THE ACHIEVEMENT GOAL FRAMEWORK AND LEARNING IN ADULTHOOD

By

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To my parents, John and Kathleen Hastings, my sister, Kendra Hastings Lee, and my soon-to-be husband, Clinton Monari.
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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>4</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>8</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>9</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>10</td>
</tr>
<tr>
<td>CHAPTER</td>
<td></td>
</tr>
<tr>
<td>1 BACKGROUND</td>
<td>12</td>
</tr>
<tr>
<td>Goal Orientation Theory</td>
<td>13</td>
</tr>
<tr>
<td>Extension of Goal Orientation Theory to Aging</td>
<td>18</td>
</tr>
<tr>
<td>Overview of Current Studies</td>
<td>24</td>
</tr>
<tr>
<td>2 WORD RECALL</td>
<td>26</td>
</tr>
<tr>
<td>Study 1 Research Questions and Hypotheses</td>
<td>26</td>
</tr>
<tr>
<td>Participants</td>
<td>28</td>
</tr>
<tr>
<td>Measures</td>
<td>29</td>
</tr>
<tr>
<td>Goal Orientation Questionnaire</td>
<td>29</td>
</tr>
<tr>
<td>Memory Self-Efficacy Questionnaire</td>
<td>30</td>
</tr>
<tr>
<td>SF-36 Short-Form Health Survey</td>
<td>30</td>
</tr>
<tr>
<td>Participant Information Form</td>
<td>32</td>
</tr>
<tr>
<td>Everyday Problem Solving Task</td>
<td>32</td>
</tr>
<tr>
<td>Incidental Learning Task (Free and Cued Recall)</td>
<td>32</td>
</tr>
<tr>
<td>Subjective performance</td>
<td>33</td>
</tr>
<tr>
<td>Causal Beliefs (CDS-II)</td>
<td>33</td>
</tr>
<tr>
<td>Telephone Interview of Cognitive Status (TICS)</td>
<td>34</td>
</tr>
<tr>
<td>Procedure</td>
<td>35</td>
</tr>
<tr>
<td>Study 1 Results</td>
<td>38</td>
</tr>
<tr>
<td>Effects of Assigned Goal Condition and Age</td>
<td>41</td>
</tr>
<tr>
<td>Moderation of Memory Self-Efficacy</td>
<td>43</td>
</tr>
<tr>
<td>Study 1 Follow-Up Analyses</td>
<td>45</td>
</tr>
<tr>
<td>Study 1 Discussion</td>
<td>47</td>
</tr>
<tr>
<td>3 STORY RECALL</td>
<td>55</td>
</tr>
<tr>
<td>Study 2 Research Questions and Hypotheses</td>
<td>55</td>
</tr>
<tr>
<td>Participants</td>
<td>57</td>
</tr>
<tr>
<td>Measures</td>
<td>59</td>
</tr>
<tr>
<td>Goal Orientation Questionnaire</td>
<td>59</td>
</tr>
<tr>
<td>Memory Self-Efficacy Questionnaire</td>
<td>59</td>
</tr>
</tbody>
</table>
## LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1</td>
<td>Sample characteristics for Study 1.</td>
<td>52</td>
</tr>
<tr>
<td>2-2</td>
<td>Study 1 measures listed in the order of administration.</td>
<td>52</td>
</tr>
<tr>
<td>3-1</td>
<td>Sample characteristics for Study 2.</td>
<td>82</td>
</tr>
<tr>
<td>4-1</td>
<td>Bivariate inter-correlations between model variables for Study 1.</td>
<td>113</td>
</tr>
<tr>
<td>4-2</td>
<td>Bivariate inter-correlations between model variables for Study 2.</td>
<td>113</td>
</tr>
<tr>
<td>4-3</td>
<td>Bivariate inter-correlations between model variables for Study 1.</td>
<td>114</td>
</tr>
<tr>
<td>4-4</td>
<td>Bivariate inter-correlations between model variables for Study 2.</td>
<td>114</td>
</tr>
<tr>
<td>Figure</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>2-1</td>
<td>Mean scores based on age group and assigned goal condition.</td>
<td>53</td>
</tr>
<tr>
<td>2-2</td>
<td>Mean scores based on age group and recall task.</td>
<td>54</td>
</tr>
<tr>
<td>3-1</td>
<td>Mean scores based on age group and assigned goal condition.</td>
<td>83</td>
</tr>
<tr>
<td>3-2</td>
<td>Regression-fitted conceptual memory scores based on memory self-efficacy and assigned goal condition.</td>
<td>85</td>
</tr>
<tr>
<td>4-1</td>
<td>Model of memory beliefs, performance, and assigned goal condition for Study 1.</td>
<td>115</td>
</tr>
<tr>
<td>4-2</td>
<td>Model of memory beliefs, performance, and assigned goal condition for Study 2.</td>
<td>116</td>
</tr>
<tr>
<td>4-3</td>
<td>Predicted model of memory beliefs, performance, and dispositional goal orientation for Study 1.</td>
<td>117</td>
</tr>
<tr>
<td>4-4</td>
<td>Final model of memory beliefs, performance, and dispositional goal orientation for Study 1</td>
<td>118</td>
</tr>
<tr>
<td>4-5</td>
<td>Final model of memory beliefs, performance, and dispositional goal orientation for Study 2.</td>
<td>119</td>
</tr>
</tbody>
</table>
The present studies examined goal orientation and adult memory performance using Dweck’s goal orientation framework, which states that individuals adopt particular goals when confronting a task. Those with learning goals focus on developing mastery and building competence; these goals are thought to increase motivation and persistence. Those with performance goals focus on demonstrating ability and view tasks as opportunities to achieve positive and avoid negative judgments; these goals are thought to decrease motivation and pursuit of challenges. These effects of performance goals are thought to be strongest when perceived ability is low. This framework has never to my knowledge been tested with a sample including older adults, despite research suggesting they may be especially prone to the maladaptive combination of performance goals and low perceived ability.

In two studies, recall task instructions were manipulated to encourage orientation toward learning goals, performance goals, or neither. Participants filled out questionnaires assessing memory self-efficacy (perceived ability), general predisposition toward learning and/or performance goals, beliefs about control, and strategy usage (Study 2). It was expected that performance goals would be associated
with worse performance, less memory controllability, and more ineffective strategy use than learning goals, whether manipulated or measured as a disposition, and especially when memory self-efficacy was low. Results showed moderate support. Manipulating goal orientation did not impact any outcomes, but learning goals appeared to buffer negative effects of low memory self-efficacy for one task. Adults with a disposition toward learning goals had higher memory self-efficacy, leading to better performance, whereas those with a disposition toward performance goals had lower memory self-efficacy and thus performed worse. Therefore, when measured at the dispositional level, learning and performance goals generally produced expected effects. Throughout life, perhaps goal orientation becomes engrained and less subject to manipulation for memory. Future research should further examine modifiability, such as whether performance on other tasks can be influenced by goal orientation manipulation. If adults are less susceptible to goal manipulation, life course factors that impact development of dispositional learning and/or performance goals should be examined, so that adaptive beliefs about learning could be encouraged throughout life to maximize cognition.
Research has suggested that memory training programs can lead to memory improvement for older adults (Verhaeghen, Marcoen, & Goossens, 1992). However, long-term maintenance of gains is not often achieved and improvement does not seem to transfer to untrained tasks (Dunlosky & Hertzog, 1998a; Rebok, Rasmusson, & Brandt, 1997; Verhaeghen et al., 1992). This may be because older adults do not extend strategies learned in training to everyday activities beyond the intervention period. Because older adults do improve memory ability and strategy use during training, it is unlikely that this tendency is due to sheer ability. Rather, it may be that some older adults adopt beliefs that are maladaptive and discourage continued independent learning (Berry & West, 1993; Lineweaver & Hertzog, 1998). In an effort to further understand the self-limiting beliefs of older adults, the present research applies the achievement goal framework to understanding the relationship between beliefs and behavior (Dweck, 1986). This framework suggests that particular achievement goals, or the manner in which individuals orient themselves toward learning tasks, underlie motivation and can influence performance outcomes.

Before considering Dweck’s model in more detail, it is important to understand the constellation of self-limiting beliefs that have been identified in the aging literature. Adults of all ages tend to believe that age-related memory decline exists and is relatively out of their control (Blatt-Eisengart & Lachman, 2004; Hertzog, Lineweaver, & McGuire, 1999; Lineweaver, Berger, & Hertzog, 2009). Reflecting this perceived lack of control over memory, Blatt-Eisengart and Lachman (2004) have found that older adults are significantly more likely to attribute memory performance to ability (an uncontrollable
cause, as defined by the authors) than to strategy use (a controllable cause), while younger adults attribute performance to both factors equally. Attributing memory difficulties to controllable causes is more adaptive because it reflects a belief that there is something one can do to improve memory. In fact, Lachman and Andreoletti (2006) found that control beliefs are related to actual memory performance for older adults, partly because they are less likely to evoke strategies if they have a low sense of memory controllability. Further, older adults tend to endorse lower memory self-efficacy (a belief about one’s capability to succeed in memory tasks) than younger adults (Berry, 1999; Berry & West, 1993). Low memory self-efficacy has also been associated with poor memory performance (Valentijn et al., 2006). Lower memory performance could then encourage an even lower sense of control, resulting in a downward spiral. Therefore, when developing memory activities and programs for older adults, it is important to take an integrative approach to memory beliefs and performance.

**Goal Orientation Theory**

The literature on achievement goal orientation allows for an integrative view of beliefs and performance because it links implicit theories of ability, self-efficacy, and task instructions into a general framework. Achievement goal orientation refers to the way a person approaches a task, and it is thought to be partially determined by beliefs about whether ability is fixed or malleable. Researchers typically distinguish between two classes of achievement goals: learning goals and performance goals (Elliott & Dweck, 1988). According to Elliott and Dweck (1988), individuals who hold learning goals are concerned with the development of mastery. These individuals are interested in learning something new for the sake of learning. Additionally, they are concerned with increasing competence in already learned domains. In contrast, those who hold
performance goals are more concerned with demonstrating ability. These individuals are focused on completing tasks to achieve positive and avoid negative judgments of competence. Another dimension of motivation has recently been proposed, mainly to address two possible types of performance goals (Elliot, 1997): approach goals and avoidant goals (Cury, Elliot, Sarrazin, DaFonseca, & Rufo, 2002; Elliot, 1997). Individuals who adopt “performance-approach” goals welcome difficult tasks as a means of demonstrating their competence. On the other hand, those with “performance-avoidant” goals steer clear of challenging tasks in order to prevent negative judgments of ability (Cury, Elliot, DaFonseca, & Moller, 2006).

Whether an individual holds learning or performance goals has been shown to impact performance and affect, particularly when faced with failure or challenge. Generally, learning goals have been associated with higher levels of information processing (Grant & Dweck, 2003), better self-efficacy and subjective achievement (Schunk & Ertmer, 1999), more sophisticated strategy use (Elliott & Dweck, 1988), and increased pursuit of challenging activities (Smiley & Dweck, 1994). This seems to be a robust finding; a meta-analysis by Utman (1997) found the average effect size (Cohen’s d) between learning goals and task performance to be .53. Generally, performance goals are thought to have negative outcomes, particularly when they lead to avoidance of challenging tasks (to avoid demonstrating ability, which may be perceived to be low). If performance goals operate to motivate learners to approach challenging tasks (to prove high perceived ability), they may result in a similar level of intrinsic motivation as a learning goal (Cury et al., 2006). However, some researchers have found that these individuals may be less likely to pursue additional challenges that entail making public
mistakes (Elliott & Dweck, 1988; Smiley & Dweck, 1994). Those who adopt performance-avoidant goals tend to perform poorly (Cury et al., 2006) and hold low levels of intrinsic motivation (Elliott & Harackiewicz, 1996).

Elliott and Dweck (1988) have proposed that whether performance goals lead to positive or negative outcomes depends on perceived ability (self-efficacy). According to Dweck’s theory, if perceived ability is low, learners with performance goals are likely to experience feelings of helplessness when faced with challenge. They will adopt a “performance-avoidant” style of goal orientation and avoid difficult tasks that may result in negative evaluations of competence and make attributions to uncontrollable causes (e.g., inadequate intelligence) for task failure (Dweck & Leggett, 1988). Consequently, these learners are likely to withdraw effort, use less strategic thinking, and express negative affect such as boredom or anxiety (Cury et al., 2002; Elliott & Dweck, 1988; Smiley & Dweck, 1994). In contrast, those with performance goals and high perceived ability are thought to show a more adaptive pattern of outcomes (Elliott & Dweck, 1988) and follow a more “performance-approach” style of goal orientation. They persist in strategy use, do not express negative affect, and continue being engaged in the task (Cury et al., 2002; Elliott & Dweck, 1988; Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002; Smiley & Dweck, 1994). Because older adults tend to have a lower level of memory self-efficacy than younger adults (Berry & West, 1993), they may be more likely to take on performance-avoidant goals with more maladaptive learning outcomes.

Whether individuals favor learning or performance goals in general is based on two main factors, according to Dweck (1986): implicit theories of intelligence and context of the task. Dweck (1986) suggests that implicit theories of intelligence consist
of entity theories and incremental or “skill” theories. Entity theorists believe that their
level of intelligence is fixed and cannot be changed. Incremental theorists believe that
intelligence is malleable and subject to learning. Based on Dweck’s (1986) theory,
entity theorists tend toward performance goals whereas incremental theorists tend
toward learning goals. These goal tendencies, in turn, lead to better performance
outcomes and positive beliefs about effort for individuals holding an entity theory of
intelligence (Blackwell, Trzesniewski, & Dweck, 2007). Because many older adults tend
to think of their ability as fixed, they may focus on performance goals more than learning
goals (Elliott & Lachman, 1989). This can be problematic because individuals with low
perceived ability and performance goals may withdraw from opportunities to use new
skills and challenge themselves. Therefore, entering any sort of memory training or
testing situation with performance goals and low perceived ability (a combination that
may be especially likely for older adults) may lead to reduced engagement and a
decreased likelihood of continued learning beyond the intervention.

In addition to implicit theories of intelligence, task context also impacts goal
orientation. As described, goal orientation can be dispositional or trait-like, in the sense
that people may be predisposed to favor one goal orientation over another based on
their implicit theory of intelligence. However, it is also generally agreed that situational
characteristics can influence which types of goals people adopt (Button, Mathieu, &
instructions to induce particular patterns of goal orientations and outcomes in a sample
of children. On a pre-task that was described as an indicator of performance on the
experimental task, the experimenters told children that they had either high or low
ability. During the experimental task, roughly half of the children in each perceived ability group were oriented toward learning goals (they were told the activity would be a big help in school because it sharpens the mind and would help them do well on their studies) and half were oriented toward performance goals (they were told their performance was going to be videotaped and their performance would be normatively evaluated by expert judges). The children then were asked to select either (a) a difficult task from which they would learn a lot, but make a lot of mistakes in front of the experimenter, or (b) a task from which they would probably not learn anything new, but would demonstrate what they could do (the latter was offered at an easy, medium, or difficult level). As the children worked on the task, experimenters recorded strategy use and verbalizations. Regardless of perceived ability, the researchers found that children oriented toward learning goals worked toward increased competence, improved strategy use, and did not pass up tasks that would increase learning even if they involved making public mistakes. These children were more likely to choose the first task. Children in the performance goal – high perceived ability group demonstrated a similar pattern, but did not choose to work on a learning task involving public mistakes. These children were most likely to choose the medium or difficult level of the second task. The most troubling outcomes occurred with children in the performance goal – low perceived ability group. These children exhibited a helpless behavior pattern, making more uncontrollable attributions for failure, expressing negative affect, and using strategies less effectively as the trials continued. In addition, these children were most likely to choose the easiest level of the second task, suggesting a desire to avoid challenging tasks. Studies such as this one demonstrate that achievement goals and
their associated outcomes may be subject to manipulation based on situational and task
characteristics (Utman, 1997), and highlight the impact of perceived ability on
performance goal outcomes. Although this pattern of outcomes has not yet been tested
with older adults, research with younger learners has suggested that it may be
important to consider task instructions and learning context when considering the
design of a learning environment.

**Extension of Goal Orientation Theory to Aging**

To my knowledge, only one study has explicitly attempted to link this line of
research to older adult learning (Elliott & Lachman, 1989; Lachman, Weaver, Bandura,
Elliott, & Lewkowitz, 1992). The researchers based their design of a memory training
intervention on Dweck’s (1986) motivational theory. Rather than explicitly manipulating
goal orientation, however, this program focused on training individuals to adopt a more
malleable theory of intelligence (expecting that this would then lead to increased
learning goals and better outcomes). This is similar to a successful intervention
approach used with adolescents by Blackwell and colleagues (2007). The Lachman
(1992) study measured whether participants adopted this more malleable theory of
intelligence using an inventory that assessed perceived memory control. Their results
did not find differences in memory improvement between experimental and control
groups. The authors were able to increase participants’ sense of control over memory,
although they did not actually manipulate goal orientation directly. It is possible that
encouraging a more malleable theory of ability with older adults and concurrently
explicitly (rather than indirectly) manipulating goal orientation could lead to better
performance outcomes. Another limitation of the Lachman (1992) training program is
that it was based on Dweck’s (1986) goal orientation framework, even though this
framework has mostly been tested in the problem-solving domain, and only with children and college students (Utman, 1997). There is a lack of research exploring goal orientation effects on memory performance (Utman, 1997). The successful intervention tested by Blackwell and colleagues (2007) focused on math motivation and performance. It is important to be sure that memory, and not just problem-solving, goals can be manipulated before applying this theory to a memory training intervention for older adults.

Thus far, Dweck’s (1986) motivation theory has only been tested with children and young adults in school and athletic environments. Because an association between achievement goals and outcomes has never been empirically established across the life span, it is difficult to know whether training that addresses learning and performance goals even has the potential for success. It is conceivable that older adults do not respond to goal orientation manipulations in the same way that children and younger adults do. Perhaps this could explain why an intervention aimed at implicit theories provided more performance benefits for adolescents (Blackwell et al., 2007) than for older adults (Lachman et al., 1992). Therefore, in the present studies, we hoped to document that the expected relationships between goal orientation and learning outcomes hold true for adults and memory. Particularly, we hoped to show that performance goals can lead to reduced memory performance, control beliefs, and strategy use for older adults, particularly when combined with low perceived memory ability.

This is important because older adults are more likely than younger individuals to endorse low perceived memory self-efficacy, or low perceived ability (Berry, 1999), but
are important targets for memory improvement due to their increased risk of memory impairment (Petersen et al., 2008). Low perceived memory ability (or, low memory self-efficacy) has been linked with worse objective memory performance (West, Bagwell, & Dark-Freudeman, 2008). Thus, it was hoped that the results of the present studies could be used to inform memory interventions for older adults by suggesting how and whether particular achievement goals can be encouraged in older adult learners to help buffer the negative effects of low perceived ability. In particular, if the achievement goal framework is supported in an older sample, memory training interventions could be developed that encourage a learning goal perspective to maximize potential for maintenance of training gains and pursuit of future memory challenges.

The domain of memory performance was selected for these studies because of its salience for many older adults (e.g. Ryan, 1992). Cutler and Grams (1988) found that self-reported memory problems tended to increase with age, suggesting that older adults believe they are having more problems with their memory. In a study of possible selves, Dark-Freudeman, West, and Viverito (2006) found that older adults were more likely to mention memory as a concern in their future than younger adults. Further, negative cultural stereotypes that associate aging with forgetfulness may make older adults more likely to notice memory failures and to link them with aging (Lineweaver et al., 2009; Ryan, 1992). Because memory difficulties can be easily noticed in everyday life, older adults may be more attuned to memory failures than difficulties in other areas of cognition (such as reasoning or processing speed).

Older adults may also be attuned to memory failures because they are likely experiencing more of them with age. A large body of research suggests that memory
performance on episodic memory tasks for new information declines with normative aging (Nilsson, 2003; Zacks & Hasher, 2006). Episodic memory is used for the conscious remembrance of items learned in one’s own past, such as grocery lists or people’s names. This form of memory is frequently measured by giving individuals lists of words to study, and then having them recall all the words from the list that they can remember. Evidence for a normative age-related decline in episodic memory has been found in the Betula study, a longitudinal study of memory and aging that began in 1988 (Nilsson, 2003). In the first wave of data collection, the researchers found cross-sectionally that episodic memory (measured through tests including free and cued recall of words) steadily decreased with age. Published reviews of the literature on memory and aging cite many other studies suggesting a similar pattern of age-related decline in episodic memory (e.g., Backman, Small, & Wahlin, 2001; Craik, 2000). This empirical evidence of memory decline underscores the importance of discovering ways to maximize memory performance, in order to ensure memory success into later life.

One way older adults may maximize their memory performance, despite age-related cognitive declines, may be through the use of strategies, which are frequently taught in memory-improvement interventions (e.g., West et al., 2008). Mnemonic strategies are techniques used to enhance memory and may involve the use of imagery, organization of to-be-remembered information, or verbal associations (West, 1995). There is a good deal of intervention research supporting the utility of strategies for increased memory performance (Lachman, Andreoletti, & Pearman, 2006; West, Welch, & Yassuda, 2000; West et al., 2008). In fact, West and colleagues (2008) found that increased strategy use was related to better memory performance. Because of this
relationship with performance, it is important to learn factors that may encourage the use of mnemonic strategies.

