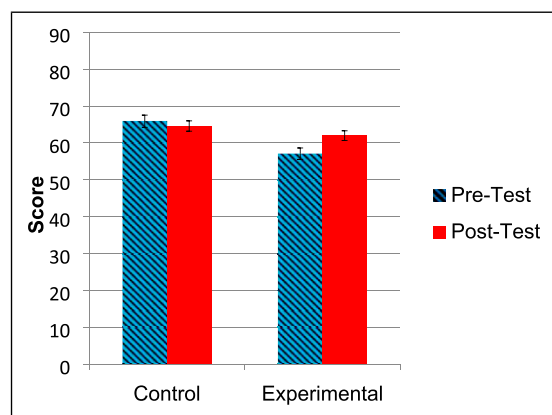
The first session included a general overview of the intervention goals and lessons that would be covered, as well as

included relevant information about aging and tips for facilitating memory performance, including sleep, social activity, and exercise. Additionally, we engaged in a discussion with the intervention group regarding their memory concerns to inform curriculum development. The second session covered goal planning strategies using external reminders to bolster retrieval of an intention (de Frias & Dixon, 2005; Einstein & McDaniel, 1990; Gilbert, 2015). Contextual clues were provided as a method of improving external reminders, as well as everyday memory. A discussion took place in which participants discussed which activities in their daily life could be assisted by utilizing external reminders and contextual cues. The second session also covered implementation intentions, a verbal rehearsal strategy that has revealed robust improvements in memory to complete future intentions in older adults, even those diagnosed with mild cognitive impairment (Lee et al., 2016; Shelton et al., 2016). Participants practiced using implementation intentions, both verbally and in the written in the form of an external reminder. The third lesson covered level of processing memory strategies, which are based on the finding that a “deeper,” more semantic encoding of material will lead to a richer, stronger memory trace relative to a “shallow” encoding for superficial features of the information ( Craik, 2002; Craik & Lockhart, 1972; Fu et al., 2017). Included in this lesson were strategies to assist the remembrance of where items were placed and how to operate electronics, which utilized level of processing. Participants completed an activity in which they attempted to remember different lists of items, using both “deep” and “shallow” encoding, in order to convey the efficacy of the strategy. The fourth intervention session covered spaced retrieval, a cognitive strategy which supports memory by testing an individual's recall repeatedly, with expanding delays in-between each testing session (Creighton et al., 2013; Small, 2012). This strategy was accompanied by practice using spaced retrieval for both lists of words and faces. For the face-based spaced retrieval activity, participants were encouraged to utilize all previous strategies covered to assist them. The final session included a general overview and synopsis of all of the lessons covered. Participants completed a post-intervention assessment of covered memory strategy knowledge at the end of the final session.

## Results

### Participant Characteristics

A Type 1 error rate of .05 was set for all analyses. Of the participants in the experimental group ( $n = 21$ ), the average age was 82.1 years old, 71.4% were female, all were Caucasian, and the average years of education was 11.7 years. Of the participants in the control group ( $n = 17$ ), the average age was 79.8 years, 68.8% were female, all were Caucasian, and the average years of education was 13.6 years. Between the



**Figure 1.** Memory self-efficacy. Note. Error bars represent 1 standard error of the mean.

two groups, there were no significant differences in mean age or years of education (all  $p$ 's > .2).

In the experimental condition, attendance was scored depending on the number of sessions the participant attended. The mean attendance was 4.48 days ( $SD = .75$ ,  $Min. = 3$ ,  $Max. = 5$ ). Of these participants, three individuals attended three sessions (14.3%), five participants attended four sessions (23.8%), and thirteen attended all five sessions (61.9%).

### Memory Self-Efficacy

Change in memory self-efficacy was operationalized as the total number of points out of 90 scored on the Satisfaction sub-scale of the Multifactorial Memory Questionnaire. Memory self-efficacy data were analyzed using a 2 (Condition: experimental/control)  $\times$  2 (Time: pre-intervention/post-intervention) mixed-factor analysis of Variance (ANOVA) with Condition as the between-participants factor and Time as the within-participants factor. The mixed-factor ANOVA was used to assess whether average scores on the memory self-efficacy scale changed from before to after the intervention in either the Experimental or Control groups. Descriptive statistics for Memory Self-efficacy scores are displayed on Figure 1. There was not a significant main effect of Time,  $F(1,34) = 2.05$ ,  $p = .161$ ,  $\eta^2_p = .057$ , or Condition,  $F(1,34) = 1.99$ ,  $p = .166$ ,  $\eta^2_p = .056$ . However, there was a significant interaction between memory score and Condition,  $F(1,34) = 6.33$ ,  $p = .017$ ,  $\eta^2_p = .157$ , 95%. Consistent with our prediction, memory self-efficacy scores increased significantly from pre-test to post-test in the experimental condition, but remained consistent in the control condition.