Past research has suggested that older adults may be somewhat disadvantaged when it comes to the use of internal memory strategies (West, 1995). Rankin and colleagues (1984) gave young, middle-aged, and older adults a categorizable list to recall, and asked them to report on the strategies used, in order to examine age differences (Rankin, Karol, & Tuten, 1984). The researchers found that list categorization (a mnemonic strategy for free list recall) was least used among the oldest group (67% reported using this strategy) and most used among the youngest group (83% reported use of the strategy), suggesting that older adults may be less likely to spontaneously use categorization as a strategy to memorize a word list (Rankin et al., 1984). Poon (1985), in a review of memory research, states that in most studies age differences in memory are reduced when older adults are provided with organizational strategies, suggesting that older adults tend to be less adept at using such strategies spontaneously and without prompting.

Other studies have suggested that older adults may have a particular deficiency in the quality of strategies used. Hertzog and colleagues found that older adults were less likely to spontaneously report using strategies considered “optimal” than younger and middle-aged adults (Hertzog, McGuire, & Lineweaver, 1998). Further, Rankin and Collins (1985) found that older adults may use elaboration as a strategy less effectively than younger adults to remember words. Elaboration involves linking the to-be-remembered words to an internal network of semantic relationships. The authors found that the most effective type of elaboration was precise elaboration, in which the words
are linked to relevant and significant meaning. Precise elaboration provides a context in which to remember the words, so that the words are less arbitrary and easier to retain in memory. Older adults were less likely to provide precise elaboration than younger adults when asked to complete a sentence containing a target word to be remembered. Thus, the authors concluded that older adults may be deficient in the use of effective elaboration, and this may help explain their decreased memory performance as compared with younger adults (Rankin & Collins, 1985).

In more recent research examining strategy use and aging, Dunlosky and colleagues suggested that older adults may report using mediator strategies (linking words together using imagery or semantics when asked to remember word pairs) as often as younger adults, but may not use them as effectively (Dunlosky & Hertzog, 1998b; Dunlosky, Hertzog, & Powell-Moman, 2005). In particular, Dunlosky and colleagues (2005) suggest that older adults are as likely as younger adults to report creating mediators (imagery or semantic links between words to recall), but are more likely to either forget the mediator when it is time for recall, or remember the mediator but still not the desired information. Therefore, taken as a whole, past research on strategy use and aging has suggested that older adults may be disadvantaged compared with younger adults. Because previous research has suggested that children with performance goals use fewer and less sophisticated strategies, it may also be the case that performance goals hinder the strategy use of older adults when given a memory task. This may be particularly important for older adults given their deficient strategy use, as suggested in past literature. Enhancing strategy use may be an
important way of maximizing memory in older adulthood, and perhaps an emphasis on learning goals can help encourage the use of such strategies.

Overview of Current Studies

The current studies attempt to link the child-focused goal orientation literature with the aging literature in order to examine the effects of goal orientation on memory performance, control beliefs, and strategy use for older adults. In this research, task instructions were manipulated (participants were either oriented toward learning goals, performance goals, or neither) to replicate two well-known earlier memory studies using elementary and college students (Benware & Deci, 1984; Graham & Golan, 1991). Study 1 examined the effects of goal orientation on incidental word recall (Graham & Golan, 1991), and Study 2 explored the effects of goal orientation on intentional story recall and strategy usage (Benware & Deci, 1984). In both studies, performance measures assessed multiple levels of learning, providing a fuller picture of goal effect patterns. Specifically, we measured free recall in both studies, cued recall in the word recall study, and rote and conceptual memory (through questioning) in the story recall study. In addition to measuring baseline levels of goal orientation in different age groups, and observing the impact of a goal orientation manipulation, established relationships in the aging literature between age and performance, strategy use, and beliefs were tested.

Because the Graham and Golan (1991) memory methodology was only used with children, and not an adult sample, Study 1 compared undergraduates with older adults to examine age and goal orientation effects on word recall, and to confirm the goal effects for college students that have been found with other research designs. Study 2 was based on the methodology of Benware and Deci (1984), which used a sample of
college students and established that the proposed goal orientation effects do occur with college students. Study 2 included a sample of older adults, but also a sample of undergraduates to compare our results to those of Benware and Deci (1984).
CHAPTER 2
WORD RECALL

Study 1 replicated the methods of Graham and Golan (1991) to examine the effects of goal orientation on free and cued word recall. The original study was conducted with a sample of fifth and sixth grade students, but our study used an older adult sample to learn whether the same patterns emerge. We also used a sample of undergraduate college students to allow for age comparisons, and to confirm that this methodology would produce the expected goal orientation effects in young adults. We expected to replicate the original findings for both age groups, so that those assigned to a condition emphasizing learning goals would outperform others on a cued recall task.

Study 1 Research Questions and Hypotheses

The first research question was whether assigned goal condition (task instructions) and/or age would impact memory performance. We expected a main effect of condition, such that participants in the learning goal group would outperform those in the performance goal group. Those in the control group were expected to show outcomes consistent with their a priori (dispositional) goal orientation, as measured by the Goal Orientation Questionnaire (Button et al., 1996) (for example, those in the control group with a priori performance goals should experience outcomes similar to those hypothesized above for the performance goal condition). We did not necessarily expect any main effects of goal condition with regard to free recall. Graham and Golan (1991) did not find such effects, possibly because free recall is more difficult than cued recall and manipulating goal orientation may not be sufficient to overcome this difficulty. Utman (1997) suggested that complex tasks generally result in more achievement goal outcomes. However, it seems reasonable to assume that learning goals would be most
beneficial for tasks viewed as attainable and part of a broader learning process. Therefore, we hypothesized that performance goals would result in worse outcomes than learning goals at least under certain conditions (when the task is viewed as more attainable, such as cued recall, and therefore easier to view as a learning experience). We also expected a main effect of age, such that older adults would perform worse on both memory tasks than younger adults, but no interaction of goal condition with age (both age groups would show similar patterns with respect to learning goals and performance goals). We also hypothesized that free recall scores overall would be worse than cued recall, because it is a more difficult task.

The second research question was whether assigned goal condition had an effect on control beliefs (CDSII; McAuley, Duncan, & Russell, 1992). We expected main effects of goal condition and age, such that older participants and those in the performance goal group would endorse lower scores on the personal control subscale of the CDSII than younger participants and those in the learning goal group. Again, the control group was expected to perform in line with their dispositional goal orientation (endorse lower personal control if they held dispositional performance goals than if they held dispositional learning goals).

The final research question was whether perceived ability (memory self-efficacy) moderated the impact of goal condition on performance and control beliefs. Based on Dweck’s theory, we expected to find a significant interaction between memory self-efficacy and assigned goal condition, indicating that memory self-efficacy moderated the effects of performance goals. Specifically, performance goals should be most detrimental for those with lower memory self-efficacy (result in lower performance
scores and lower personal control); however, memory self-efficacy should not have as much of an impact on performance or control beliefs for those with learning goals or in the control condition.

**Participants**

Two hundred sixty participants (140 older adults, 120 younger adults) were recruited to participate in the study. Thirty-two older adults and two younger adults declined participation (25 older adults did not return survey packets, three older adults and two younger adults did not return phone calls to complete the study, and four older adults indicated they did not want to invest the time). All of the undergraduates were recruited from the undergraduate psychology participant pool and received research credit for their participation. The majority of the older adults were recruited through younger adult and other older adult referrals (“snowball sampling”); others were recruited via email advertisements to family and friends. Older adult participants received a $10 gift card to Publix® grocery stores or CVS® pharmacy for their participation. Elimination criteria included use of anticholinergic medications ($N=0$), dementia diagnosis ($N=1$ older adult), poor global cognitive function ($N=0$), or extreme difficulty with instructions ($N=0$). Other participants were eliminated due to illness ($N=1$ older adult), difficulty hearing over the phone ($N=2$ older adults), not being fluent in English ($N=1$ older adult), not being in the eligible age range or not completing the second part of the study within 30 days of the first part ($N=6$ older adults).

Therefore, the final sample consisted of ninety-seven healthy community-dwelling older adults (aged 60-84, $M=71.28$, $SD=6.58$) and one hundred eighteen college undergraduates (aged 18-22, $M=18.50$, $SD=.87$), for a total sample of two hundred and fifteen participants. The final sample was healthy ($M=7.88$, $SD=1.73$ on a
scale where 1= “very poor health” and 10= “excellent health”), had at least a high school education ($M=13.81$, $SD=2.33$ years of education), was predominately female (75.3% female), and was mostly Caucasian (67.4% Caucasian, 12.1 % African American, 11.2% Hispanic/Latino, 6% Asian, 1.4% other races). See Table 2-1 for other sample characteristics.

**Measures**

Each measure took 5-15 minutes to complete and is listed in order of administration in Table 2-2.

**Goal Orientation Questionnaire**

Participants completed the Goal Orientation Questionnaire (GOQ) which has acceptable reliability and validity (Button et al., 1996) and consists of eight items on performance goal orientation ($\alpha=.90$, e.g., “I prefer to do things that I can do well rather than things I can do poorly”) and eight items on learning goal orientation ($\alpha=.93$; e.g., “The opportunity to do challenging work is important to me”), each on a 7-point Likert scale (1= “strongly disagree” to 7= “strongly agree”). Responses were summed to yield separate performance goal and learning goal scores (possible score range was 7 to 56 for each scale). Button and colleagues (1996) found that a high learning goal score on this scale was significantly correlated with self-esteem, an incremental theory of ability, and perceived control, suggesting good validity. Goal orientation is conceptualized as a stable individual difference variable that is also affected by situational factors (such as the proposed study manipulation). Because goal orientation has a dispositional component (Button et al., 1996), the GOQ was administered to ensure that there were no baseline condition or age differences in dispositional goal orientation.
Memory Self-Efficacy Questionnaire

The Memory Self-Efficacy Questionnaire-4 assessed perceived ability for story, name, shopping list, and object location recall, with five items per scale (MSEQ-4; West, Thorn, & Bagwell, 2003). Participants rated how certain they were that they could do each task (ex: “If someone showed me the photographs of 10 people and told me their names once, I could identify 10 persons by name if I saw the pictures again a few minutes later”) from 0-100 (0 = “I cannot do it” and 100 = “100% sure I could do it”). This example represents a difficult version of this task and the task description was then repeated at four easier levels (e.g., “If someone showed me the photographs of 10 people and told me their names once, I could identify eight persons by name if I saw the pictures again a few minutes later”). Responses were averaged to obtain an overall efficacy score between 0 and 100, which showed high reliability in this study (α=.95) and strong validity in past research (Berry, West, & Dennehy, 1989; West et al., 2003). The MSEQ-4 was included because it is believed that self-efficacy moderates the impact of goal orientation (Elliott and Dweck, 1988).

SF-36 Short-Form Health Survey

The SF-36 (Ware & Sherbourne, 1992) is a brief health questionnaire with good reliability and validity, including eight subscales (General Health, Physical Functioning, Physical Limitations/ADLs, Pain, Vitality, Emotional Limitations, Social Functioning, and Mental Health). The General Health subscale consists of five items assessing the participants’ overall rating of his or her health (α=.75; e.g., “In general, would you say your health is________?”) on a 5-point Likert scale (1= “excellent,” 5= “poor”; score range is 5-25). The Physical Functioning subscale consists of 10 descriptions of physical activities (α=.94; e.g., “lifting or carrying groceries,” “climbing one flight of
stairs”) which participants rated on a 3-point Likert scale (1=“yes, limited a lot,” 2= “yes, limited a little,” 3= “no, not limited at all”; score range is 10-30). The Physical Limitations and Activities of Daily Living (ADLs) subscale consists of four items to which participants responded whether or not (1= “yes,” 2= “no”) over the past four weeks, they have had a particular problem as a result of physical health (α=.83; e.g., “accomplished less than they would like”; score range is 4-8). The Pain subscale consists of two items (α=.82; e.g., “How much bodily pain have you had in the past four weeks?”) rated on a 6-point Likert Scale (1= “none,” 6= “very severe”; score range is 1-12). The Vitality subscale consists of four items (α=.82; e.g., “How much of the time in the past four weeks have you felt full of pep?”) rated on a 6-point Likert Scale (1= “all of the time,” 6= “none of the time”; score range is 4-24). The Emotional Limitations subscale consists of three items (α=.74; e.g., “During the past four weeks have you cut down the amount of time you spent on work or other activities due to emotional problems, such as feeling depressed or anxious?”) to which participants responded “yes” or “no” (1=”yes,” 2= “no”; score range is 3-6). The Social Functioning subscale consists of two items (α=.74; e.g., “During the past four weeks, how much of the time has your physical health or emotional problems interfered with your social activities, like visiting with friends or relatives?”) rated on a 5-point Likert scale (1= “all of the time,” 5= “none of the time”; score range is 2-10). Finally, the Mental Health subscale consists of five items (α=.79; e.g., “How much of the time in the past four weeks have you been a very nervous person?”) rated on a 6-point Likert scale (1= “all of the time,” 6= “none of the time”; score range is 5-30). Responses were summed within each individual subscale following the procedures recommended by Ware and Sherbourne (1992) such that
higher scores represent better health; and subscale scores were used to ensure that participants reported similar levels of health across randomized groups.

**Participant Information Form**

Participants were asked to report basic demographic information, including gender, race, education, and self-rated health on a scale of 1-10 (reverse coded so that 1= “very poor,” 10= “excellent”). Participants also reported on medications and history of hospitalization. These items were used to ensure that randomized condition groups were roughly equivalent, and to serve as potential exclusion criteria if there was evidence of dementia or stroke for the older adults.

**Everyday Problem Solving Task**

The Everyday Problem Solving Task was adapted from Artistico, Cervone, and Pezzuti (2003). Participants were given three everyday problems and instructed to list all the possible solutions to the problem, whether or not these solutions would be adopted by them in such a situation (e.g., “A person who lives alone wants to see her/his children, nieces, and nephews more frequently. What could she/he do?”). Participants were allowed three minutes to generate all possible solutions. This activity was not scored, as it was simply used as a pre-task for the condition manipulation to orient participants either toward building mastery (learning goals) or proving cognitive ability (performance goals).

**Incidental Learning Task (Free and Cued Recall)**

The experimental task (word game) was an incidental learning test based on those of Craik and Tulving (1975) and Graham and Golan (1991), containing two practice trials and 40 actual trials. Each trial consisted of a question (e.g., “Is this word a type of fruit?”) followed by a 2-second pause. Then, a noun (target word) was presented (ex:
“cherry”). Participants indicated “yes” or “no,” as to whether the target word fit the question. Questions were of two types, with 20 items of each type: sentence (e.g., “Does this word fit into the sentence: ‘She spilled the _______’?”) and category (e.g., “Is this word an ingredient for cooking?”). Two different random question orders were generated and assigned via counterbalancing to participants. Following Graham and Golan (1991), only about 25% (10 out of 40) of the questions required a negative response due to methodological issues addressed by Craik and Tulving (1975), who found that questions requiring a positive response enhanced recall over those requiring a negative response. Only the 30 responses that required a positive response counted toward participants’ scores. For free recall, scores represented the number of words correctly recalled out of 30 after the incidental learning task was completed (possible score range was 0 to 30). For cued recall, participants were given the same questions from the incidental learning task one at a time (in two new counterbalanced random orders), to use as cues (e.g., “Is this word a type of fruit?”) and participants were asked to provide the word that was associated with each question (e.g., “cherry”). The possible score range for cued recall was also 0 to 30, because while all 40 items were cued, only the 30 that required positive responses were scored.

Subjective performance

Participants were asked to rate their performance on the memory task on a scale of 1 (“excellent”) to 10 (“very poor”). These scores were then reverse coded so that higher scores would represent better subjective performance.

Causal Beliefs (CDS-II)

The Revised Causal Dimension Scale (CDS-II; McAuley et al., 1992) was used to assess the characteristics of the attributions which participants made about their
Participants were asked to respond to 12 statements about causes of their performance on a 5-point Likert scale (1= “strongly agree,” 5= “strongly disagree”). The CDSII includes four subscales: locus of causality (α=.33; e.g., “This factor reflects an aspect of myself”), stability (α=.36; e.g., “This cause is variable over time”), personal control (α=.68; e.g., “This cause is manageable by me”), and external control (α=.78; e.g., “This factor is controllable by others”). A factor analysis confirmed that these four scales are reliable and represent empirically different constructs (McAuley et al., 1992).

Responses were summed within each subscale to yield a score ranging from 3-15 on each subscale. In line with Elliott & Dweck (1988), particular attention was paid to the personal control subscale because it would best reveal a helpless attribution pattern (attributional beliefs should be affected by the goal orientation manipulation). This control scale was chosen over other measures of control beliefs in the aging literature (Dixon, Hultsch, & Hertzog, 1988; Lachman, Bandura, Weaver, & Elliott, 1995) because it centered on one primary cause selected by the individual, and it is brief, yet highly reliable (McAuley et al., 1992).

**Telephone Interview of Cognitive Status (TICS)**

The TICS (Brandt, Spencer, & Folstein, 1988) is a global cognitive screening measure that can be completed via telephone. The TICS was used to exclude participants with dementia. The TICS includes 11 items, takes about 5-10 minutes to administer, and has a high score of 41 points (scores can range from 0 to 41). A score below 30 was used as evidence of dementia, as suggested by Brandt and colleagues (1988). According to Brandt and colleagues (1988), the TICS has high test-retest reliability ($r=.97$). The researchers also found that, in a sample including both cognitively healthy and cognitively impaired older adults, the TICS had a sensitivity of
94% and specificity of 100%, suggesting high validity and ability to predict dementia status (Brandt et al., 1988). This measure was administered on a case-by-case basis for participants who seemed to have difficulty with survey completion or the telephone interview, and when used, was presented to the participant as the last assessment, as if it were part of the standard administration of the study.

**Procedure**

When participants contacted the laboratory to participate, they were given a packet either in person or by U.S. mail containing the informed consent form, four questionnaires (Goal Orientation Questionnaire, Memory Self-Efficacy Questionnaire, SF-36, and participant information form), a stamped return envelope, and a request for preferred phone call times. They were instructed to read the consent form, and if interested, sign and return the form along with the included questionnaires using the stamped return envelope (or in person) to our laboratory. Upon receipt of the packet, participants were assigned to one of three conditions (learning goal, performance goal, control) using counterbalancing. In the final sample, there were 68 participants assigned to the learning goal condition (40 younger adults, 28 older adults), 75 to the performance goal condition (39 younger adults, 36 older adults), and 72 controls (39 younger adults, 33 older adults). Survey packets were reviewed to ensure that responses were clear, and then participants were contacted to set an appointment for the telephone interview (using their preferred call times). Any survey responses that needed to be clarified were discussed with the participant at the time of the phone interview. Participants were not told to which condition they were assigned. If the phone appointment could not be scheduled within thirty days of receipt of the questionnaire, the participants’ data were eliminated prior to analysis.
The telephone portion of this study was adapted from Graham & Golan (1991). On the telephone, the experimenter informed participants that we were studying cognitive activities, including everyday problems and word games. The experimenter explained that scores on the first task are highly related to performance on the second. For the first task, participants were given the Everyday Problem Solving Task, which included three everyday problems (Artistico et al., 2003) and three minutes to generate all possible solutions for each problem. If the participant stopped giving solutions before three minutes were up, the experimenter said, “there is still time left, can you think of any more solutions?” If the participant said “no”, the experimenter continued with the next activity. The experimenter did not give specific feedback on this first activity, and then moved on to the manipulation. Participants assigned to the learning goal were focused on the learning process and were told:

Many people have difficulty with these problems in the beginning but get better as they go along. When people see problems as a challenge, it makes them try harder and have more fun along the way. The next activity is a lot like the last one because they are both mental activities. So if you just concentrate on the task, try to see it as a challenge, and enjoy mastering it, you will probably get better as you go along.

To focus attention on ability and achievement, the performance goal group was told:

From your problem solving task score, I have a pretty good idea of how good you are at this sort of activity compared to other study participants. The next activity is a lot like this one in that some people are better at mental activities than other people. So how you do will tell me something about how good you are at this kind of task.

The control group was simply told:

We are now going to do a second activity which involves a word game. We will ask questions about words and you will respond to these questions. This is related to the last task we did because both are mental activities.
Thus, those in the learning goal group condition were encouraged to see the Everyday Problem Solving Task as a sort of warm-up toward building a skill, while those in the performance goal condition were directed to view success on both the problem-solving activity and the next activity (the Incidental Learning Task) as an indication of their ability.

The Incidental Learning Task was presented as a word game (Graham and Golan, 1991). Participants were instructed that they would hear a question followed by a target word. They were to listen carefully to each statement and then respond “yes” or “no” depending on whether the target word fit with the statement. After the two practice and 40 actual trials contained in the Incidental Learning Task, the experimenter administered a surprise recall task. Participants received the free recall test ("tell me all the words you remember") followed by a cued recall test (each question served as a cue). When participants did not recall a word, they were encouraged to make their best guess.

Then, the CDSII (McAuley et al., 1992) was administered to assess participants' feelings of control over their memory. Participants were asked, "What do you think was the most important cause of your performance today?" Then, the items from the CDSII were administered, and in each case, participants were asked specific attribution items, with the questions tailored to the cause identified by each particular participant as primary (for example, if a person identified “general ability” as the most important cause of performance, one item would be “General ability is something I can regulate”). Each question was followed by a Likert scale for response, ranging from 1= “strongly agree” to 5= “strongly disagree.”
Finally, participants were asked two questions about the word game as a manipulation check (“During the word game, were you trying to memorize the target words?” and “During the word game, did you realize that you would be asked to recall the target words later?”) to be sure that learning was not actually intentional.

Participants were then debriefed. If an older adult participant seemed to have had extreme difficulty with instructions at any point during the phone call, the experimenter administered the TICS as a screening for possible dementia just before debriefing. The TICS was administered to three participants, and each time the participant scored above the cutoff of 30 (Brandt et al., 1988). Thus, in no case did the TICS result in the elimination of a participant. On average, the entire phone call took about 20-30 minutes.

**Study 1 Results**

The manipulation check suggested that participants were adequately surprised by the recall tasks. Only 8.4% of participants reported trying to memorize the words, and only 5.1% of participants said they thought they would be asked to recall the words. There was no association between the second manipulation check question (“did you realize you would be asked to recall the game words later?”) and age or assigned condition. However, a chi-square test revealed that proportionally more participants who responded affirmatively to the first manipulation check question (indicating that they were trying to remember the words) were part of the older age group, $\chi^2(1) = 5.83$, $p < .05$. In no instance did controlling for the first manipulation check response influence results, so it was not included as a covariate in the reported analyses.

A preliminary analysis of group differences assessed whether randomization was successful, by examining age and condition (learning, performance, and control)
differences in a priori dispositional goal orientation (GOQ; Button et al., 1996), memory self-efficacy, health, and education. To examine baseline differences in dispositional goal orientation, an Age x Condition multivariate analysis of variance (MANOVA) was conducted, using the learning and performance goal subscales of the Goal Orientation Questionnaire as dependent variables. This analysis revealed no baseline differences in a priori dispositional goal orientation across age groups, Pillai’s trace=.01, multivariate $F(2, 206)=.94, p=.39, \eta_p^2=.01$, or assigned goal conditions, Pillai’s trace=.02, multivariate $F(4, 414)=.98, p=.42, \eta_p^2=.01$.

To examine baseline differences in memory self-efficacy, an Age x Condition univariate analysis of variance (ANOVA) was conducted using memory self-efficacy as the dependent variable. This analysis showed that memory self-efficacy differed across age groups, such that younger adults reported higher memory self-efficacy ($M=73.93, SE=1.58$) than older adults ($M=64.30, SE=1.75$), $F(1)=16.76, p<.001, \eta_p^2=.07$. Memory self-efficacy also differed by condition assignment, $F(2)=3.06, p=.05, \eta_p^2=.03$, such that it was higher in the performance goal group ($M=72.39, SE=1.98$) than in the control group ($M=65.41, SE=2.03$). There was not a significant difference in memory self-efficacy between the learning goal group ($M=69.55, SD=2.11$) and performance goal group, or the learning goal group and control group.

To examine baseline differences in self-rated health, an Age x Condition univariate analysis of variance (ANOVA) was conducted using self-rated health as the dependent variable. This analysis suggested that younger adults reported significantly better health ($M=8.28, SE=.15$) than older adults ($M=7.44, SE=.17$), $F(1)=13.40, p<.001, \eta_p^2=.06$, and there was no significant difference in self-rated health across assigned
goal conditions, $F(2)=2.51, \rho=.08, \eta_p^2=.02$. An Age x Condition multivariate analysis of variance (MANOVA) was also run to examine potential baseline health differences, using the eight SF-36 subscales as outcome variables. This analysis suggested no condition differences on SF-36 subscales, Pillai’s trace=.08, multivariate $F(16, 394)=.95$, $\rho=.51, \eta_p^2=.04$. However, there was a significant difference between age groups, Pillai’s trace=.40, multivariate $F(8, 196)=16.16, p<.001, \eta_p^2=.40$. Univariate follow-up tests showed that younger adults endorsed better health on the following three subscales: Physical Functioning, $F(1)=70.77, p<.001, \eta_p^2=.26$ (younger $M=29.00, SE=.39$; older $M=24.12, SE=.43$), Physical Limitations, $F(1)=7.31, p<.01, \eta_p^2=.04$ (younger $M=7.41, SE=.12$; older $M=6.93, SE=.13$), and Pain, $F(1)=24.26, p<.001, \eta_p^2=.11$ (younger $M=9.85, SE=.18$; older $M=8.52, SE=.20$). Older adults endorsed better health on the following two subscales: Vitality, $F(1)=4.92, p<.05, \eta_p^2=.02$ (younger $M=15.52, SE=.36$; older $M=16.70, SE=.39$) and Emotional Limitations, $F(1)=4.78, p<.05, \eta_p^2=.02$ (younger $M=5.09, SE=.10$; older $M=5.41, SE=.11$).

Finally, to examine baseline differences in years of education, an Age x Condition univariate analysis of variance (ANOVA) was conducted using years of education as the dependent variable. This analysis showed higher education in the older adult group ($M=15.10, SE=.21$) than the younger group ($M=12.75, SE=.19$), $F(1)=71.56, p<.001, \eta_p^2=.26$, but no differences based on goal condition group, $F(2)=.19, p=.83, \eta_p^2=.00$.

Based on the above findings, self-rated health$^1$, education, and memory self-efficacy were controlled for in all analyses of variance that included age as an

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$^1$ Self-rated health was strongly positively correlated with every SF-36 subscale that showed age differences (correlations ranged from .31 to .61, all $p<.01$), and it represents a single overall health rating, so was used alone to control for health differences overall.
independent factor (Table 2-1). Therefore, when interpreting findings, it is important to note that two variables commonly associated with age (memory self-efficacy and health) were controlled for, and this may result in a reduction of age effects.

**Effects of Assigned Goal Condition and Age**

The first research question was whether assigned goal condition and/or age had an effect on memory performance. To examine this question, an Age x Condition repeated measures multivariate analysis of variance (RMANOVA) was run, with cued and free recall as outcomes. As expected, the free recall scores ($M=4.46$, $SE=.21$) were significantly lower than the cued recall scores ($M=23.22$, $SE=.25$), because it was a more difficult task, Pillai’s trace=.27, multivariate $F(1, 206)=77.41$, $p<.001$, $\eta^2_p=.27$ (Figures 2-1 and 2-2). There was no significant Condition x Recall task interaction apparent in the multivariate analysis, suggesting the effect of condition did not differ between recall tasks, Pillai’s trace=.01, multivariate $F(2, 206)=.68$, $p=.51$, $\eta^2_p=.01$. Tests of between-subjects effects suggested that there was not a main effect of condition, $F(2)=.90$, $p=.41$, $\eta^2_p=.01$, nor was there an Age x Condition interaction, $F(1)=.15$, $p=.86$, $\eta^2_p=.00$, on overall memory performance (Figure 2-1). The multivariate analysis showed an Age x Recall task interaction, Pillai’s trace=.09, multivariate $F(1, 206)=21.28$, $p<.001$, $\eta^2_p=.09$, suggesting that the main effect of age differed between the two recall tasks (free and cued recall). Specifically, participant age group had a stronger effect for cued recall (younger adults $M=25.14$, $SE=.38$; older adults $M=21.30$, $SE=.43$) than for free recall (younger adults $M=4.85$, $SE=.32$; older adults $M=4.08$, $SE=.36$) (Figure 2-2). Therefore, in response to the first research question, results confirmed that age group did have an impact on performance but only for cued recall.
(younger participants performed better). Results did not support the hypothesis that performance would differ based on goal condition assignment.

The second research question was whether assigned goal condition and/or age had an effect on control beliefs, specifically the personal beliefs subscale of the CDSII (McAuley et al., 1992). To examine this question, an Age x Condition univariate analysis of variance was run (ANOVA), with the CDS personal control subscale as the dependent variable. Contrary to hypotheses, results did not support a main effect of age, $F(1)=0.00$, $p=1.00$, $\eta^2_p=0.00$, or condition assignment, $F(2)=0.81$, $p=0.45$, $\eta^2_p=0.01$, on personal control. Thus, participants tended to endorse similar levels of personal control over memory regardless of age or whether they were assigned to receive learning goals, performance goals, or neither (Figure 2-1).

In relation to both of these primary research questions, it was hypothesized that participants in the control group, who were not given any specific task instructions to orient them toward learning or performance goals, would perform in line with their dispositional goal orientation, as measured by the Goal Orientation Questionnaire (GOQ; Button et al., 1996). Specifically, control participants with a disposition toward learning goals were expected to show better performance and endorse higher personal control beliefs than those with a disposition toward performance goals. A series of analyses of variance (ANOVAs) were run to examine this hypothesis using recall variables and personal control beliefs as outcomes. Age group (0=younger adult, 1=older adult) and dispositional goal orientation group (0=High performance goals/Low learning goals, 1=High learning goals/Low performance goals) were entered as independent factors (the following section contains details on how these dispositional
goal groups were constructed). As in all previous analyses, health, education, and memory self-efficacy were used as covariates because they significantly differed at baseline. First, an Age group x Dispositional goal orientation group repeated measures multivariate analysis of variance (RMANOVA) was run using only control group participants and the two recall variables as outcomes (free recall and cued recall). Results did not support the hypothesis that control group participants would perform in line with their dispositional goal orientation (dispositional goal orientation group had no effect on memory performance). There was no significant interaction of dispositional goal orientation and recall task in the multivariate analysis, suggesting the effect of dispositional goal group did not differ between recall tasks, Pillai’s trace=.03, multivariate $F(1, 13)=.35, p=.57, \eta_p^2=.03$. There was also no main effect of dispositional goal orientation group, $F(1)=.09, p=.77, \eta_p^2=.01$. Similarly, an Age group x Dispositional goal orientation group univariate analysis of variance (ANOVA) was run using only control group participants and personal control beliefs as the outcome variable. Again, results did not support the hypothesis that control group participants would perform in line with their dispositional goal orientation (dispositional goal orientation group had no effect on personal control beliefs), $F(1)=.01, p=.93, \eta_p^2=.00$.

**Moderation of Memory Self-Efficacy**

A third research question was whether memory self-efficacy, (representing the theoretical construct of perceived ability) moderated the impact of goal condition on performance and control beliefs. In order to investigate the moderating effect of self-efficacy, a moderated regression analyses was run separately for each dependent variable (free recall, cued recall, and the personal control subscale from CDSII). The main effects of condition and memory self-efficacy were entered in the first regression
block. To control for multicollinearity, a residualized interaction term was computed by multiplying condition and memory self-efficacy for each case, then using the standardized residuals obtained from running a separate analysis regressing this product on condition and memory self-efficacy as the interaction variable (Little, Bovaird, & Widaman, 2006)\(^2\). This interaction term between condition and memory self-efficacy was entered in the second regression block. A significant interaction would be interpreted as evidence that memory self-efficacy (perceived ability) moderated the effects of performance goals. Because preliminary analysis did not suggest any significant baseline differences based on condition, none were used as controls in the regression analyses.

A preliminary review of scatterplots revealed one participant (in the learning goal condition) with an extremely high free recall score (22) and low memory self-efficacy score (26.50). This participant also answered affirmatively to the first manipulation check question (indicating that she was trying to remember the words). This outlier was removed and not included in the regression results that follow.\(^3\)

The main effect of condition was not significant in any of the regression equations, which was to be expected based on the previously-run ANOVAs. The main effect of memory self-efficacy was significant for free recall, \(\beta=.27, t(213)=4.08, p<.01\) and cued recall, \(\beta=.23, t(214)=3.43, p<.01\), and tended toward significance for personal control,

\(^2\) For each dependent variable, identical regressions were also run using mean-centering to compute the interaction terms. Similar results were obtained.

\(^3\) Including this participant resulted in a significant Condition x Memory Self-Efficacy interaction, suggesting that participants in the learning goal condition performed similarly regardless of memory self-efficacy level. Because this result differs from that found when these data were excluded, it can be assumed this effect was driven by this outlying case. Data is available upon request. Excluding this participant from all other analyses in this paper did not affect results, so these data were included.
β=.13, t(214)=1.89, p=.06, suggesting that the higher the efficacy, the better the free and cued recall performance and the higher perceived personal control endorsed regardless of condition assignment. Contrary to hypotheses, the interaction between goal condition and self-efficacy was not significant for free recall, β=.06, t(213)=-.90, p=.37, cued recall, β=-.03, t(214)=-.46, p=.64, or personal control β=-.08, t(214)=-1.18, p=.24. This suggests that memory self-efficacy did not have a differential impact across conditions for either cued recall or personal control.

**Study 1 Follow-Up Analyses**

As discussed in Chapter 1, goal orientation has been conceptualized as a stable individual difference variable that is also affected by situational factors (Button et al., 1996). Therefore, it is possible that two dimensions of goal orientation were present during the course of the study: the participants’ general disposition toward cognitive tasks (either through a learning goal or performance goal perspective) as well as the assigned goal condition, which was experimentally manipulated. It is possible that these two dimensions interacted in some way, and thereby clouded the effects. Specifically, it is possible that individuals high in a particular dispositional goal orientation (for example, learning goals) were more impacted by an assignment to the corresponding goal assignment (learning) than those with a disposition toward a goal that conflicted with their assignment (for example, dispositional performance goal but assigned to learning goals). It was expected that participants who were either high or low in both learning or performance goals would respond more to the goal condition manipulation, because this could be seen as an indication that they are not strongly predisposed to approach tasks with one goal or the other.
Because learning goal and performance goal subscale scores on the goal orientation questionnaire (GOQ, Button et al., 1996) were highly correlated ($r = .66$, $p < .01$), it was not possible to simply dichotomize participants into either learning or performance goal groups. Therefore, to explore this research question, Study 1 participants were divided into four groups, based on dispositional goal orientation (GOQ subscales for learning and performance goals; Button et al., 1996): High learning goals/Low performance goals ($N = 29$), High performance goals/Low learning goals ($N = 25$), High in both goals ($N = 48$), Low in both goals ($N = 56$). The criterion for group membership was based on falling within the top or bottom 40% of the sample distribution (the cutoff for high learning goals was 47 and high performance goals was 46 and the cutoff for low in either goal was 43). Four separate Condition x Age repeated measures analyses of variance (RMANOVAs) were run using only the participants from each dispositional group, with cued and free recall as outcomes. As described previously, health, education, and memory self-efficacy were used as covariates because they significantly differed across levels of the independent factors. Results did not support the hypothesis that the impact of assigned goal condition depended on dispositional goal group; a similar pattern of results emerged for each dispositional group as was found for the entire sample. Four separate Condition x Age analyses of variance (ANOVAs) were also run using only the participants from each dispositional group, with personal control beliefs as the outcome. Health, education, and memory self-efficacy were used as covariates. Again, results did not support the hypothesis that the impact of assigned goal condition would depend on dispositional
goal group; a similar pattern of results emerged for each dispositional group as was found for the entire sample.

**Study 1 Discussion**

Study 1 aimed to replicate past research on goal orientation theory (Dweck, 1986) in an adult sample using an incidental word recall task (Graham & Golan, 1995). Specifically, it was expected that encouraging a learning goal orientation via task instructions would result in better free and cued recall performance, and higher personal control beliefs, than encouraging a performance goal orientation. This effect was expected to be largest for participants with low memory self-efficacy, or perceived memory ability. If supported, the goal orientation theory could be used as a way to further explore and understand non-ability factors that impact learning in adulthood.

Study 1 results provided little support for Dweck’s (1986) achievement goal framework. Age group impacted cued recall in the expected direction (younger adults performed better than older adults), but did not affect personal control beliefs. Contrary to hypotheses, manipulating achievement goals did not impact cued recall, free recall, or personal control beliefs for participants. The moderation results suggested that memory self-efficacy was positively related to free and cued recall and personal control beliefs; however, its impact was similar for all assigned goal conditions. These results therefore did not support the hypothesis that low memory self-efficacy would negatively impact participants in the performance goal group more than in the learning goal or control groups.

Follow-up analyses examining the role of dispositional goal orientation did not suggest differential response to the goal orientation manipulation based on dispositional goal orientation, even for control group participants (who were expected to behave in
line with their dispositional orientation). The significant positive association between learning goals and performance goals found in the process of this analysis was interesting and supports the claim by Button and colleagues (1996) that an individual may "simultaneously strive to improve one's skills and to perform well relative to others."

It has been suggested that adults' conceptions of ability may not be purely entity theories (fixed) or incremental theories (skill) (Hertzog et al., 1999; Kanfer, 1990). In particular, Hertzog and colleagues (1999) maintain that adults may simultaneously believe that biological processes associated with aging limit memory improvement, but still think that behavior (mental exercise, or practice, for example) may determine to what extent cognitive ability is harmed by the aging process. That is, adults may view cognitive activity as a way to exert some compensatory control (skill theory) over a somewhat uncontrollable biological aging process (entity theory) (Hertzog et al., 1999).

In this context, the correlation between learning and performance goals makes sense in the aging literature. Interestingly, Harackiewicz and colleagues have also suggested that a learning goal/performance goal combination may produce more desirable outcomes than holding one goal or the other, at least for college students (Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000; Harackiewicz et al., 2002).

Harackiewicz and colleagues (2002) suggest that academic achievement is actually best predicted by performance-approach goals, but interest is best predicted by learning goals. Clearly both interest and performance are important outcomes when evaluating the effects of goal orientation on learning, and for this reason, holding both goals simultaneously may be beneficial.
There were several limitations associated with Study 1 that should be addressed in future research. First, the learning goal instructions may not have given the participants enough of a reason to work hard. For the performance goal group, participants were told the purpose was to prove their ability, whereas learning goal participants were essentially told to do their best and try to get better. It is possible that these vague instructions in the learning goal condition hindered the potential performance enhancement thought to result from the adoption of learning goals. In other words, learning goal participants may not have really believed that getting better at the word game task would have any important positive outcomes, whereas performance goal participants were told that a positive outcome would result from doing well on the task (specifically, they would prove that they had high ability). Study 2 addresses this limitation because the learning goal instructions were changed in Study 2 to include a purpose for learning goal participants to work hard: to learn the material well enough to teach the material to another person.

Another limitation that was exposed during the study was the complicated nature of the task instructions for the word game. Many older adults reported confusion about how to respond to the statements during the example portion. Although instructions were explained until the participant seemed to completely understand, it is possible that some participants still had difficulty following instructions throughout the word game. If this differentially occurred in the older versus younger group, this could provide an alternate explanation of the widespread negative effects of age on performance.

Although the instructions may have been tricky at first, the word game required only a yes or no response to a series of questions about simple nouns, and therefore
participants likely considered it a simple task (it is not difficult to state whether or not a shirt is an item of clothing). The meta-analysis of goal orientation effects by Utman (1997) found that learning goals conferred the largest advantage when the tasks used in the study were complex. To further explore this issue, the memory task used in Study 2 is more complex, being a 24-sentence story with interconnecting ideas and conceptual recall questions (rather than 40 individual simple nouns).

The incidental nature of the task may have also been a limitation. Because participants were not aware they would be tested, and the "word game" was relatively simple, it is possible that participants oriented toward learning goals did not really view the word game as an opportunity to build mastery. Likewise, participants oriented toward performance goals may not have been significantly threatened by the potential for poor performance on such a task (because they could blame poor performance on the surprise nature of the task rather than memory ability), and thus their goal orientation did not have a negative effect. Further, because both cued and free recall were surprise memory tasks for participants, they did not have the chance to allow the goal manipulation to impact how much effort they put into encoding the words (only how much effort they put into retrieval). Perhaps a more intentional memory task would lend itself more to goal manipulation effects, because behavior specific to memory (such as strategy use and effort) would be purposefully used by participants. However, it is important to note that the present study was based on one of the few goal orientation studies using a memory task that exists in the literature (Graham & Golan, 1995; Utman, 1997), and that the study on which the present study was based did find significant goal orientation effects (Graham & Golan, 1995). Regardless, this limitation
is addressed in Study 2, in which participants were told that there would be a recall task before the to-be-remembered material was presented.