### Memory Strategy Knowledge

Memory strategy knowledge was operationalized by the differences in average performance scores from pre-test to post-test on the weekly memory strategy quizzes completed by participants in the experimental group. Each test had three

**Table 1.** Memory Strategy Knowledge Scores Pre-Test and Post-Test.

Week	N	Pre-Test		Post-Test	
		M	SD	M	SD
Week 2	17	1.82	.39	2.53	.62
Week 3	14	2.29	.61	2.64	.50
Week 4	15	2.20	.78	2.60	.83

questions, for a total of three points possible. For each week, the change in scores was analyzed using a paired-samples  $t$ -test, which compares average scores on the quizzes before and after the lesson. Descriptive statistics for Memory Strategy Knowledge scores are displayed in Table 1. There was a significant increase from mean pre-test scores to mean posttest scores for Week 2,  $t(16) = 4.95$ ,  $p < .001$ ,  $d = 1.37$ , 95% CI [.40, 1.01] and Week 3,  $t(13) = 2.69$ ,  $p = .019$ ,  $d = .628$ , 95% CI [.07, .64]. A significant increase in scores between tests was not found for Week 4,  $t(14) = 1.25$ ,  $p = .233$ ,  $d = .498$ , 95% CI [-.29, 1.09].

On Week 5, the cumulative review of previous sessions' material, a seven-question cumulative memory strategy quiz was administered. The average score ( $n = 17$ ) was 84.0%,  $SD = 18.8\%$ , with the highest score 100%, and the lowest score 50%.

### Discussion

The purpose of this study was to investigate the efficacy of a 5-week memory training intervention for improving memory self-efficacy and knowledge of the specific memory strategies in older adults living in a residential care facility. Throughout the memory workshop, participants were taught various strategies for improving everyday memory functioning, which included naturalistic scenarios in which the strategies could be implemented, and activities to explain and practice using the strategies. This is novel in comparison to other cognitive interventions, many of which focus on improving participants' ability to improve laboratory-based memory tasks. Our findings demonstrated attending the memory intervention resulted in significant improvements to memory self-efficacy and memory strategy knowledge.

### Memory Self-Efficacy

Recent efforts have been dedicated to facilitating memory functioning by improving the memory self-efficacy of older adults. The focus on memory confidence is based upon empirical and theoretical work, such as the Self-efficacy Theory (Bandura, 2003). Indeed, one's beliefs about their memory influence their persistence, effort, and anxiety towards the memory task, moderating their memory performance (Beaudoin, 2018; Beaudoin & Desrichard, 2016;

Hudes et al., 2019). Findings of the present study demonstrated improved memory-self efficacy following a relatively short intervention, consistent with a recent meta-analysis (Hudes et al., 2019). These results could suggest the level of effort or persistence participants were willing to put forth towards memory task improved. Measures of persistence or effort towards memory were not included in the present study, (nor were they examined in the meta-analysis of Hudes et al., 2019), but should be considered in future work in this area.

Another possibility is the improvements to memory self-efficacy may have been influenced by fostering optimistic beliefs regarding participants' ability to control their memory. In a recent study, beliefs regarding memory controllability were significantly positively associated with memory self-efficacy in older adults, most specifically, the sub-measure of potential improvement of memory abilities (Cherry et al., 2019). Perhaps, because the focus of the current intervention regarded strategies to improve everyday memory functioning, this led to more optimistic beliefs regarding their ability to improve their memory, thus raising memory self-efficacy scores.

## Memory Strategy Knowledge

One of the main goals of memory interventions is to teach strategies individuals can use to assist in their daily memory functioning. Improvements to strategy knowledge should presumably result in increased use, ease of use, and effectiveness of the strategy, leading to advancements in everyday functioning. Indeed, several studies have demonstrated cognitive interventions do improve memory strategy knowledge and use (Hudes et al., 2019; Kinsella et al., 2009; Troyer et al., 2008). These findings are important, as they suggest participants are learning the presented material and have the potential to use these strategies in everyday life. However, it should be noted booster sessions occurring several weeks or months following completion of the program are often needed to remind participants about the strategies. If refresher courses are not provided, participants could forget the learned strategies (Kinsella et al., 2009, 2016; Willis et al., 2006).

In the present study, memory strategy knowledge was measured using daily pre- and post-intervention tests. These tests consisted of three multiple-choice questions that gave a hypothetical scenario, and asked participants to choose the strategy which would be most effective for assisting in remembering to complete that task. This novel approach allowed us to test participants' memory strategy knowledge using real-life examples, as well as the efficacy of the specific lessons within the curriculum. Naturalistic examples are more relevant to older adults' everyday lives than lab-based assessments, providing older adults a clearer path to incorporate the strategies into daily life. The quiz questions also were an effective method of assessing cognition in an entertaining,

non-threatening manner, which was important for the confidence-building focus of the study.

It is worth noting, while improvements to strategy knowledge were observed in the sessions covering goal completion and level of processing, such a benefit in strategy knowledge was not observed following the lesson on retrieval practice. Although it is unclear why the lesson on retrieval practice was less effective in bolstering strategy knowledge, it may be due to the questions or lesson material being more difficult, the lesson being perceived as less interesting or not as effective by participants, or poor question quality.

To test long-term retention of strategy knowledge gained during the intervention, a seven-question cumulative test was completed on the fifth session by participants, who scored an average of 84%. Such a finding is encouraging as it suggests participants retained most of their knowledge of the material learned throughout the intervention. Ultimately, the goal of cognitive interventions is to encourage long-term retention of the information. Although a booster session was not included in the present study, a memory workshop binder was provided to all participants. The binder contained daily lesson plans, hand-outs about healthy aging practices, and cognitive activities to apply strategy knowledge.

## Limitations and Future Directions

Due to our efforts to create an accessible memory intervention, as well as to ensure continued participation, several limitations were present in the study. First, we did not administer individualized measures of cognitive performance, resulting in no objective assessment of memory performance outside of learned strategy knowledge. Long, objective measures of cognition are not only time-consuming and lead to participant fatigue, but could also set up a stigmatizing environment in which participants feel they are being "measured and observed," rather than participating in an enjoyable learning experience. Because of this, as well as the association between memory self-efficacy and cognitive performance (Bandura, 2003; Beaudoin & Desrichard, 2016), forgoing an objective measure of cognition was best suited for this study.

Second, data were not gathered regarding the participants' usage of the memory strategy packets that were provided, nor their usage of the strategies taught in their daily lives. Participants in the experimental condition did show an improvement in memory strategy knowledge, however, it is uncertain if this translated to successfully using the strategies. Future studies could assess the prevalence of strategy use by asking participants to use a journal to record when they use strategies in their daily lives both during and following the intervention.

Third, due to only gathering information in one residence, many of the residents come from a similar background, as seen in the completely Caucasian sample. However, diversity in age, level of education, and level of cognitive impairment

of the sample was present. In future implementations of this intervention, completing the memory workshop at additional residential care facilities with more diverse backgrounds of residents would be advantageous, as well as increase the sample size of both conditions.

Fourth, to maintain the confidentiality of the participants, data was not provided regarding which individual participants had a diagnosis of neurological impairment. Only the number of participants in each group with a diagnosis was provided. Because of this, analyses of the effect of the intervention on participants diagnosed with a neurological impairment was not possible. Future implementations of this intervention would benefit from procuring these data and assessing the effects of the intervention on participants with a neurological impairment.

Lastly, selection bias may be present in this sample, due to the process of recruiting participants. Although the intervention was open to all in the facility, there is a possibility those who decided to participate are individuals more willing to attempt to improve their memory, thus are more likely to see improvements in memory self-efficacy. Although this issue cannot be completely avoided, continuing to invite all residents to participate, as well as completing the intervention at multiple residencies will promote inclusivity and may reduce bias in future studies.

## Conclusions

The findings from the present study promote the utility of an accessible cognitive intervention for improving participants' ability to identify effective strategies for completing everyday tasks, resulting in greater confidence in one's own memory ability. These findings are important, as more positive beliefs regarding one's own memory will encourage older adults to remain independent and challenge their memory abilities, and may even affect objective memory performance. Furthermore, the improvement to memory strategy knowledge will expand the "mental toolbox" of strategies older adults can use to complete challenging memory tasks, potentially improving older adults' confidence in their functional abilities. As the population of older adults increases worldwide, the need for strategies to support everyday functioning and nurture positive beliefs about one's own abilities will become increasingly important. Healthcare professionals should consider short workshops as potential avenues of improving the confidence of older adults, as opposed to long, strenuous interventions.

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## Declaration of Conflicting Interests

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## Ethical Approval

IRB Approval: University of Tennessee at Chattanooga Institutional Review Board: #19-041.

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## Supplemental material

Supplemental material for this article is available online.

## Note

1. Satisfaction sub-scale of the Multifactorial Memory Questionnaire was administered in the pre/posttest phases to assess quality of life. No differences were observed between conditions or from pre-to posttest.

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