Thus, Study 1 provided very little support for the goal orientation framework: assigned participants to adopt learning or performance goals did not impact performance or control beliefs. Separating participants based on predisposition toward a particular goal orientation did not result in different effects: all participants were equally resistant to the goal orientation manipulation, regardless of their dispositional goal orientation profile. Although the current study used a task that had shown some significant performance effects in past goal orientation research with children, it is possible that a more intentional and challenging cognitive task could yield more of a direct benefit for adults with learning goals. Study 2 will examine similar hypotheses using an intentional, more complex task, to learn whether goal orientation can be manipulated for intentional story memory.
### Table 2-1. Sample characteristics for Study 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Younger</th>
<th>Older</th>
<th>Total</th>
<th>Younger</th>
<th>Older</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>18.50</td>
<td>71.28</td>
<td>42.18*</td>
<td>.87</td>
<td>6.58</td>
<td>26.68</td>
</tr>
<tr>
<td>Education (years)</td>
<td>12.75</td>
<td>15.10</td>
<td>13.81*</td>
<td>.94</td>
<td>2.82</td>
<td>2.33</td>
</tr>
<tr>
<td>Self-rated health</td>
<td>8.28</td>
<td>7.40</td>
<td>7.88*</td>
<td>1.21</td>
<td>2.11</td>
<td>1.73</td>
</tr>
<tr>
<td>Learning goals (GOQ)</td>
<td>41.58</td>
<td>43.18</td>
<td>42.29</td>
<td>10.60</td>
<td>9.44</td>
<td>10.11</td>
</tr>
<tr>
<td>Performance goals (GOQ)</td>
<td>41.47</td>
<td>42.90</td>
<td>42.11</td>
<td>10.91</td>
<td>8.81</td>
<td>10.02</td>
</tr>
<tr>
<td>Memory self-efficacy (MSEQ-4)</td>
<td>73.95</td>
<td>64.53</td>
<td>69.70*</td>
<td>14.62</td>
<td>20.03</td>
<td>17.86</td>
</tr>
<tr>
<td>Personal control (CDS-II)</td>
<td>10.90</td>
<td>10.49</td>
<td>10.72</td>
<td>2.74</td>
<td>2.50</td>
<td>2.64</td>
</tr>
<tr>
<td>Cued recall (words recalled)</td>
<td>25.05</td>
<td>21.41</td>
<td>23.41*</td>
<td>2.92</td>
<td>4.40</td>
<td>4.08</td>
</tr>
<tr>
<td>Free recall (words recalled)</td>
<td>4.92</td>
<td>3.98</td>
<td>4.49*</td>
<td>2.66</td>
<td>3.46</td>
<td>3.08</td>
</tr>
</tbody>
</table>

*Significant mean difference (t-test) between age groups, p<.05.

### Table 2-2. Study 1 measures listed in the order of administration.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Measure</th>
<th>When administered</th>
</tr>
</thead>
<tbody>
<tr>
<td>A priori goal orientation</td>
<td>Goal Orientation Questionnaire (GOQ)</td>
<td>At home before study (in packet)</td>
</tr>
<tr>
<td>Memory self-efficacy</td>
<td>Memory Self Efficacy Questionnaire (MSEQ-4)</td>
<td>At home before study (in packet)</td>
</tr>
<tr>
<td>Health (e.g., ADLs)</td>
<td>SF-36 Short-Form Health Survey</td>
<td>At home before study (in packet)</td>
</tr>
<tr>
<td>Sociodemographic information</td>
<td>Participant Information Form</td>
<td>At home before study (in packet)</td>
</tr>
<tr>
<td>Everyday problem solving</td>
<td>Questions adapted from Artistico, Cervone, &amp; Pezzuti (2003)</td>
<td>By phone, before condition manipulation</td>
</tr>
<tr>
<td>Memory performance</td>
<td>Free and cued recall of words (Incidental Learning Task)</td>
<td>By phone, after condition manipulation</td>
</tr>
<tr>
<td>Control beliefs</td>
<td>Revised Causal Dimension Scale (CDS-II)</td>
<td>By phone, after condition manipulation</td>
</tr>
<tr>
<td>General cognitive function</td>
<td>The Telephone Interview of Cognitive Status(TICS)</td>
<td>By phone, if needed</td>
</tr>
</tbody>
</table>
Figure 2-1. Mean scores based on age group and assigned goal condition. A) For free recall. B) For cued recall. C) For personal control beliefs.
Figure 2-2. Mean scores based on age group and recall task.
CHAPTER 3
STORY RECALL

Study 2 used a paradigm examining goal orientation from Benware and Deci (1984) to expand on Study 1, by examining story recall and strategy use. The original study was conducted in-person with a sample of college students, but our replication took place over the phone and also included an older adult sample to learn whether the same patterns would emerge. The younger adult sample was included to demonstrate that the effects found in Benware and Deci (1984) still result using the telephone procedure.

Study 2 Research Questions and Hypotheses

Study 2 research questions and hypotheses mirrored those of Study 1, because the main goal was to replicate Study 1 results with a different type of memory (intentional story recall rather than incidental word recall) and to examine strategy use.

The first research question was whether assigned goal condition and/or age would impact memory performance for comprehension questions (rote and conceptual) and free recall. We expected main effects of age, such that increased age would be associated with worse memory performance. Following Elliott and Dweck (1988), we also predicted a main effect of condition, such that those in the performance goal group would have worse memory performance for all three memory measures than those in the learning goal or control groups. Those in the control group should show outcomes consistent with their a priori goal orientation, as measured by the Goal Orientation Questionnaire (Button et al., 1996) (for example, those in the control group with a priori performance goals should experience outcomes similar to those hypothesized above for the performance goal condition). No interaction of age and condition was expected,
suggesting that the predicted benefits of learning goals on performance should be equally present for younger and older participants.

The second research question was whether assigned goal condition and/or age would impact personal control beliefs (as measured by the CDSII, McAuley et al., 1992). We expected a main effect of age and condition, such that older participants and those in the performance goal condition would endorse lower levels of personal control than younger participants and those in the learning goal and control conditions. Again, those in the control group should show outcomes consistent with their a priori goal orientation, as measured by the Goal Orientation Questionnaire (Button et al., 1996). Once again, no interaction of age and condition was expected, suggesting that the predicted benefits of learning goals on personal control beliefs should be equally present for younger and older participants.

The third research question was whether assigned goal condition and/or age would impact the number or quality of memory strategies used. We expected a main effect of age and condition, such that older participants and those in the performance goal condition would use fewer strategies than younger participants and those in the learning goal and control conditions. Those in the control group should show outcomes consistent with their a priori goal orientation, as measured by the Goal Orientation Questionnaire (Button et al., 1996). Once again, no interaction of age and condition was expected, suggesting that the predicted benefits of learning goals on number of strategies used should be equally present for younger and older participants. To examine quality of strategies used, two of the strategies rated as most effective by cognitive psychologists in previous research for our laboratory were included on the
strategy checklist (these two strategies included: “In your mind, pictured the events of the story in a video, as they unfolded” and “Focused on the personal meaning of the story, such as whether it was happy or sad, or whether the story could happen to a friend of yours”). We expected that those in the performance goal group would be less likely than those in the learning goal group to report that these methods were among their primary strategies. We also expected that older participants would be less likely to report using one of these two highly effective strategies as a primary strategy.

The final research question was whether memory self-efficacy moderated the impact of goal condition on memory performance, control beliefs, and strategy use. Based on Dweck’s theory, we expected to find a significant interaction between memory self-efficacy and assigned goal condition, indicating that memory self-efficacy moderated the effects of performance goals. Specifically, performance goals should be most detrimental for those with lower memory self-efficacy (result in lower performance scores, lower personal control, and fewer strategies used); however, memory self-efficacy should not have as much of an impact on performance, control beliefs, or strategy usage for those with learning goals or in the control condition.

Participants

Participants who participated in Study 1 were not eligible to participate in Study 2, to prevent any a priori knowledge of the study’s purpose. Three hundred nineteen participants (176 older adults, 143 younger adults) were recruited to participate in the study. Fifty-five older adult participants and six younger adults declined participation (43 older adults did not complete the survey packet, six older adults and six younger adults did not return phone calls to complete the study, five older adults indicated they did not want to invest the time needed to complete the study, one older adult had to
discontinue due to her husband’s illness). All of the undergraduates were recruited from the undergraduate psychology participant pool or psychology courses, and received research or course credit for their participation. The majority of the older adults were recruited through younger adult and other older adult referrals (“snowball sampling”); others were recruited via email advertisements to family and friends. Older adult participants received a $10 check for their participation. Elimination criteria included use of anticholinergic medications ($N=0$), dementia diagnosis ($N=1$ older adult), poor global cognitive function ($N=0$), extreme difficulty with instructions ($N=0$), or other evidence of cognitive impairment ($N=2$). Other participants were eliminated due to being familiar with the study’s purpose ($N=1$ younger adult), having difficulty hearing over the phone ($N=4$ older adults), not being fluent in English ($N=8$ older adults), phone interview interruptions or problems ($N=6$ older adults), or not completing the second part of the study within 30 days of the first part ($N=4$ older adults).

Therefore, the final sample consisted of ninety-six healthy community-dwelling older adults (aged 60-86, $M=71.14$, $SD=6.95$) and one hundred thirty-six college undergraduates (aged 18-22, $M=18.93$, $SD=.96$), for a total sample of two hundred and thirty-two participants. The final sample was healthy ($M=7.77$, $SD=1.83$ on a scale where 1=very poor and 10=excellent health), had at least a high school education ($M=13.72$, $SD=2.26$ years of education), was predominately female (76.7% female), and was mostly Caucasian (70.3% Caucasian, 12.5% African American, 9.5% Hispanic/Latino, 6% Asian, 1.7% other races). See Table 3-1 for other sample characteristics.
Measures

Goal Orientation Questionnaire

The same Goal Orientation Questionnaire was used for Study 2 as in Study 1 (Button et al., 1996).

Memory Self-Efficacy Questionnaire

The same memory self-efficacy questionnaire was used for Study 2 as in Study 1 (West et al., 2003).

SF-36 Short-Form Health Survey

The SF-36 (Ware & Sherbourne, 1992) was used as it was used in Study 1.

Participant Information Form

The same participant information was collected for Study 2 as for Study 1.

Story Recall

Stories were pulled from a book of 25 stories for aging research written to be equivalent on semantic structure (Dixon, Hultsch, & Hertzog, 1989). The two stories that were used for the study were identified by a number of research assistants in our laboratory as free of ethnic and gender biases. Both stories included 24 sentences written at a seventh grade reading level (Dixon et al., 1989). One story was about a man running a race. The other story was about a couple going on their annual camping trip. Free recall scores were calculated based on a propositional analysis using SPSS Text Analysis for Surveys. SPSS Text Analysis for Surveys has been shown to have high inter-rater reliability with trained scorers in our lab ($r = .91$; Hastings & West, 2009). Propositions were entered into the program based on a propositional analysis of the stories (Dixon et al., 1989). In the running story, 157 propositions were identified, and there were 155 propositions in the story about the camping trip. Proportion of
propositions recalled by each participant (number recalled divided by 157 or 155, depending on which story the participant received) was used as a free recall score (possible scores ranged from 0-100). Participants also answered eight rote memory questions about the story (e.g., What was the name of the main character in the story?) and eight conceptual questions (e.g., Why was the man especially proud of his performance in the race?). For the rote memory items, a list of acceptable responses was created using the consensus responses identified by four research assistants who reviewed all protocols. The number of correct responses was used as the outcome measure (possible scores ranged from 0-8). For the conceptual memory items, a similar list of acceptable responses was created based on the consensus of four research assistants. For the conceptual items, there was considerable variability in the number of points available for each response. For example, in the running story, a question about the weather could have involved a number of weather features mentioned in the story. Once the number of acceptable responses was identified, SPSS Text Analysis was used to score the number of possible correct responses given by each participant for each question. The number of correct responses were summed across items and then divided by the total number of possible correct responses generated by the consensus meeting (43 for the race story; 58 for the camping story) to create a proportion correct score (possible scores ranged from 0-100).

Subjective Performance

The same subjective performance rating was requested for Study 2 as for Study 1.

Causal Beliefs (CDS-II)

The same causal beliefs questionnaire was used for Study 2 as in Study 1 (McAuley et al., 1992).
Strategy Use

A strategy checklist developed for other story recall research included 12 different techniques that people use when remembering text (e.g., “I concentrated and paid attention to each part of the story”, “I related the story to a personal experience I have had”). Past research has supported the utility and validity of self-reported measures of strategy use for memory (Dunlosky & Hertzog, 1998b; West et al., 2008). The experimenter read each strategy and the participant responded “yes” or “no” as to whether they used that particular strategy when trying to remember the story (West et al., 2008). The total number of reported strategies was used as the dependent variable in the model to be tested (score range was 0-12). Participants were also asked to identify the strategy they used most. In previous research for our laboratory, a group of cognitive psychologists rated each strategy in terms of how effective it is. Based on that analysis, the two most effective strategies on the checklist for text recall were “In your mind, pictured the events of the story in a video, as they unfolded” and “Focused on the personal meaning of the story, such as whether it was happy or sad, or whether the story could happen to a friend of yours.” For dependent measures, examination included both the number of strategies utilized during text recall and the frequency of reported high usage (the strategy used most often) of one of the best two strategies.

Telephone Interview of Cognitive Status (TICS)

The TICS (Brandt et al., 1988) was used in the same way as in Study 1.

Procedure

When participants contacted the laboratory to participate, they were given a packet either in person or by U.S. mail containing the informed consent form, four questionnaires (Goal Orientation Questionnaire, Memory Self-Efficacy Questionnaire,
SF-36, and participant information form), a stamped return envelope, and a request for preferred phone call times. They were instructed to read the consent form, and if interested, sign and return the form along with the included questionnaires using the stamped return envelope (or in person) to our laboratory. Upon receipt of the packet, participants were assigned to one of three conditions (control, learning goal, performance goal), and one of the two stories for recall, using counterbalancing. In the final sample, there were 77 participants assigned to the learning goal condition (44 younger adults, 33 older adults), 76 to the performance goal condition (46 younger adults, 30 older adults), and 79 controls (46 younger adults, 33 older adults). They were contacted to set a phone appointment in order to complete the remainder of the study (using their preferred call times). Participants were not told to which condition they had been assigned. If the phone appointment could not be set within 30 days of survey packet receipt, the participant’s data were eliminated before analysis.

The following telephone interview procedure was modeled after Benware and Deci (1984). Participants were first told that we were studying processes associated with story teaching and learning. Learning goal participants were instructed to focus on mastering the material, with minimal focus on demonstrating ability. It is important to note that, while the instructions mention that the participant will be teaching the story to a student, no actual student existed and these instructions were simply given to encourage a focus on building knowledge (to teach, in this case). Specifically, those in the learning goal group were told the following:

We are studying processes related to story teaching and learning. Today I’d like to do a few activities with you. For the first activity, I am going to play you a brief story. The purpose for playing you this story is so that you can teach the story to another person, whom we will call your “student.”
After you hear the story, we will record your retelling of the story and play it for the other person. At a later date, that person will listen and try to recall the story and all of the details in the story. Use whatever strategies seem most appropriate to help you so that you can retell the story. Let me know if you would like me to pause the recording at any point to let the details sink in. (Benware & Deci, 1984).

To focus their attention on showing ability compared with others, performance goal participants were told:

We are studying processes related to story teaching and learning. Today I’d like to do a few activities with you. For the first activity, I am going to play you a brief story. The purpose for playing you this story is so that you will score as high as possible on a test based on the story. For this test, you will try to recall the story and all of the details in the story, and we will use your score as a measure of your ability compared with other study participants. Use whatever strategies seem most appropriate to help you so that you can remember the story. Let me know if you would like me to pause the recording at any point to let the details sink in. (Benware & Deci, 1984).

Instructions in the control group did not focus the participants on demonstrating memory ability compared with other people; they just focused on the participant answering a few comprehension questions. The control group was told:

We are studying processes related to story teaching and learning. Today I’d like to do a few activities with you. For the first activity, I am going to play you a brief story and then ask you some questions about the story. Use whatever strategies seem most appropriate to help you learn the story. Let me know if you would like me to pause the recording at any point to let the details sink in.

The experimenter played a recording of the 24-sentence story (Dixon et al., 1989), which had been previously recorded by a female undergraduate research assistant using clear speech techniques (Kricos, 2003) that increase comprehension for hearing impaired individuals. After hearing the story, those in the performance goal and control groups were asked to recall as many details about the story as possible (free recall). Then, they were given the 16 questions (eight rote memory, eight conceptual) to answer.
about the story. After hearing the story, the learning goal participants were asked to retell the story as precisely as possible, so that we could record the retelling for their student (free recall). Because those in the learning goal group were not expecting to be tested (rote memory and conceptual questions), they were informed that some participants were randomly selected to take the same test that would later be given to their student. The purpose of this surprise test was explained as a way for us to compare how the teacher understood the material in comparison with the student (Benware & Deci, 1984). As previously mentioned, however, there actually was no student who was learning the material. The experimenter then administered the same 16 questions about the story that were given to the performance goal and control participants.

Then, the CDSII (McAuley et al., 1992) was administered to assess participants’ feelings of control over their memory. Participants were asked “What do you think was the most important cause of your performance today?” and the items from the CDSII were administered. Participants responded to questions about their ability to control factors related to their own personally selected cause. Finally, at the end of the phone call participants were told that we were interested in learning what strategies they used while trying to remember the story, and were given the strategy use measure. Participants were then debriefed. As in Study 1, if a participant seemed to have extreme difficulty with instructions at any point during the phone call, the experimenter was instructed to administer the TICS as a screening for possible dementia just before debriefing. However, in no case was the TICS needed. As in Study 1, the typical total time per phone call was between 20-30 minutes.
**Study 2 Results**

A preliminary analysis of group differences examined whether randomization was successful, so that no differences in a priori dispositional goal orientation (GOQ; Button et al., 1996), memory self-efficacy, health, or education existed between age or condition (learning goal, performance goal, control) groups. To examine baseline differences in dispositional goal orientation, a preliminary Age x Condition multivariate analysis of variance (MANOVA) using the learning and performance goal subscales of the Goal Orientation Questionnaire as dependent variables was conducted. This MANOVA revealed no baseline differences in a priori dispositional goal orientation across age groups, Pillai’s trace=.00, multivariate $F(2, 225)=.06$, $p=.95$, $\eta_p^2=.00$, or assigned goal conditions, Pillai’s trace=.04, multivariate $F(4, 452)=2.14$, $p=.08$, $\eta_p^2=.02$.

To examine baseline differences in memory self-efficacy, an Age x Condition ANOVA was conducted. This analysis showed that memory self-efficacy differed across age groups, such that younger adults reported higher memory self-efficacy ($M=74.10$, $SE=1.41$) than older adults ($M=60.77$, $SE=1.70$), $F(1)=36.48$, $p<.001$, $\eta_p^2=.14$. Memory self-efficacy did not differ by condition assignment, $F(2)=2.01$, $p=.14$, $\eta_p^2=.02$.

An Age x Condition analysis of variance (ANOVA) examined self-rated health as the dependent variable and found that younger adults reported significantly better health ($M=8.03$, $SE=.16$) than older adults ($M=7.40$, $SE=.19$), $F(1)=6.80$, $p<.05$, $\eta_p^2=.03$, and there was no significant difference in self-rated health across assigned goal conditions, $F(2)=.93$, $p=.40$, $\eta_p^2=.01$.

Another Age x Condition multivariate analysis of variance (MANOVA) was also run to examine potential baseline health differences, using the eight SF-36 subscales as
outcome variables. This analysis suggested no condition differences on SF-36 subscales, Pillai’s trace=.08, multivariate $F(16, 426)=1.17, p=.29, \eta^2_p=.04$. However, there was a significant difference between age groups, Pillai’s trace=.47, multivariate $F(8, 212)=23.75, p<.001, \eta^2_p=.47$. Specifically, younger adults endorsed better health on the following three subscales: Physical Functioning, $F(1)=99.57, p<.001, \eta^2_p=.31$ (younger $M=28.86, SE=.30$; older $M=24.15, SE=.36$), Physical Limitations, $F(1)=34.18, p<.01, \eta^2_p=.14$ (younger $M=7.63, SE=.11$; older $M=6.68, SE=.13$), and Pain, $F(1)=19.15, p<.001, \eta^2_p=.08$ (younger $M=10.03, SE=.18$; older $M=8.82, SE=.21$). Older adults endorsed better health on the following three subscales: Vitality, $F(1)=10.22, p<.01, \eta^2_p=.05$ (younger $M=14.63, SE=.34$; older $M=16.32, SE=.41$), Mental Health, $F(1)=15.77, p<.01, \eta^2_p=.07$ (younger $M=22.32, SE=.38$; older $M=24.64, SE=.45$), and Emotional Limitations, $F(1)=13.44, p<.001, \eta^2_p=.06$ (younger $M=4.97, SE=.09$; older $M=5.50, SE=.11$).

Finally, an Age x Condition ANOVA using years of education as the outcome variable was run to examine baseline differences in education. This analysis found higher education in the older adult group ($M=14.40, SE=.22$) than the younger group ($M=13.22, SE=.19$), $F(1)=16.37, p<.001, \eta^2_p=.07$, but no differences based on goal condition, $F(2)=2.14, p=.12, \eta^2_p=.02$.

Based on the above findings, health\(^1\), education, and memory self-efficacy were controlled for in all analyses of variance that included age as an independent factor (Table 3-1). As in Study 1, it is important to note that two variables commonly

\(^{1}\) Self-rated health was strongly positively correlated with every SF-36 subscale that showed age differences except for Emotional Limitations (correlations ranged from .26 to .52, all $p<.01$), and it represents a single overall health rating, so it was used alone to control for health differences overall. Emotional Limitations was not strongly associated with any of the outcome variables, so was not used as a covariate.
associated with age (memory self-efficacy and health) were controlled for, and this may result in a reduction of age effects.

**Effects of Assigned Goal Condition and Age**

To examine the first research question of whether assigned goal condition and/or age would impact memory performance for free recall and comprehension questions (rote and conceptual), an Age x Condition multivariate analysis of variance (MANOVA) was performed using the three recall variables as outcomes. Results suggested a main effect of age, such that younger participants performed better overall than older participants, Pillai’s trace=.04, multivariate $F(3, 218)=2.95$, $p<.05$, $\eta^2_p=.04$. Contrary to the hypothesis, there was no main effect of condition, Pillai’s trace=.01, multivariate $F(6, 438)=.18$, $p=.98$, $\eta^2_p=.00$, suggesting no difference in performance based on goal condition assignment, and no Age x Condition interaction, Pillai’s trace=.04, multivariate $F(6, 438)=1.58$, $p=.15$, $\eta^2_p=.02$, suggesting the effect of age was the same across goal conditions (Figure 3-1).

The second research question was whether assigned goal condition and/or age would impact personal control beliefs (as measured by the CDSII, McAuley et al., 1992). To evaluate this question, a univariate analysis of variance (ANOVA) was run using age and goal condition as independent factors and the personal control subscale of the CDSII as the dependent variable. Contrary to hypotheses, results did not support a main effect of age, $F(1)=.67$, $p=.41$, $\eta^2_p=.00$, or condition, $F(2)=.82$, $p=.44$, $\eta^2_p=.01$, suggesting no difference in personal control beliefs based on participant age or goal condition assignment. Results also did not support an Age x Condition interaction, $F(2)=1.19$, $p=.31$, $\eta^2_p=.01$, suggesting that age had similar null effects across goal conditions (Figure 3-1).
The third research question was whether assigned goal condition and/or age would impact the number or quality of memory strategies used. A univariate analysis of variance was run using age and goal condition as independent factors and total number of strategies reported from the strategy checklist as the dependent variable. Results of this analysis suggested a main effect of age, $F(1)=7.68$, $p<.01$, $\eta^2_p=.03$, such that younger participants unexpectedly reported using fewer strategies ($M=7.47$, $SE=.18$) than older participants ($M=8.29$, $SE=.22$). There was no main effect of condition, $F(2)=.13$, $p=.88$, $\eta^2_p=.00$, suggesting no difference in number of strategies used across goal condition assignments, and no Age x Condition interaction, $F(2)=1.46$, $p=.24$, $\eta^2_p=.01$, suggesting the effect of age was the same across goal conditions (Figure 3-1).

To examine quality of strategies used, a chi-square test was run examining age and condition group differences for each of the two strategies rated as most effective by cognitive psychologists for our laboratory (“In your mind, pictured the events of the story in a video, as they unfolded” and “Focused on the personal meaning of the story, such as whether it was happy or sad, or whether the story could happen to a friend of yours”). Relatively few participants reported using either of these strategies more than any other (12.1% of participants for the “video” strategy, 1.7% of participants for the “personal meaning” strategy). Not surprisingly based on these small numbers, most of these chi-square tests were nonsignificant, suggesting that neither age or condition group was more likely to report using either of these strategies more than any other. However, the chi-square tests did reveal that younger adults (27 out of 136) were more likely to report using the video strategy more than any other than were older adults (1 out of 96), $\chi^2(1)=18.77$, $p<.01$. Next, chi-square tests were run for age and condition group to
learn if there were differences in likelihood of reporting using either of these two strategies at all. Likelihood of using either strategy did not differ based on assigned goal condition, \( \chi^2(2) = 1.56, p = .46 \) (“video” strategy), \( \chi^2(2) = .57, p = .75 \) (“personal meaning” strategy), suggesting that whether participants were assigned to learning goals, performance goals, or the control group did not impact whether or not they used either of these strategies to remember the story. However, likelihood of using both strategies differed depending on participant age group, \( \chi^2(1) = 4.75, p < .05 \) (“video” strategy), \( \chi^2(1) = 19.00, p < .001 \) (“personal meaning” strategy). More younger adults (72.06%) than older adults (58.33%) reported using the “video” strategy. Conversely, more older adults (63.54%) than younger adults (34.56%) reported using the “personal meaning” strategy.

In relation to hypotheses about performance, control beliefs, and strategies, it was hypothesized that participants in the control group, who were not given any specific task instructions to orient them toward learning or performance goals, would perform in line with their dispositional goal orientation, as measured by the Goal Orientation Questionnaire (GOQ; Button et al., 1996). Specifically, control participants with a disposition toward learning goals were expected to show better performance, endorse higher personal control beliefs, and use more strategies than those with a disposition toward performance goals. A series of analyses of variance (ANOVAs) were run to examine these hypotheses using recall variables, personal control beliefs, and number of strategies as outcomes. Age group (0=younger adult, 1=older adult) and dispositional goal orientation group (0=High performance goals/Low learning goals, 1=High learning goals/Low performance goals) were entered as independent factors.
(see the following section for details on how these dispositional goal groups were constructed). As in all previous analyses, health, education, and memory self-efficacy were used as covariates because they significantly differed with respect to age group at baseline. First, an Age group x Dispositional goal orientation group multivariate analysis of variance (MANOVA) was run using only control group participants and the three recall variables as outcomes (free recall, conceptual recall, and rote recall). Results did not support the hypothesis that control group participants would perform in line with their dispositional goal orientation, Pillai’s trace=.03, multivariate $F(3, 16)=.17, p=.92, \eta^2_p=.03$. Similarly, an Age group x Dispositional goal orientation group univariate analysis of variance (ANOVA) was run using only control group participants and personal control beliefs as the outcome variable. Again, dispositional goal orientation group had no significant effect, $F(1)=.11, p=.74, \eta^2_p=.01$. Finally, an Age group x Dispositional goal orientation group univariate analysis of variance (ANOVA) was run using only control group participants and number of strategies as the outcome variable. Dispositional goal orientation group had no effect on number of strategies for control group participants, $F(1)=2.21, p=.16, \eta^2_p=.11$.

**Moderation of Memory Self-Efficacy**

The final research question was whether perceived ability (memory self-efficacy) moderated the impact of goal condition on performance, personal control beliefs, and number of strategies used. In order to investigate the moderating effect of memory self-efficacy, a moderated regression analyses was run separately for each dependent variable (free recall, rote comprehension, conceptual comprehension, the personal control subscale from CDSII, and number of strategies used). The main effects of condition and memory self-efficacy were entered in the first regression block. Then, a
residualized interaction term was computed to control for multicollinearity (by multiplying condition and memory self-efficacy for each case, then using the standardized residuals obtained from running a separate analysis regressing this product on condition and memory self-efficacy as the interaction variable) (Little et al., 2006). This interaction term between condition and memory self-efficacy was entered in the second regression block. A significant interaction would be interpreted as evidence that memory self-efficacy moderated the effects of performance goals. Because preliminary analyses did not suggest a significant condition difference for any baseline variables, none were used as controls in the regression analyses. The main effect of condition (learning, performance, or control) was not significant in any of the regression equations, which was expected based on the previously-run ANOVAs.

Contrary to hypotheses, the interaction between goal condition and memory self-efficacy was not significant for free recall, $\beta=.02$, $t(229)=.30$, $p=.77$, or for rote memory $\beta=-.01$, $t(228)=-.07$, $p=.95$. This suggests that memory self-efficacy did not have a differential impact across conditions for either free or rote recall. The main effect of memory self-efficacy was significant for free recall, $\beta=.26$, $t(229)=3.83$, $p<.01$, but not for rote recall, $\beta=.11$, $t(228)=1.61$, $p=.11$, suggesting that the higher the memory self-efficacy, the better the free recall performance regardless of condition assignment.

The main effect of memory self-efficacy was also significant for conceptual recall, $\beta=.23$, $t(229)=3.46$, $p<.01$, suggesting that the higher the memory self-efficacy, the better the conceptual recall performance across assigned goal conditions. Interestingly, the interaction between goal condition and memory self-efficacy tended toward

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2 For each dependent variable, identical regressions were also run using mean-centering to compute the interaction terms. Similar results were obtained.
significance for conceptual recall, $\beta=.13$, $t(229)=1.91$, $p=.057$, suggesting that memory self-efficacy differentially impacted conceptual recall performance across assigned goal conditions. As expected, memory self-efficacy did not have much impact on conceptual recall performance for participants in the learning goal group, $\beta=.05$, $t(76)=.40$, $p=.69$, as compared to the performance goal, $\beta=.33$, $t(75)=2.95$, $p<.01$, and control participants, $\beta=.23$, $t(76)=2.09$, $p<.05$ (Figure 3-2).

To determine which conditions differed, dummy-coded variables were created to represent learning goal condition, performance goal condition, and control condition. Then, a residualized interaction term was computed (to control for multicollinearity) for each dummy-coded condition variable by multiplying it by memory self-efficacy, and then regressing this interaction term on the condition variable and memory self-efficacy (Little et al., 2006). Finally, a regression was created using conceptual recall as the outcome variable: each dummy coded condition variable (learning goals, performance goals, control) was entered in the first block of the regression and each dummy coded condition’s interaction with memory self-efficacy was entered in the second block of the regression. Results suggested that the interaction between learning goals and memory self-efficacy was significantly different than that between performance goals and memory self-efficacy, $\beta=-.15$, $t(229)=-2.01$, $p<.05$, but not significantly different than that between controls and memory self-efficacy, $\beta=-.14$, $t(229)=-1.66$, $p=.10$. The interaction between performance goals and memory self-efficacy did not significantly differ from that between controls and memory self-efficacy, $\beta=.01$, $t(229)=.11$, $p=.91$.

Results for personal control beliefs and numbers of strategies used were similar to the moderated regression results for free recall and rote memory. They suggested that
memory self-efficacy did not have a differential impact (as evidenced by a nonsignificant interaction between condition and memory self-efficacy) across conditions for either personal control, $\beta = -.01, t(226) = -.12, p = .91$, or number of strategies used, $\beta = .07, t(229) = 1.01, p = .31$. The main effect of memory self-efficacy was marginally significant for personal control beliefs, $\beta = .12, t(226) = 1.71, p = .09$, and significant for number of strategies used, $\beta = .19, t(229) = 2.82, p < .01$, suggesting that the higher the memory self-efficacy, the higher the level of personal control and number of strategies reported, regardless of condition assignment.

**Study 2 Follow-Up Analyses**

Follow-up analyses were conducted to examine the general importance of dispositional goal orientation, as measured by the Goal Orientation Questionnaire (GOQ; Button et al., 1996). A procedure similar to that used in Study 1 was repeated using the Study 2 data. Again, dispositional learning and performance goals were highly correlated ($r = .57, p < .01$). Participants were divided into four groups, based on dispositional goal orientation (GOQ subscales for learning and performance goals; Button et al., 1996): High learning goals/Low performance goals ($N = 32$), High performance goals/Low learning goals ($N = 34$), High in both goals ($N = 49$), Low in both goals ($N = 52$). The criterion for group membership was based on falling within the top or bottom 40% of the sample distribution (the cutoff for high in either goal was 46, the cutoff for low in learning goals was 41, the cutoff for low in performance goals was 43). Four separate Condition x Age multivariate analyses of variance (MANOVAs) were run using only the participants from each dispositional group, with free recall, rote memory, and conceptual memory as outcomes. As in previous analyses, health, education, and memory self-efficacy were used as covariates because they significantly differed across
levels of the independent factors. Results did not support the hypothesis that the impact of assigned goal condition depended on dispositional goal group; a similar pattern of results emerged for each dispositional group as was found for the entire sample.

Four separate Condition x Age analyses of variance (ANOVAs) were also run using only the participants from each dispositional group, with personal control beliefs as the outcome. Health, education, and memory self-efficacy were used as covariates. Again, results did not support the hypothesis that the impact of assigned goal condition would depend on dispositional goal group; a similar pattern of results emerged for each dispositional group as was found for the entire sample.

Finally, four separate Condition x Age analyses of variance (ANOVAs) were run using only the participants from each dispositional group, with number of strategies used as the outcome. Health, education, and memory self-efficacy were used as covariates. For this outcome, results did depend on dispositional group, but in the opposite direction from predicted. For the first three groups (High learning goals/Low performance goals, High performance goals/Low learning goals, and High in both goals), results were similar to those found for the entire sample, except the main effect of age was only significant for the High learning goals/Low performance goal group, \( F(1)=8.26, p<.01, \eta_p^2=.26 \) (younger participants used fewer strategies than older). However, the main effect of condition was significant in the fourth group (Low in both goals), \( F(2)=5.45, p<.01, \eta_p^2=.21 \). Decomposing this effect revealed that participants assigned to learning goals in this group used significantly fewer strategies (\( M=5.92, SE=.45 \)) than those in the performance goal group (\( M=7.95, SE=.39 \), \( t(36)=-2.01, \).
There was not a significant difference in number of strategies used between performance goal and control participants ($M=7.36$, $SE=.46$), $t(32)=.22$, $p=.83$, or between learning goal and control participants, $t(30)=-1.53$, $p=.14$.

An analysis of quality for the most used strategy was not run, due to the relatively small number of participants who reported using the two strategies rated as most effective by cognitive psychologists for our laboratory. Because relatively few participants reported using either of these strategies more than any other (12.1% of participants for the “video” strategy, 1.7% of participants for the “personal meaning” strategy), these numbers were very small within each dispositional subgroup and not sufficient to provide adequate statistical power. However, chi-square tests were run for age and condition group to learn if there were differences in likelihood of reporting either of these two strategies at all. When age effects were significant, they were generally in the same direction found for the entire sample (more younger adults reported using the “video” strategy; more older adults reported using the “personal meaning” strategy.). In the High learning goal/High performance goal group, likelihood of using the “personal meaning” strategy differed based on assigned goal condition, $\chi^2(2)=6.81$, $p<.05$, suggesting that participants assigned to performance goals were more likely to report using this strategy to remember the story than those assigned to the learning goal, $t(29.78)=-2.30$, $p<.05$, or control group, $t(28.52)=2.84$, $p<.05$. There was no significant difference in likelihood of using the “personal meaning” strategy between the learning goal group and control group, $t(33)=.51$, $p=.61$. In no other case did the condition effects differ from those found with the entire sample.
Study 2 Discussion

Like Study 1, Study 2 aimed to replicate past research on goal orientation theory (Dweck, 1986) in an adult sample. However, Study 2 employed an intentional story recall task (Benware & Deci, 1984), thereby addressing some of the limitations identified in the first study. It was expected that Dweck’s (1986) theory would be supported with adults. In contrast to the performance goal group, encouraging a learning goal orientation via task instructions was hypothesized to result in better story recall performance, higher personal control beliefs, and more and better strategy use. This effect was expected to be largest for participants with low memory self-efficacy, or perceived memory ability. If supported, results of this study could be used to further explore and understand non-ability factors that impact learning in adulthood.

Study 2 results provided partial support for Dweck’s (1986) achievement goal theory, mainly through the moderation analysis. Whether a participant received learning goals, performance goals, or neither did not impact memory performance (for free, rote or conceptual recall), personal control beliefs, or number of strategies used. As expected, younger adults performed better than older adults on the recall tasks. However, there was no effect of age group on levels of personal control over memory. Interestingly, and contrary to hypotheses, younger adults reported using fewer strategies than older adults. The fact that younger adults used fewer strategies, yet performed better, is an interesting finding and suggests that younger adults may be using the few strategies they do report in a more effective way, whereas older participants may be using more strategies less effectively or too quickly abandoning one strategy in favor of another. Younger adults and older adults also differed in the type of strategies they utilized. Younger participants were more likely to report using an
imagery-related strategy (pictured the events as a video) and older adults were more likely to report using personal meaning to remember the story. This finding is consistent with past research suggesting that imagery is a rather complex strategy, not preferred by older adults (West, 1995). Older adults may be more inclined to use other strategies such as those based on verbal skills or, in this case, life experience (Pachana, Marcopulos, & Takagi, 2000).

Evidence of some moderating role of memory self-efficacy was only found for one recall task (conceptual recall). Memory self-efficacy was positively related to free recall, rote memory, personal control beliefs, and number of strategies used. However, its impact was similar in all assigned goal conditions. For learning goal participants, performance was not affected by level of memory self-efficacy. However, for participants in the performance goal and control groups, memory performance was significantly influenced by level of memory self-efficacy such that the higher the memory self-efficacy, the better the performance. It is unclear why this moderating effect occurred only for conceptual memory. It could be argued that conceptual memory represented the most complex memory task given to participants, and it has been suggested that goal orientation effects are strongest when the task is complex (Utman, 1997). Conceptual memory questions required participants to remember and interpret content from the story (such as, “why do all the park rangers know them by name?”). For several of these questions, the exact answer was not present in the story. Rather, the participant had to think about the story material to come up with a response. Conceptual recall questions required participants to give longer open-ended answers, and it seems that learning goal participants, regardless of self-efficacy level, gave more
descriptive responses with more correct answers. In contrast, rote memory questions (such as “what was the name of the main character in the story?”) only had one correct answer that was scored as either correct or incorrect.

As in Study 1, follow-up analyses examining the role of dispositional goal orientation suggested no differential memory performance or endorsement of personal control beliefs in response to goal manipulation, even for control group participants (who were expected to behave in line with their dispositional orientation). However, for Study 2, outcomes associated with strategy use did suggest some effect of goal manipulation based on dispositional orientation. For participants who were low in both dispositional learning and performance goals, participants assigned to the performance goal condition reported using more strategies than those in the learning goal or control groups. These participants did not have a clear predisposition toward either learning or performance goals, but were oriented toward performance goals (evaluation of their ability) in the task instructions. It is unclear why these participants would report using more strategies than learning goal or control participants, but it is possible that being focused on evaluation led them to over-report number of strategies used as a sort of social desirability bias (that is, they perhaps thought they would receive a more positive evaluation if they reported using more strategies). Participants in the learning goal and control groups were not focused on personal evaluation, so may have been more likely to accurately report number of strategies used.

Analyses suggested that participants simultaneously high in both dispositional learning and performance goals, in the performance goal condition, were more likely to report using one of the most effective strategies (focusing on personal meaning), as
compared to those in the learning goal or control groups. These participants represent those who generally approach cognitive tasks both as a way to build mastery and as a way to demonstrate ability, so they may represent the most highly motivated group of participants. Because these participants generally perceive cognitive tasks as beneficial (either for learning or for demonstrating ability), they may take on more cognitive challenges in everyday life and therefore have more experience on tasks such as memory activities. When told they would be evaluated (in the performance goal condition), they may have used one of the strategies they have found to be effective in the past in order to perform well.

Study 2 addressed some limitations of the previous study, however, there were also some limitations specific to Study 2 that could be addressed in future research. For instance, learning goal participants were given more of a reason to learn the material in this study than in the previous one, but they were learning the material in order to teach to another person. There was no clear benefit to the actual participant to master the material, meaning that mastering the story material would not necessarily help the participant build personal competence, although this is at the crux of learning goal orientation. The manipulation instructions depended on the participants being motivated to build knowledge in order to help another person. Presumably, some participants felt more accountable to other people than others, and this tendency may be related to unmeasured variables, such as personality factors (e.g., conscientiousness). Because personality factors were not measured, it is unclear whether this could have played a role in the degree to which the learning goal
manipulation impacted performance. Future research using these procedures may benefit from inclusion of a personality assessment.

Another limitation specific to Study 2 was the task used. The to-be-remembered story was 24 sentences long, and was presented orally to the participants. Therefore, participants could not use one of the most useful story memory strategies, PQRST (West et al., 2008). This strategy requires the reader to preview the material, ask questions, read the text, summarize what was read, and then test him/herself. This strategy is only usable when the text is visually presented to participants so that they can complete these steps and re-read the story if necessary. A long story was chosen deliberately for this study, in order to create a large amount of recall variance, but story length combined with oral presentation may also have hindered the use of some strategies. An in-person story recall task presented as text to read and study may have produced better results.

Thus, Study 2 provided only limited support for the goal orientation framework, and this support was only found for the moderating impact of memory self-efficacy on the most complex task (conceptual recall). For conceptual recall, adults of all ages oriented toward learning goals were not affected by level of memory self-efficacy as much as the performance or control groups. Therefore, learning goals seemed to act as a buffer against the negative effects of low memory self-efficacy, as expected. Separating participants based on predisposition toward a particular goal orientation did not result in different effects on memory performance or personal control beliefs; all participants were equally resistant to the goal orientation manipulation, regardless of their dispositional goal orientation profile. However, for participants not disposed to either
goal, or high in both goals, the performance goal manipulation seemed to increase the number of strategies used and the likelihood of using an effective strategy.

Overall Study 2 did not reveal substantial evidence that achievement goal orientation could be manipulated to impact memory behavior. Therefore, the lack of support for modifiability of achievement goals in Study 1 cannot be explained simply by the fact that the task was incidental (a surprise memory task), because in Study 2, memory was intentional (participants knew they would be asked to recall the story). It seems most likely that either (a) participants were simply not sufficiently invested in either task to be influenced by goal manipulation, or (b) by the time individuals reach adulthood, goal orientation becomes increasingly engrained, more dispositional, and less subject to modification. The dispositional role of goal orientation is explored further in Chapter 4.
Table 3-1. Sample characteristics for Study 2.

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<th>Variable</th>
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<th>Older</th>
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<td>Number of strategies used</td>
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NOTE: Significant mean difference (t-test) between age groups, p<.05.
Figure 3-1. Mean scores based on age group and assigned goal condition. A) For free recall. B) For rote recall. C) For conceptual recall. D) For personal control beliefs. E) For number of strategies used.
Figure 3-1. Continued.
Figure 3-2. Regression-fitted conceptual memory scores based on memory self-efficacy and assigned goal condition.
A structural equation model was tested using AMOS 17.0 for both Study 1 and Study 2 to investigate the relationships between age, assigned goal orientation condition, memory self-efficacy (perceived ability), control beliefs, strategy use (Study 2 only), and performance. Structural equation models allow for a more reliable and complex analysis of relationships between variables because measurement error is estimated and removed, and the resulting model provides a simultaneous test of all specified relationships between model variables (Ullman, 2007). As discussed previously, it is likely that goal orientation is part of a broader constellation of memory factors (such as memory self-efficacy, control beliefs, strategy use, and age) that impact memory performance. An advantage of using structural equation modeling in addition to analyses of variance (ANOVAs) and regressions (such as those presented earlier in this paper) is that it is the only analysis that allows simultaneous exploration of these multidimensional relationships and incorporates them into a broader model, taking these simpler analyses a step further (Ullman, 2007). For all models, evaluation of fit will be based on the following criteria (Kline, 2005): nonsignificant chi-square ($p > .05$), $CFI$ and $TLI \geq .90$, and $RMSEA \leq .05$.

Predicted Model (Study 1)

The predicted model for Study 1 (Figure 4-1), included Condition (learning or performance goals), Age (younger or older adults), Memory Self-Efficacy (from MSEQ), Memory performance (measured by free and cued recall), and Control Beliefs (from CDSII). As found in the aging literature, it was hypothesized that age would be negatively related to memory self-efficacy (Berry & West, 1993), control (Blatt-Eisengart
& Lachman, 2004) and both measures of memory performance (Nilsson, 2003; West, Bagwell, & Dark-Freudeman, 2005; West et al., 2008). Also based on prior research, memory self-efficacy was expected to show a positive relationship with memory performance (Valentijn et al., 2006), as were attributions to controllable causes for performance (Lachman & Andreoletti, 2006). Self-efficacy and control beliefs are defined differently from each other (Bandura, 1997), but have been shown to be related in past research (West & Yassuda, 2004). Because the memory self-efficacy measure was administered prior to the personal control beliefs measure, and based on Bandura’s (1997) social learning theory, it was predicted that memory self-efficacy would positively impact control beliefs. A person with high memory self-efficacy likely engages in more pursuit of memory challenges, greater persistence, and has had more memory success than a person with low memory self-efficacy (Bandura, 1997), these experiences should lead to participants with higher memory self-efficacy endorsing a greater sense of control over memory. As suggested by Dweck’s (1986) theory and found by Graham and Golan (1991), those in the learning goal condition, compared with the performance goal condition, were expected to experience the best outcomes with regard to memory performance and beliefs.

According to Dweck’s theory (Dweck, 1986), it was expected that memory self-efficacy would moderate the effects of performance goals. Among those assigned to performance goals, individuals with low memory self-efficacy, should endorse lower personal control for memory and perform more poorly than those with high memory self-efficacy. These moderating effects were also examined. To do this, participants were split at the median into low and high self-efficacy groups, and a multigroup analysis was
run in AMOS 17.0. This analysis applies different level of constraints to determine the most stringent level at which the model still fits well. For example, at the level of “structural weights,” the program simultaneously runs the same model for two different groups of participants (those with high self-efficacy and those with low), constraining all the unstandardized regression paths in the model to be equal across the two groups. If the overall fit is still good, even though the program set the regression paths to be the same for both groups, this means that the relationships are statistically similar across the two groups. Because age and self-efficacy have consistently been found to be related (Berry, 1999; Berry & West, 1993; West, Dark-Freudeman, & Bagwell, 2009), this procedure was conducted separately with the older and younger age groups, that is, in the younger group, models for high and low self-efficacy were compared and in the older group, models for high and low self-efficacy were compared.

**Model Results (Study 1)**

Free and cued recall measures were used to construct a latent factor for memory. A negative error variance associated with the cued recall variable (suggesting no individual differences in scores) had to be set to zero to allow the model to run. Each memory indicator significantly contributed to the latent factor (loadings for free and cued recall on memory were .37 and 1.00, respectively, both \( p < .001 \)). Age was used as a dichotomous variable, such that 0= younger adult and 1=older adult, to reflect the categorical nature of the age groups in this sample. Only the learning and performance goal conditions were examined, to learn the differences between the two goal conditions expected to differ the most (0= learning goals, \( N = 68 \); 1=performance goals, \( N = 75 \)). Thus, it is important to note that these models only included two-thirds of the overall sample (those in the learning and performance goal conditions, no controls) to capture
the two groups expected to differ the most. When considering results, therefore, consider that some of the relationships may have been stronger had the entire sample been included. Sample size \( (N=143) \) was adequate for estimation of the models, according to Bentler and Chou (1987), who recommended 5-10 participants per parameter estimated (15 distinct parameters were estimated in the predicted model).

Overall, the model shown in Figure 4-1 showed good fit to the data, supporting the predicted relationships in general, \( \chi^2(6)=5.00, p=.54, CFI=1.00, TLI=1.04, RMSEA=.00 \) (Table 4-1 for bivariate correlations of model variables). However, when examining specific pathways, only a few reached statistical significance. As expected, age group had a negative impact on memory self-efficacy \( (\beta=-.29, p<.01) \), with younger participants reporting higher memory self-efficacy. Age group also negatively predicted memory performance \( (\beta=-.45, p<.01) \), such that younger participants had better performance than older participants. Memory self-efficacy had a significant positive impact on control beliefs \( (\beta=.18, p<.05) \) such that those with higher memory self-efficacy endorsed higher personal control over performance.

Other hypotheses were not supported. Most importantly, assigned goal condition did not have an impact on either control beliefs \( (\beta=-.09, p=.28) \) or memory performance \( (\beta=-.02, p=.83) \). Age also did not impact control beliefs \( (\beta=-.03, p=.76) \), and control beliefs did not predict performance \( (\beta=-.05, p=.55) \). Interestingly, memory self-efficacy also did not impact performance \( (\beta=.08, p=.30) \). Thus, age group was the only variable to predict memory performance, and 22.7% of the variance in memory performance was accounted for by the model. In contrast, only 8.1% of the memory self-efficacy variance was explained, and only 4.2% of the variance in control beliefs.
A multiple group analysis was run using Amos 17.0, to ensure that this pattern of results was replicated in both age groups (Ullman, 2007). In this analysis, the age variable was treated as continuous so that continuous age effects could be examined within each age group of participants. Results indicated that the general pattern of results, including regression path weights, held true for both age groups. When measurement weights and intercepts, as well as structural weights and intercepts were constrained to be equal in the younger and older sample, model fit was still very good: $\chi^2(25)=19.44$, $p=.78$, $CFI=1.00$, $TLI=2.48$, $RMSEA=.00$.

For the self-efficacy moderation analysis, separate multigroup models (based on memory self-efficacy) were run for the older and younger adult groups (Ullman, 2007). Within these groups, participants were scored dichotomously as either high in memory self-efficacy or low in memory self-efficacy, using the medians as cut points (76.50 for younger adults, 69.00 for older adults). Again, in these analyses, the age variable was treated as continuous so that continuous age effects could be examined within each age group of participants. For the younger multigroup model, results suggested that the general pattern of results, including regression path weights, held true whether memory self-efficacy was above or below the median. When measurement weights and intercepts, as well as structural weights, were constrained to be equal between levels of memory self-efficacy, model fit was still very good: $\chi^2(23)=22.10$, $p=.51$, $CFI=1.00$, $TLI=1.10$, $RMSEA=.00$. These results therefore indicate that the pattern of relationships in the model was not moderated by level of self-efficacy in the younger sample.

In contrast, for the older multigroup model, results suggested that the general pattern of results differed based on whether memory self-efficacy was above or below
the median. The most stringent level of constraint that was supported by good fit was measurement weights, meaning that the structure of the latent variable (memory) was the same for both groups, $\chi^2(13)=12.17$, $p=.51$, CFI=1.00, $TLI=2.99$, $RMSEA=.00$. This suggests that the pattern of relationships in the model was moderated by memory self-efficacy in the older sample. However, the only path that was differentially significant between memory self-efficacy groups was the path from memory self-efficacy to memory performance, which bordered on significance in the low memory self-efficacy group ($\beta=.29$, $p=.06$) but not in the high memory self-efficacy group ($\beta=.13$, $p=.43$).

Assigned goal condition still did not significantly predict any outcome for either memory self-efficacy group, so this finding did not support the hypothesis that goal condition effects would be moderated by memory self-efficacy.

**Predicted Model (Study 2)**

A similar model was predicted for Study 2 (Figure 4-2), with a few differences: memory was assessed using three measures rather than two (free recall, rote memory, conceptual memory) and a strategy use variable (number of strategies reported using) was added. As predicted for Study 1, it was hypothesized that age would be negatively related to memory self-efficacy (Berry & West, 1993), control (Blatt-Eisengart & Lachman, 2004), and all three measures of memory performance (Nilsson, 2003; West et al., 2005; West et al., 2008). As in Study 1 and in accordance with prior research, memory self-efficacy was expected to be positively related to memory performance (Valentijn et al., 2006) and control beliefs (Bandura, 1997; West & Yassuda, 2004).

Strategy Use was an outcome variable in the Study 2 model, but not in the Study 1 model, because Study 1 was an incidental learning task for which participants were unlikely to use deliberate strategies. Age was expected to be negatively related to
strategy use, based on research suggesting that increased age is associated with deficient strategy use across the lifespan (Dunlosky & Hertzog, 1998b; Dunlosky et al., 2005; Naveh-Benjamin, Brav, & Levy, 2007; Shing, Werkle-Bergner, Li, & Lindenberger, 2008; Verhaeghen & Marcoen, 1994). Based on theory, it was expected that self-efficacy would be positively related to strategy use, because self-efficacy is important for effort and persistence (Bandura, 1997; Berry, 1999), although empirical research examining this link is lacking. Additionally, those in the performance goal condition were expected to use fewer strategies, following previous research (Cury et al., 2002; Elliott & Dweck, 1988; Smiley & Dweck, 1994). Finally, control beliefs were hypothesized to predict strategy use such that making more controllable attributions for performance would be related to more strategy use, based on past research (Lachman & Andreoletti, 2006).

Memory performance was expected to show a positive relationship with strategy use, according to past intervention research supporting the benefits of mnemonic training for memory (Lachman et al., 2006; West et al., 2000; West et al., 2008). Additionally, based on past research, control beliefs were hypothesized to predict memory performance such that those who made more controllable attributions for their performance would perform better than those who made uncontrollable attributions (Lachman & Andreoletti, 2006). Finally, in line with Dweck’s (1986) theory and as found by Graham and Golan (1991), those in the learning goal condition, compared with the performance goal condition, were expected to experience the best outcomes with regard to memory performance, strategy use, and control beliefs.
As in Study 1, the moderating effects of memory self-efficacy were tested with the Study 2 data. The same analysis method was used but with one modification: the moderating effect of memory self-efficacy on number of strategies used was added as an outcome, in addition to memory performance (and in this study, memory performance included three indicators – free recall, rote, and conceptual memory).

**Model Results (Study 2)**

Free recall, rote memory, and conceptual memory measures were used to construct a latent factor for memory. Each indicator significantly contributed to the latent factor (loadings for free recall, rote memory, and conceptual memory on memory were .92, .68, and .47, respectively, all $p<.001$). Again, age was used as a dichotomous variable, such that 0 = younger adult and 1 = older adult, to reflect the categorical nature of the age groups in this sample. Also as in the previous model, only the learning and performance goal conditions were examined, to learn the differences between the two goal conditions expected to differ the most (0 = learning goals, $N=77$; 1 = performance goals, $N=76$). Thus, once again it is important to note that these models only included two-thirds of the overall sample (those in the learning and performance goal conditions, no controls) and results may have been stronger if the whole sample had been included. Sample size ($N=153$) was slightly small for estimation of the model, according to Bentler and Chou (1987), who recommend 5-10 participants per parameter estimated (32 distinct parameters were estimated in the predicted model). Therefore, the model may not have the power to detect any but the strongest effects.

Overall, the model shown in Figure 4-2 showed good fit to the data, suggesting support for the general predicted relationships in the Study 2 data, $\chi^2(12)=9.03$, $p=.70$, $CFI=1.00$, $TLI=1.07$, $RMSEA=.00$. Table 4-2 shows the bivariate correlations of model
variables. Some pathways were not statistically significant, however, a few showed effects similar to the model in Study 1. As expected, age group had a negative impact on memory self-efficacy ($\beta = -0.39, p < 0.01$), with younger participants reporting higher memory self-efficacy. Age group tended to negatively predicted memory performance ($\beta = -0.17, p = 0.057$), such that younger participants had better performance than older participants. In addition, participants higher in personal control beliefs ($\beta = 0.16, p = 0.057$) and memory self-efficacy ($\beta = 0.22, p < 0.05$) showed better memory performance, though the former was only marginally significant. Number of strategies used was a new variable examined in this model, and showed a marginally significant positive correlation with control beliefs ($r = 0.15, p = 0.07$). Participants higher in memory self-efficacy reported using more strategies than those lower in memory self-efficacy ($\beta = 0.20, p < 0.05$). In contrast, neither age group ($\beta = 0.09, p = 0.30$) nor assigned goal condition ($\beta = -0.02, p = 0.81$) impacted number of strategies used. Interestingly, number of strategies used did not predict memory performance ($\beta = -0.03, p = 0.74$).

Other hypotheses were not supported. Most importantly, assigned goal condition did not have an impact on either control beliefs ($\beta = 0.07, p = 0.41$) or memory performance ($\beta = -0.00, p = 0.97$). Age also did not impact control beliefs ($\beta = -0.04, p = 0.66$). Unlike the results of the Study 1 model, memory self-efficacy did not have a significant positive impact on control beliefs ($\beta = 0.11, p = 0.23$). Thus, age group, control beliefs, and memory self-efficacy were the only variables to approach significant predictive power on memory performance, and memory self-efficacy was the strongest predictor of these three. About 14.1% of the variance in memory performance was accounted for by the model and about 15.3% of the memory self-efficacy variance was explained (age group being
the only predictor), along with 3.4% of the variance in number of strategies used, and 2.0% of the variance in control beliefs.

As in Study 1, a multiple group analysis was run using Amos 17.0, to ensure that this pattern of results was replicated in both age groups (Ullman, 2007). Again, the age variable was treated as continuous so that continuous age effects could be examined within each age group of participants. Results indicated that the general pattern of results, including regression path weights, held true for both age groups. When measurement weights and intercepts, as well as structural weights, were constrained to be equal in the younger and older sample, model fit was still acceptable by most criteria: $\chi^2(41)=51.46$, $p=.13$, $CFI=.91$, $TLI=.83$, $RMSEA=.04$.

For the moderation analysis, separate multigroup models (based on memory self-efficacy) were run for the older and younger adult groups (Ullman, 2007). Within these groups, participants were scored dichotomously as either high in memory self-efficacy or low in memory self-efficacy, using the medians as cut points (76.50 for younger adults, 69.00 for older adults). Again, in these analyses, the age variable was treated as continuous so that continuous age effects could be examined within each age group of participants. For the younger multigroup model, results suggested that the general pattern of results held true only when measurement intercepts were constrained to be equal between high and low memory self-efficacy groups, $\chi^2(29)=30.81$, $p=.38$, $CFI=.97$, $TLI=.94$, $RMSEA=.03$. These results therefore indicate that the pattern of relationships in the model did differ based on memory self-efficacy level in the younger sample. For younger adults with low memory self-efficacy, personal control beliefs positively and significantly predicted memory performance, ($\beta=.40$, $p<.01$). This
relationship was not significant for younger adults with high memory self-efficacy (\(\beta = .17, p = .33\)). Thus, in the younger sample, memory self-efficacy moderated the relationship between control beliefs and memory performance. It was also found that for younger adults with high memory self-efficacy, memory self-efficacy was significantly and negatively related to numbers of strategies used (\(\beta = -.31, p < .05\)). This relationship was not significant for younger adults with low memory self-efficacy (\(\beta = .07, p = .65\)). Thus, in the younger sample, categorical memory self-efficacy (high or low group) moderated the relationship between continuous memory self-efficacy and memory performance (such that those below the median in memory self-efficacy used a similar number of strategies regardless of their precise memory self-efficacy score, whereas those above the median in memory self-efficacy used fewer strategies the higher their precise memory self-efficacy score). Interestingly, in the low memory self-efficacy group for younger adults, assigned goal condition had a marginally significant impact on number of strategies used, such that those in the learning goal condition used more strategies than those in the performance goal condition (\(\beta = -.25, p = .09\)). This provides moderate support for the hypothesis that performance goals lead to less strategy use especially when memory self-efficacy is low.

In contrast, for the older multigroup model, the pattern of relationship was supported. When measurement weights and intercepts, as well as structural weights, were constrained to be equal for both levels of memory self-efficacy, model fit was good: \(\chi^2(41) = 45.01, p = .31, CFI = .94, TLI = .89, RMSEA = .04\). This suggests that the pattern of relationships in the model was not moderated by memory self-efficacy in the older sample: they were similar regardless of self-efficacy level.
Follow-Up Model Analyses

Similar to follow-up questions in Chapters 2 and 3, an important question arose as to whether dispositional goal orientation (as opposed to situationally manipulated goal condition) would affect memory performance. As discussed previously, goal orientation has been conceptualized as a stable individual difference variable that is also affected by situational factors (Button et al., 1996). Previous analyses (Chapters 2, 3, and 4) revealed that situationally manipulating achievement goal orientation did not impact memory performance in this sample. It is possible that goal orientation becomes more dispositional and engrained with age, and therefore less subject to modification. If this is true, does a tendency to approach cognitive tasks with a certain goal orientation impact outcomes in the direction expected, such that a disposition toward learning goals is associated with positive outcomes and a disposition toward performance goals is associated with negative outcomes? The purpose of the following analysis was to learn whether goal orientation, measured as an individual difference characteristic (or disposition), would impact memory performance in this adult sample when included in a structural equation model.

A model similar to that tested earlier was predicted, examining relationships between demographic variables (age group and education), beliefs (dispositional goal orientation and memory self-efficacy), and memory (free and cued recall). The key difference was the elimination of assigned goal condition as a single predictor, and the inclusion of dispositional goal orientation as two separate predictors. The two dispositional goal orientation variables consisted of separate scores on the learning and performance goal subscales of the Goal Orientation Questionnaire (Button et al., 1996). Education was included in this model as an exploratory variable because it was
expected that participants with more years of education would be more predisposed
toward learning goals (since education as a process involves learning from mistakes
and conceptualizing cognitive tasks as building blocks to greater mastery). Subjective
performance was also included in the model as an exploratory component, to learn
whether participants were generally accurate in self-evaluation of their performance.

Based on Dweck’s (1986) theory, it was expected that a disposition toward
learning goals would have a positive impact, and a disposition toward performance
goals would have a negative impact, on memory performance. Memory self-efficacy
was also expected to positively impact performance. It was expected that dispositional
goal orientation would be related to memory self-efficacy. Theoretically, an association
between dispositional goal orientation and self-efficacy could be expected based on the
proposed sources of self-efficacy presented by Bandura (1997) – mastery, vicarious
experience, verbal persuasion, and physiological states. Mastery experiences are
composed of past successes in a given domain. Such experiences are thought to be
the strongest source of memory self-efficacy (Bandura, 1997). Individuals who
generally approach tasks through the lens of a learning goal are likely to have had more
mastery experiences because they have persisted more in challenging activities, and
when they have failed, they have not viewed it as an indication of lack of ability (Phillips
& Gully, 1997). Thus, those with dispositional learning goals likely have perceived more
past experiences as a process of building or achieving mastery, and thus should have
higher self-efficacy.

Goal orientation is probably also linked to physiological states, which are also
proposed by Bandura to be a source of memory self-efficacy (Bandura, 1997).
Consistently approaching cognitive tasks with concern about demonstrating ability (performance goals) is likely to create anxiety with regard to those tasks. Further, for those who hold performance goals, failure is an indication of low ability, and this is likely to induce more failure-related anxiety than for those who embrace failure as a natural part of learning (learning goals). Cury and colleagues (2002) found that individuals with performance-avoidant goals reported higher levels of anxiety than those with learning goals, supporting the potential impact of goal orientation on physiological states (Cury et al., 2002). Similarly, Brodish and Devine (2009) found that performance avoidance goals positively predicted worry, which then negatively predicted performance. Individuals may then report less confidence for success (self-efficacy) due to the anxiety provoked by the performance goal orientation with which they are approaching the task.

**Follow-Up Model Results (Study 1)**

The model was first analyzed using the Study 1 data and Amos 17.0. Free and cued recall measures were used to construct a latent factor for memory. Each of these indicators significantly contributed to the latent factor (loadings for free and cued recall on memory were .45 and .92, respectively, both \( p < .001 \)). Age was used as a dichotomous variable, such that 0 = younger adult and 1 = older adult, to reflect the categorical nature of the age groups in this sample. Age and education, education and learning goals, and learning and performance goals were allowed to covary, because preliminary analyses suggested that these were the only significantly correlated exogenous variables in the model (Table 4-3). Age was not related to holding either learning or performance goals. Following Kline (2005), as well as the criteria for the previous models, these criteria were used to indicate good model fit: nonsignificant chi-square, \( CFI \) and \( TLI \geq .90 \), and \( RMSEA \leq .05 \). Sample size (\( N=215 \)) was adequate for
estimation of the models, according to Kline (2005), who suggests that samples over 200 can be considered "large" for structural equation models.

A preliminary model was run, similar to that shown in Figure 4-3, but also including a personal control variable (CDS-II). The preliminary model showed personal control being predicted by learning and performance goals, memory self-efficacy, and education, and, in turn, showed personal control predicting memory and subjective performance. None of these pathways were significant, suggesting personal control beliefs were not significantly related to any of the variables in the model. Therefore, the first model reported here (Figure 4-3) does not include this variable. The first model run showed excellent fit to the data, \( \chi^2(11)=13.04, p=.29, CFI=1.00, TLI=.98, RMSEA=.03 \), suggesting that the overall pattern of predictions was supported in this sample. In order to construct a more parsimonious final model (Figure 4-4), four other nonsignificant paths were trimmed (including direct paths from both learning goals and performance goals to memory, education to memory, and performance goals to subjective performance). Removing these paths did not significantly degrade model fit, according to a nested-model chi-square test, \( \Delta \chi^2(4)=4.22, p=.38 \). Therefore, the remainder of this section will focus on the results obtained in this more parsimonious model, which obtained excellent model fit, \( \chi^2(15)=17.26, p=.30, CFI=1.00, TLI=.99, RMSEA=.03 \).

Age and education were significantly positively correlated \( (r=.50, p<.01) \), with the older group reporting more years of education than the younger group. Both age and education predicted memory self-efficacy. Age group was negatively associated with memory self-efficacy \( (\beta= -.38, p<.01) \), with younger participants reporting higher memory self-efficacy. Education had a positive impact on memory self-efficacy \( (\beta=.22, \)
such that more educated individuals reported higher memory self-efficacy. Age group negatively predicted memory performance ($\beta = -.43, p<.01$), such that younger participants had better performance than older participants.

Dispositional learning goals and performance goals were highly correlated ($r=.66, p<.01$). Participants who endorsed high learning goals also endorsed high performance goals, suggesting that such goals are not mutually exclusive. Learning goals were also significantly related to education ($r=.12, p<.05$). Learning goals had a positive effect on memory self-efficacy ($\beta = .28, p<.01$), such that participants higher in general dispositional learning goals reported higher memory self-efficacy. Performance goals had a negative effect on memory self-efficacy ($\beta = -.22, p<.01$), such that participants higher in general dispositional performance goals reported lower memory self-efficacy. These two variables (learning and performance goals), along with the demographic variables (age and education) explained 16.8% of the variance in memory self-efficacy in the final model.

In order to examine the directional relationship between goal orientation and memory self-efficacy, an identical exploratory model was run, however, with the two causal arrows between learning and performance goals to memory self-efficacy reversed. Although model fit was comparable, paths from memory self-efficacy to learning goals and performance goals were nonsignificant, suggesting that the causal direction represented in this model is valid.

Subjective performance was positively predicted by actual memory performance ($\beta = .56, p<.01$), with participants fairly accurately assessing their general level of performance. Learning goals also had a significant effect on subjective performance
independent of actual performance (β= .12, p<.05). The final model explained 33.6% of the variance in subjective performance.

Memory self-efficacy had a significant positive impact on memory performance (β= .16, p<.05), with higher memory self-efficacy leading to better performance. Sobel tests were conducted to learn whether learning and/or performance goals had significant indirect effects on memory performance, via memory self-efficacy, because their direct effects were nonsignificant (and had been removed from the model). Results suggested that the indirect effect of learning goals on memory performance via memory self-efficacy was significant (Sobel test statistic=1.97, p<.05) and the indirect effect of performance goals on memory performance via self-efficacy was marginally significant (Sobel test statistic= -1.81, p=.07) (Preacher & Leonardetti, 2006). Thus, learning goals seemed to have a positive effect on memory performance, and performance goals seemed to have a negative effect on memory performance, but both effects occurred indirectly through the impact of both goals on memory self-efficacy. About 24.9% of the variance in memory performance was explained by the final model.

A multiple group analysis was run using Amos 17.0, to ensure that the pattern of results was replicated in both age groups (Ullman, 2007). In this analysis, the age variable was treated as a continuous variable so that continuous age effects could be examined within each age group of participants. Results indicated that the general pattern of results, including regression path weights, held true for both age groups. When measurement weights and intercepts, as well as structural weights and intercepts were constrained to be equal in the younger and older sample, model fit was still very good: χ²(43)=47.91, p=.28, CFI=.99, TLI=.98, RMSEA=.02. The multiple group analysis
illuminated only two differences between the older and younger participants: the correlation between learning goals and education was significant only for older participants, and the relationship between age and education was significant only in the younger group. These results are not surprising, given that the younger participants were undergraduate students, whose ages generally correspond with their years of education, and both of these variables (age and years of education) showed a relatively narrow range in undergraduates.

A moderation analysis was run separately for the younger and older sample, following the same procedures described earlier (Ullman, 2007). Direct paths from dispositional learning goals and performance goals to recall were re-added to see if they would be significant for those with low memory self-efficacy but not high, as Dweck’s theory would suggest. Median cutoffs for high and low memory self-efficacy groups were 76.50 for the younger participants and 65.00 for the older participants. When measurement weights and intercepts, as well as structural weights, were constrained to be equal for both levels of memory self-efficacy in the younger adult group, model fit was good: $\chi^2(42)=41.29, p=.50, CFI=1.00, TLI=1.01, RMSEA=.00$. The same was found in the older adult sample when measurement weights and intercepts, as well as structural weights, were constrained to be equal, $\chi^2(42)=47.91, p=.25, CFI=.92, TLI=.86, RMSEA=.04$. This suggests that the pattern of relationships in the model was not moderated by memory self-efficacy in the younger or the older sample: relationships were similar regardless of self-efficacy level for both age groups.

**Follow-Up Model Results (Study 2)**

A similar model to the final model described above was run using the data from Study 2 (Table 4-4 and Figure 4-5). Again, sample size ($N=232$) was adequate for
estimation of the models, according to Kline (2005), who suggests that samples over 200 can be considered "large" for structural equation models. The only modifications included the addition of a variable for the number of strategies used, and the use of different measures for construction of the memory latent variable (free recall, rote memory, and conceptual memory). Again, first an exploratory model was run using personal control beliefs, including pathways from learning and performance goals, education, age, and memory self-efficacy, and to memory and subjective performance. Personal control beliefs were allowed to covary with number of strategies used. This first model achieved adequate fit, $\chi^2(26)=35.49$, $p=.10$, $CFI=.98$, $TLI=.94$, $RMSEA=.04$.

To achieve a more parsimonious model, four paths to personal control beliefs were trimmed, including those from learning and performance goals, age group, and education (all were nonsignificant). The correlation between personal control beliefs and number of strategies used was also removed, because it was not significant.

The final model did not fit significantly worse than the first model, according to a nested model chi-square test, $\Delta \chi^2(5)=5.35$, $p=.37$, and also achieved acceptable fit, $\chi^2(31)=40.84$, $p=.11$, $CFI=.98$, $TLI=.95$, $RMSEA=.04$. The loadings of the three indicators on the memory factor were .86 (free recall), .67 (rote memory), and .55 (conceptual memory). Interestingly, in this model, learning goals had a significant impact on number of strategies used ($\beta=.24$, $p<.01$) as well as on memory self-efficacy ($\beta=.19$, $p<.01$). Performance goals did not impact number of strategies used ($\beta=-.09$, $p=.26$), but did negatively impact memory self-efficacy ($\beta=-.16$, $p<.05$). Education did not impact number of strategies used ($\beta=-.09$, $p=.17$), but participants who were older ($\beta=.20$, $p<.01$) or had higher memory self-efficacy ($\beta=.21$, $p<.01$) were significantly
more likely to report using more strategies. Memory performance was positively predicted by age group (β = -.15, p = .057), though this effect was only marginally significant, and memory self-efficacy (β = .20, p < .05), such that those who were younger or had higher memory self-efficacy performed better. Older adults reported significantly lower memory self-efficacy than younger participants (β = -.40, p < .001). Additionally, those who endorsed more personal control over their memory performance performed significantly better (β = .16, p < .05), and tended to report higher subjective performance (β = .13, p = .06). Number of strategies used was not related to memory performance (β = .03, p = .67), but those who reported using more strategies tended to believe they performed better (subjective performance, β = .11, p = .06). Individuals with higher levels of memory self-efficacy also endorsed higher personal control (β = .13, p = .05). In contrast with Study 1, learning goals did not predict subjective performance (β = -.07, p = .21) and education did not predict memory self-efficacy (β = .08, p = .19), suggesting these relationships were not robust across recall tasks. This model explained 1.6% of the variance in personal control, 9.7% of the variance in the number of strategies used, 12.0% of the variance in memory performance, 18.1% of the variance in memory self-efficacy, and 36.7% of the variance in subjective performance.

Again, Sobel tests were conducted to learn whether learning and/or performance goals had significant indirect effects on memory performance, via memory self-efficacy, because their direct effects were nonsignificant (and were therefore not included in the model). Results suggested that the indirect effect of learning goals on memory performance via memory self-efficacy was significant (Sobel test statistic = 2.60, p < .01), as was the indirect effect of performance goals on memory performance via self-efficacy.
(Sobel test statistic= -2.15, $p<.05$) (Preacher & Leonardetti, 2006). Thus, as found for the model tested with the Study 1 data, learning goals seemed to have a positive effect on memory performance, and performance goals seemed to have a negative effect on memory performance, via their impact on memory self-efficacy.

As in Study 1, in order to examine the directional relationship between goal orientation and memory self-efficacy, an identical exploratory model was run, however, with the two causal arrows between learning and performance goals to memory self-efficacy reversed. Although model fit was comparable, paths from memory self-efficacy to learning goals and performance goals were nonsignificant, suggesting that the causal direction represented in this model is valid.

Once again, a multiple group analysis was run to ensure that the pattern of results was replicated in both age groups (Ullman, 2007). As previously described, the age variable was treated as a continuous variable so that continuous age effects could be examined within each age group of participants. Results indicated that the general pattern of results, including regression path weights, did not hold true for both age groups. Good model fit was only obtained when just the measurement weights were constrained to be equal in the younger and older samples, $\chi^2(65)=81.84$, $p=.07$, $CFI=.96$, $TLI=.93$, $RMSEA=.03$. This suggests that the model does not fully represent the relationships within each age group, however, this could be because of the reduced sample size (examining each age group individually results in half the sample). Examining the regression coefficients suggests that the significant paths in the model are primarily driven by the older adult sample; the only model paths that retained significance in the younger sample were those from memory performance to subjective
performance (β=.59, p<.001), the one from learning goals to number of strategies used (β=.35, p<.01), and the one from personal control beliefs to subjective performance (β=.16, p<.05).

A moderation analysis for memory self-efficacy was run separately for the younger and older sample, following the same procedures described earlier (Ullman, 2007). Direct paths from dispositional learning goals and performance goals to recall were re-added to see if they would be significant for those with low memory self-efficacy but not high, as Dweck’s theory would suggest. Median cutoffs for high and low memory self-efficacy groups were 76.25 for the younger participants and 63.25 for the older participants. When measurement weights and intercepts, as well as structural weights, were constrained to be equal for both levels of memory self-efficacy in the younger adult sample, model fit was good: \( \chi^2(86)=93.58, p=.27, CFI=.98, TLI=.97, RMSEA=.03. \) Similar results were found with the older sample. When measurement weights and intercepts, as well as structural weights, were constrained to be equal for both levels of memory self-efficacy in the older sample, model fit was good by most criteria: \( \chi^2(86)=92.49, p=.30, CFI=.95, TLI=.93, RMSEA=.03. \) These results therefore suggest that the pattern of relationships in the model was not moderated by memory self-efficacy in the younger or older adult sample: they were similar regardless of self-efficacy level.

**Discussion of Models**

Structural equation models were run to examine effects of assigned goal condition, as well as dispositional goal orientation, on memory performance. An advantage of using this method in addition to the analyses of variance (Chapters 2 and 3) is that it
allows for a multivariate exploration of effects, simultaneously considering relationships among all variables specified in the model (Ullman, 2007).

Assigned goal condition model results fell in line with results from the previously presented ANOVAs (Chapters 2 and 3). Specifically, whether participants were given learning or performance goals did not predict performance on the word recall or story recall tasks. However, in line with hypotheses and previous analyses, in both studies, age had a significant negative impact on memory performance, such that older participants performed worse than younger adults. As predicted, for both studies, age also had a negative impact on memory self-efficacy, such that older participants endorsed lower memory self-efficacy than younger participants. Also as expected, for Study 2 (story recall), memory self-efficacy and personal control beliefs positively impacted memory performance, but these effects were not evident for Study 1 (word recall). Contrary to hypotheses, age was not related to personal control beliefs in either study. Thus, in the models for assigned goal condition, memory performance and memory self-efficacy were only consistently predicted by age (however, for Study 2, memory self-efficacy and control beliefs also emerged as predictors of performance). Results may have been stronger had the entire sample been used (only learning goal and performance goal conditions were included), but condition coded as a three-level categorical variable (rather than continuous or dichotomous) does not lend itself to analyses using continuous measures, as those employed in a structural equation model. Results of the analyses of variance suggest that including the control group would not have led to a significant relationship between assigned goal condition and
outcome variables (memory performance, control beliefs, and number of strategies used).

Interesting, in the Study 2 model including assigned goal condition, the relationship between control beliefs and memory performance was moderated by memory self-efficacy for younger adults: when younger adults endorsed low memory self-efficacy, perceived control had a stronger effect on performance than when they endorsed low memory self-efficacy. This result is similar to a finding reported by West and Yassuda (2004), who found that younger adults with high perceived control showed higher memory performance, endorsed a higher rating of their own performance, and set higher goals for themselves than younger adults with low perceived control. Younger adults with lower perceived control performed similar to those with higher perceived control only when they had a set goal. Interestingly, participants who set goals had higher memory self-efficacy than those without goals. Therefore, as found in the present study, younger adults with low perceived control benefitted more from high memory self-efficacy (associated with setting goals) than those with high perceived control (West & Yassuda, 2004).

Dispositional goal orientation model results illuminated some interesting effects. In these models, the whole sample was utilized (rather than just learning and performance goal groups), because assigned goal condition was not included. Both models (using Study 1 and Study 2 data) fit well, suggesting that the inter-relationships between the model variables were robust across recall tasks (word recall and story recall) and context (incidental learning and intentional learning). Age and memory self-efficacy significantly predicted memory performance in both studies (and for Study 2, personal
control beliefs did as well) in the direction expected. Specifically, the higher the age, the worse the performance, and the higher the memory self-efficacy and personal control beliefs, the better the performance. For both studies, memory self-efficacy was significantly predicted by learning goals, performance goals, and age group (and for Study 1, by education as well). As expected, older participants endorsed lower memory self-efficacy than younger participants. Participants high in learning goal disposition endorsed higher memory self-efficacy than those low in learning goal disposition. Performance goal disposition had the opposite effect: the higher the performance goal disposition, the lower the memory self-efficacy. Thus, learning and performance goal disposition did impact memory performance in the direction expected, via their impact on memory self-efficacy.

Interestingly, memory self-efficacy emerged as one of the most important predictors of performance, and its predictive power surpassed that of any other variable in the dispositional models (excluding age in Study 1). This is important because memory self-efficacy may be a modifiable characteristic, as evidenced by interventions that have successfully improved it in participants (West et al., 2008). The fact that it is such a strong predictor of performance highlights its importance as a target to stimulate memory change. It is also interesting to note that the multigroup analysis for Study 2 suggested that most of the model relationships were strongest for the older adult sample. This finding further underscores the importance of examining memory beliefs, goal orientation, and performance for older adults.

For the dispositional model in Study 2, which included an exploration of strategy use, number of strategies used was not associated with memory performance. This
finding suggests that it may not be sheer number of strategies that is important, and that quality, as well as how effective the strategy is used, may need to be considered as well. The Study 2 model also suggested that older participants, and participants with higher memory self-efficacy, reported using more memory strategies than the younger participants. As discussed in Chapter 3, it is possible that older adults are using more strategies because they are not using any single strategy effectively or too quickly moving from one strategy choice to another. This could also account for the lack of relationship between number of strategies used and performance.

As discussed in Chapter 2, the correlation between learning and performance goals evident in both models supports the conception that people may simultaneously strive to build competence as well as attain positive appraisals of ability (Hertzog et al., 1999). Although the learning and performance goal variables were highly correlated in both models, it is important to note that for all relationships estimated in the model, the relationship between learning and performance goals was controlled for statistically, by estimating the correlation in the model. Thus, all relationships between learning or performance goals and any other model variable can be interpreted as the unique effects of each type of achievement goal (learning or performance).

Considering that assigned goal condition did not impact memory performance for adults (but dispositional goal orientation did), together with past research supporting the impact of situational goal manipulation for children (e.g., Elliott & Dweck, 1988; Utman, 1997), leads to the possible conclusion that as people age, goal orientation becomes less subject to manipulation and dispositional goal orientation becomes more important. As discussed in Chapters 2 and 3, limitations were present in the specific tasks
administered that may have limited the potential for goal manipulation success. Therefore, it is important for future research to attempt goal manipulation with other types of tasks, particularly those in the problem solving domain, where many goal orientation effects have been found in past research (Utman, 1997).
Table 4-1. Bivariate inter-correlations between model variables for Study 1.

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NOTE: *p<.05, **p<.10.

Table 4-2. Bivariate inter-correlations between model variables for Study 2.

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NOTE: *p<.05, **p<.10.
Table 4-3. Bivariate inter-correlations between model variables for Study 1.

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NOTE: *p<.05, **p<.10.

Table 4-4. Bivariate inter-correlations between model variables for Study 2.

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NOTE: *p<.05, **p<.10.
Figure 4-1. Model of memory beliefs, performance, and assigned goal condition for Study 1 (incidental word recall).

NOTE: *p<.05, **p<.01.
Figure 4-2. Model of memory beliefs, performance, and assigned goal condition for Study 2 (intentional story recall).
Figure 4-3. Predicted model of memory beliefs, performance, and dispositional goal orientation for Study 1 (incidental word recall).

NOTE: Dashed lines represent pathways that were trimmed to enhance model fit.
Figure 4-4. Final model of memory beliefs, performance, and dispositional goal orientation for Study 1 (incidental word recall).

NOTE: *p<.05, **p<.01
Figure 4-5. Final model of memory beliefs, performance, and dispositional goal orientation for Study 2 (intentional story recall).
Dweck’s (1986) achievement goal theory provides a useful framework for understanding learning behavior in school-aged students. The present study aimed to demonstrate that this framework could also be used to understand the relationship between beliefs and performance in the older adult population. Specifically, it was expected that learning goals would facilitate adaptive learning behavior (better performance, more strategy use, and higher beliefs about personal control over memory performance) and performance goals would foster maladaptive learning patterns. The negative effects of performance goals were expected to be magnified for those participants who reported low perceived memory ability (memory self-efficacy). If hypotheses were supported, the present research would provide the first empirical evidence, to my knowledge, that goal orientation may interact with memory self-efficacy to produce particular learning outcomes for older adults. It would also provide the aging literature with evidence that achievement goals can be manipulated for older adults, which could inform how tasks in training programs may be framed to maximize short- and long-term benefits.

Overall, results did not support modifiability of achievement goals in either the younger or older adult sample. Studies 1 and 2 included a goal manipulation, and most results suggested that situational manipulation of learning and performance goals did not impact performance on either the word or story recall task, beliefs about personal control over performance, or the number of strategies used. In most cases, younger adults outperformed older adults on the memory tasks, but Study 2 suggested that older
adults reported using more strategies. Age differences were not found for level of personal control beliefs.

The role of perceived ability, measured by memory self-efficacy, is an important issue that was explored in both studies. Theoretically, according to Dweck (1986), perceived ability plays an important moderating role, particularly for performance goals. Research by Dweck and colleagues has provided empirical data that performance goals, paired with low perceived ability, lead to negative outcomes, but when paired with high perceived ability, outcomes are not as troubling (Dweck & Leggett, 1988; Elliott and Dweck, 1988; Smiley & Dweck, 1994). We expected to find this same moderating effect with our adult sample. For most recall tasks, memory self-efficacy was positively related to memory performance; participants with low memory self-efficacy did not perform as well as those with high memory self-efficacy. Contrary to hypothesis, this effect was found regardless of goal condition for free recall, cued recall, and rote memory (i.e., this effect was not reduced for participants in the performance goal condition). However, in line with hypotheses, for conceptual memory (Study 2), memory self-efficacy did not impact performance for those in the learning goal condition. This suggests that giving participants a learning goal may have buffered the overall effect of low memory self-efficacy for conceptual recall, resulting in improved performance. The fact that this same effect was not found for other outcomes, however, suggests that this finding is not robust across type of memory task. As noted earlier, however, the moderating effect of memory self-efficacy was found for what could be considered the most complex task (in Study 2), in line with the meta-analytic finding of Utman (1997). Conceptual recall could be considered more complex than free recall or rote memory
because it involved learning and interpreting the information in the story, rather than a simple re-telling.

Results of the structural equation models generally supported the pattern of results for Study 1 and Study 2, such that assigned goal condition did not impact memory behavior. Additionally, most regression paths from condition to memory performance did not significantly differ for those with high and low memory self-efficacy, showing no support for moderation. Thus, it was not the case that condition assignment impacted performance only for those with low memory self-efficacy, as would be expected based on Dweck’s (1986) theory. This finding suggests that, when examined in a multivariate model including all measures of performance and personal control (and strategy use for Study 2), the moderating impact found for conceptual recall (Study 2) disappeared. Because the moderating effect was not robust in the regressions (it only occurred for one task), this is not surprising. There was no evidence that situationally-manipulated goal orientation impacted outcomes, however, these models did suggest that dispositional goal orientation impacted outcomes via memory self-efficacy. Specifically, when measured on a dispositional level, learning goals were positively related and performance goals were negatively related to memory self-efficacy. Memory self-efficacy, in turn, emerged as one of the strongest predictors of memory performance such that the higher the memory self-efficacy, the better the memory performance. Additionally, the Study 2 model showed a positive relationship between dispositional learning goals and number of strategies used, in line with past research (Elliott & Dweck, 1988).
Because achievement goal orientation was conceptualized on a general, dispositional level for these models, it is likely that general goal orientation has a broad impact on how adults approach tasks in multiple domains in everyday life: how they interpret failure when it occurs, their confidence for success, their strategy use, and ultimately, how well they perform. For example, an individual with a disposition toward learning goals would view memory challenges as an opportunity to enhance his or her general memory ability. As memory challenges arise, this individual may pursue them in hopes of building competence, putting forth maximum effort and using multiple strategies for success. If the person succeeds at these challenges, this would provide some mastery experiences and therefore enhance memory self-efficacy, leading toward the pursuit of more memory challenges (Bandura, 1997). If the person fails at these challenges, her or she may perceive them simply as a part of the learning process (as opposed to evidence of poor ability), and try harder to master them. Thus, failure may not impact pursuit of future challenges for a person with learning goals, leaving open the possibility of memory success in the future. In contrast, a person with a disposition toward performance goals may view memory failures as evidence of poor memory ability, thereby decreasing memory self-efficacy. This lowered memory self-efficacy can lead to future avoidance of memory challenges (Bandura, 1997). Learning more about this interplay between goal orientation, social cognitive factors (including self-efficacy), and performance could be important for understanding cognitive functioning and engagement in adulthood.

It is important to note that the models represent cross-sectional examinations of the relationships between achievement goals, memory self-efficacy, and memory
performance. Because of the models’ cross-sectional nature, conclusions about how the variables impact one another over time cannot be made using these data. A longitudinal study could examine the interplay between memory self-efficacy and goal orientation, to learn whether there are reciprocal relationships between the two variables over time. The models in this paper conceptualized memory self-efficacy as a causal effect of dispositional goal orientation. This choice was made following social learning theory (Bandura, 1997), specifically because goal orientation should impact self-efficacy, by affecting two factors that predict self-efficacy, such as mastery experiences and physiological states. The validity of this choice was examined by running alternate models with the direction reversed (self-efficacy predicted learning goals and performance goals). Results suggested that the models presented in this paper (predicting self-efficacy from goal orientation) better represented the data (model fit was comparable, but paths from memory self-efficacy to learning goals and performance goals were nonsignificant in the alternative models).

These findings are especially interesting in the context of past research examining older adult cognition. Stine-Morrow and colleagues’ self-regulated language processing model (SRLP; Stine-Morrow, Miller, & Hertzog, 2006) considered the impact that motivational factors have on self-regulated learning. The authors suggested that perceptions of how much control learners have over their performance (how changeable it is), as well as their confidence in their ability to succeed (self-efficacy), together may be related to the amount of cognitive resources allocated to a task. If the cognitive resources invested in a task are not sufficient to compensate for normative age-related changes, this failure of self-regulated learning can negatively impact performance.
Thus, one possibility is that the positive outcomes associated with learning goals and memory self-efficacy in the current study may be partially due to their influence on self-regulation processes (Stine-Morrow et al., 2006). The model presented in the current study supports the SRLP model by suggesting that adult learners who adopt learning goals also tend to be higher in memory self-efficacy, and perform at a higher level (as would be expected if more cognitive resources were being allocated to the task). This is supported by the finding that those high in learning goals, and those high in memory self-efficacy, were likely to report using more strategies. This is also consistent with a study conducted by Lachman and Andreoletti (2006), who found that older adults who endorsed lower levels of control over memory were also less likely to invest effort in strategies, thereby decreasing performance. If adult learners engage in a maladaptive learning pattern continuously over time in their everyday lives (believing in a lack of control or endorsing low memory self-efficacy, and therefore investing little self-regulatory effort in learning situations), the cumulative effect of these failures may further undermine motivation and future performance. Thus, these models yield an important and original contribution to the aging literature by showing how the achievement goal framework could link key self-regulatory factors that have been widely supported as crucial to late life memory performance: cognitive resource allocation, control beliefs, implicit theories, learning goal orientation, and memory self-efficacy.

Although providing some of the first evidence that the achievement goal framework operates as expected in an older adult sample, at the dispositional level, the current research also had several limitations that were common to both studies. First, it is possible that the telephone interview procedure did not allow participants to engage in
the memory tasks to the same level that an in-person interview would. Both studies were based on established procedures that resulted in significant effects based on goal manipulation in children (Graham & Golan, 1991) and college students (Benware & Deci, 1984). However, these previous studies were conducted in person, and it is possible that this made the participants feel more invested in the task. Telephone studies present multiple challenges that can be controlled in person, such as distractions, hearing difficulty, and connection problems (e.g., static, dropped calls). Participants who obviously had any of these obstacles were eliminated from analyses, however, it is possible that some participants had similar problems but these were not obvious to the experimenter nor mentioned by the interviewee.

Another challenge of using telephone methods is specific to memory tasks. When a memory task is presented in-person, the participant typically is given a set period of time to read and study the material. This allows the participant to use strategies that are not possible when given material orally, such as reviewing information that was not understood at first glance or organizing word lists into categories. Over the phone, participants were not given the opportunity to review information even if they asked, because repeating this information would confer an unfair advantage to those who heard it more than once. Being presented the memory task in-person also probably allows the participant to use more strategies at a time in a more flexible way because they can take the time to re-read the material using a variety of different strategies each time, continually adjusting their strategy choice. Results of the present studies suggest that number of strategies used was not important for memory performance. It is possible that this result would be different if the task was presented in-person rather
than over the phone. In fact, there is considerable past research highlighting the importance of strategy use for increased memory performance (Lachman et al., 2006; West et al., 2000; West et al., 2008), suggesting it may be the nature of the tasks used in the present studies that limited this effect.

A further limitation is that the present studies did not examine the role of theories of intelligence—incremental versus entity theories, which are proposed to lead to dispositional learning goals and performance goals, respectively. Thus, it is not known whether implicit theories of ability impact achievement goal adoption in the same way they do in children (Elliott & Dweck, 1988). Future research should examine factors that lead to learning or performance goal adoption in adulthood, to learn whether perceptions of intelligence influence achievement goal adoption as has been shown in children (Blackwell et al., 2007; Dweck & Leggett, 1988).

Past manipulations of goal orientation have largely been done with tasks in the problem-solving domain, in which persistence in spite of setbacks may be more relevant than in the memory domain. Solving problems often requires a system of trial-and-error, and learning goals may help individuals cope better with these “errors.” Memory was the chosen domain for the present studies, largely due to the salience of memory concerns in older adulthood (Dark-Freudeman et al., 2006). Although both study procedures were modeled after past memory research it is important to note that there are relatively few studies of goal orientation in the memory domain, and goal orientation effects could be more reliable for problem-solving tasks. Future research should examine the achievement goal framework in the problem-solving domain with older adults, to learn whether manipulation of achievement goals can produce the expected
results. If not, it is possible that, as people age and have many cognitive experiences, goal orientation becomes more dispositional and ingrained. However, memory training studies have been successful in modifying cognitive beliefs, such as memory self-efficacy and locus of control (Floyd & Scogin, 1997; Lachman et al., 1992; West et al., 2008), providing some evidence that such beliefs can be modified even into older age.

Future research should also examine mechanisms for the impact of goal orientation on performance. The present studies established a link between dispositional goal orientation and memory-self efficacy, the latter of which predicted actual performance. However, there are other potential mechanisms for the impact of goals, suggested in research using younger samples, which were not examined in these studies, including level of cognitive processing (Coutinho & Neuman, 2008; Phan, 2009; Sins, van Joolingen, Savelsbergh, & van Hout-Wolters, 2008), goal-directed behavior (Seijts, Latham, Tasa, & Latham, 2004), critical thinking (Phan, 2009), and metacognition (Coutinho & Neuman, 2008). The role of self-regulation, including allocation of cognitive resources, should also be examined in the context of achievement goals, self-efficacy, and memory performance, as suggested by Stine-Morrow and colleagues (Stine-Morrow et al., 2006). Examining goal orientation in relation to other learning and social cognitive influences may help elucidate a broader understanding of how these factors impact performance in older learners. Individual differences in goal orientation should be studied as well. It is possible that special populations, such as those experiencing cognitive impairment, are more or less vulnerable to goal effects than the healthy adults we used in our studies.
Finally, the results of these studies did suggest that learning goals are adaptive at the dispositional level. Thus, exploring how to induce a learning goal orientation in adults may be important for memory performance. Follow-up studies should be conducted in person, to learn the degree to which achievement goals can be modified in adulthood. Additionally, a line of research could be developed exploring what life course factors (for example, socioeconomic status, marriage, or health-related events) influence the development of a learning goal orientation and what types of interventions may alter it. For example, if research shows that lower socioeconomic status is related to an increased disposition toward performance goals, interventions may be aimed at this group. Extrapolating from Dweck’s (1986) model, such an intervention would probably need to (a) help participants adapt a more malleable view of ability so that they learn that they have power to change, and (b) help participants learn to conceptualize setbacks in life as necessary parts of growth. If participants can be taught to view life circumstances as changeable and to brainstorm ways that they can use their past setbacks to build future success, they may be more likely to form learning goals. This change in goal orientation may then impact self-efficacy and lead to better outcomes in any number of domains.

Despite the lack of evidence found in the present studies for the situational modifiability of achievement goals, an important contribution was made to the aging literature by establishing that the same general patterns emerge for older as for younger learners. Specifically, at the dispositional level, learning goals were beneficial for performance and performance goals were maladaptive, through their association with memory self-efficacy. This is the first evidence, to our knowledge, that the general
structure of the achievement goal framework may hold true in a sample including older adults, and sets the stage for further research examining whether such goals are modifiable in older samples, as well as further studies of factors that influence these dispositional orientations through adulthood. Learning more about goal orientation patterns of older adults in relation to other self-regulatory factors such as self-efficacy and control beliefs, may lead to a broader understanding of how non-ability factors can influence cognitive performance in seniors.


APPENDIX A
GOAL ORIENTATION QUESTIONNAIRE (GOQ)

GOQ

On this page, there are some statements about how different people feel about mentally challenging tasks. You should circle the number that best indicates how strongly you agree or disagree with each statement. You may only circle one number for each statement. Please read each statement carefully before you decide on your answer. There are no right or wrong answers on these questions.

1. I prefer to do things that I can do well rather than things that I do poorly.

   1  2  3  4  5  6  7
   Strongly Agree Strongly Disagree

2. The opportunity to do challenging work is important to me.

   1  2  3  4  5  6  7
   Strongly Agree Strongly Disagree

3. I’m happiest working when I perform tasks on which I know that I won’t make any errors.

   1  2  3  4  5  6  7
   Strongly Agree Strongly Disagree

4. When I fail to complete a difficult task, I plan to try harder the next time I work on it.

   1  2  3  4  5  6  7
   Strongly Agree Strongly Disagree

5. I prefer to work on tasks that force me to learn new things.

   1  2  3  4  5  6  7
   Strongly Agree Strongly Disagree

6. The things I enjoy the most are the things I do best.

   1  2  3  4  5  6  7
   Strongly Agree Strongly Disagree
7. The opinions others have about how well I can do certain things are important to me.

1  2  3  4  5  6  7
Strongly Agree  Strongly Disagree

8. The opportunity to learn new things is important to me.

1  2  3  4  5  6  7
Strongly Agree  Strongly Disagree

9. I feel smart when I do something without making any mistakes.

1  2  3  4  5  6  7
Strongly Agree  Strongly Disagree

10. I do my best when I am working on a fairly difficult task.

1  2  3  4  5  6  7
Strongly Agree  Strongly Disagree

11. I try hard to improve on my past performance.

1  2  3  4  5  6  7
Strongly Agree  Strongly Disagree

12. I like to be fairly confident that I can successfully perform a task before I attempt it.

1  2  3  4  5  6  7
Strongly Agree  Strongly Disagree

13. The opportunity to extend the range of my abilities is important to me.

1  2  3  4  5  6  7
Strongly Agree  Strongly Disagree
14. I like to work on tasks that I have done well on in the past.

1  2  3  4  5  6  7
Strongly Agree Strongly Disagree

15. I feel smart when I can do something better than most other people.

1  2  3  4  5  6  7
Strongly Agree Strongly Disagree

16. When I have difficulty solving a problem, I enjoy trying different approaches to see which one will work.

1  2  3  4  5  6  7
Strongly Agree Strongly Disagree
APPENDIX B
MEMORY SELF-EFFICACY QUESTIONNAIRE

MSEQ-4

The purpose of these questions is to find out what you think about your own memory ability.

We would like to know your opinions.

There are no right or wrong answers.

DIRECTIONS:
There are some memory tasks described on the following pages. Please circle your responses on these pages in the boxes.

If you know that you cannot do the task described, you circle the 0.

If you are 100% sure that you can do the task described, you circle 100.

If you think you might be able to do it, but you are not 100% sure, your answer would fall in the middle somewhere between 10 and 90, depending on how certain you are.
Use the full scale, from 0 to 100 to show how confident you are that you can do the task described in each statement.

EXAMPLE:

These questions ask you about your ability to remember to do some errands for a friend who is ill. To help you answer these questions, here is a sample list of errands. This is just an example; you will not be asked to remember this list at this time.

<table>
<thead>
<tr>
<th>Errands</th>
</tr>
</thead>
<tbody>
<tr>
<td>take shirt to the cleaners</td>
</tr>
<tr>
<td>pick up prescription medicine</td>
</tr>
<tr>
<td>get money at the bank</td>
</tr>
<tr>
<td>buy some tissues</td>
</tr>
<tr>
<td>buy milk</td>
</tr>
<tr>
<td>fill car with gas</td>
</tr>
<tr>
<td>find birthday card for brother</td>
</tr>
<tr>
<td>call nurse about her condition</td>
</tr>
</tbody>
</table>

X-1. IF A SICK FRIEND ASKED ME TO DO 8 ERRANDS FOR HER, I COULD REMEMBER TO DO ALL 8 ERRANDS.

HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

<table>
<thead>
<tr>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
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<th>80</th>
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<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>I cannot do it</td>
<td>Moderately certain</td>
<td>I can do it</td>
<td>100% sure</td>
<td>I can do it</td>
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</table>

X-2. IF A SICK FRIEND ASKED ME TO DO 8 ERRANDS FOR HER, I COULD REMEMBER TO DO 2 OF THESE ERRANDS.

HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

<table>
<thead>
<tr>
<th>0</th>
<th>10</th>
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<th>40</th>
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</tr>
</thead>
<tbody>
<tr>
<td>I cannot do it</td>
<td>Moderately certain</td>
<td>I can do it</td>
<td>100% sure</td>
<td>I can do it</td>
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</tbody>
</table>

135
These questions ask you about your ability to remember where you have recently placed common household items. To help you answer these questions, there are some examples below of items that you could put away. Some time later (10-20 minutes later), you would need to find them again. These are only examples; you will not be asked to find these items at this time.

rubber band, scarf, scissors, notepad, thread, stapler, coaster, stamp, keys, matches, book, pencil, magnet, brush, necklace, toothbrush, comb, wallet

A-1. IF I PLACED 18 COMMON EVERYDAY OBJECTS IN DIFFERENT LOCATIONS AT HOME, A FEW MINUTES LATER I COULD REMEMBER WHERE I HAD PUT ALL 18 OF THE ITEMS.

<table>
<thead>
<tr>
<th>HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)</th>
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</thead>
<tbody>
<tr>
<td>0  10  20  30  40  50  60  70  80  90  100</td>
</tr>
<tr>
<td>I cannot do it      Moderately certain</td>
</tr>
<tr>
<td>I can do it         I can do it</td>
</tr>
</tbody>
</table>

A-2. IF I PLACED 18 COMMON EVERYDAY OBJECTS IN DIFFERENT LOCATIONS AT HOME, A FEW MINUTES LATER I COULD REMEMBER WHERE I HAD PUT 14 OF THE ITEMS.

<table>
<thead>
<tr>
<th>HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)</th>
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</thead>
<tbody>
<tr>
<td>0  10  20  30  40  50  60  70  80  90  100</td>
</tr>
<tr>
<td>I cannot do it      Moderately certain</td>
</tr>
<tr>
<td>I can do it         I can do it</td>
</tr>
</tbody>
</table>
A-3. IF I PLACED 18 COMMON EVERYDAY OBJECTS IN DIFFERENT LOCATIONS AT HOME, A FEW MINUTES LATER I COULD REMEMBER WHERE I HAD PUT 10 OF THE ITEMS.

HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

0 10 20 30 40 50 60 70 80 90 100
I cannot do it Moderately certain I can do it 100% sure I can do it

A-4. IF I PLACED 18 COMMON EVERYDAY OBJECTS IN DIFFERENT LOCATIONS AT HOME, A FEW MINUTES LATER I COULD REMEMBER WHERE I HAD PUT 6 OF THE ITEMS.

HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

0 10 20 30 40 50 60 70 80 90 100
I cannot do it Moderately certain I can do it 100% sure I can do it

A-5. IF I PLACED 18 COMMON EVERYDAY OBJECTS IN DIFFERENT LOCATIONS AT HOME, A FEW MINUTES LATER I COULD REMEMBER WHERE I HAD PUT 2 OF THE ITEMS.

HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

0 10 20 30 40 50 60 70 80 90 100
I cannot do it Moderately certain I can do it 100% sure I can do it
These questions ask you about your ability to remember a friend’s shopping list. To help you answer these questions, here is a sample shopping list. This is only an example; you will not be asked to remember this list at this time.

cottage cheese, blueberries, rolls, bread, paper towels, peaches, napkins, tissues, milk, eggs, margarine, lunch meat, chicken, aspirin, peas, birthday card, t-shirt, hamburger

C-1. IF I WENT TO THE STORE THE SAME DAY, I COULD REMEMBER 18 ITEMS FROM A FRIEND’S SHOPPING LIST OF 18 ITEMS, WITHOUT USING A LIST.

<table>
<thead>
<tr>
<th>HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0  10  20  30  40  50  60  70  80  90  100</td>
</tr>
<tr>
<td>I cannot do it</td>
</tr>
<tr>
<td>Moderately certain</td>
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<tr>
<td>100% sure</td>
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<tr>
<td>I can do it</td>
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</tbody>
</table>

C-2. IF I WENT TO THE STORE THE SAME DAY, I COULD REMEMBER 14 ITEMS FROM A FRIEND’S SHOPPING LIST OF 18 ITEMS, WITHOUT USING A LIST.

<table>
<thead>
<tr>
<th>HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)</th>
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</thead>
<tbody>
<tr>
<td>0  10  20  30  40  50  60  70  80  90  100</td>
</tr>
<tr>
<td>I cannot do it</td>
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<tr>
<td>Moderately certain</td>
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<tr>
<td>100% sure</td>
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<tr>
<td>I can do it</td>
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</table>

C-3. IF I WENT TO THE STORE THE SAME DAY, I COULD REMEMBER 10 ITEMS FROM A FRIEND’S SHOPPING LIST OF 18 ITEMS, WITHOUT USING A LIST.

<table>
<thead>
<tr>
<th>HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)</th>
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<tbody>
<tr>
<td>0  10  20  30  40  50  60  70  80  90  100</td>
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<tr>
<td>I cannot do it</td>
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<tr>
<td>Moderately certain</td>
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<tr>
<td>100% sure</td>
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<tr>
<td>I can do it</td>
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</table>
C-4. IF I WENT TO THE STORE THE SAME DAY, I COULD REMEMBER 6 ITEMS FROM A FRIEND’S SHOPPING LIST OF 18 ITEMS, WITHOUT USING A LIST.

<table>
<thead>
<tr>
<th>HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)</th>
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<tbody>
<tr>
<td>0     10    20   30  40  50  60  70  80  90  100</td>
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<tr>
<td>I cannot do it                         Moderately certain I can do it 100% sure I can do it</td>
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</table>

C-5. IF I WENT TO THE STORE THE SAME DAY, I COULD REMEMBER 2 ITEMS FROM A FRIEND’S SHOPPING LIST OF 18 ITEMS, WITHOUT USING A LIST.

<table>
<thead>
<tr>
<th>HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)</th>
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<tbody>
<tr>
<td>0     10    20   30  40  50  60  70  80  90  100</td>
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<tr>
<td>I cannot do it                         Moderately certain I can do it 100% sure I can do it</td>
</tr>
</tbody>
</table>
These questions ask you about your ability to remember people’s names. To help you answer these questions, here is a sample list of names. This is only an example; you will not be asked to remember these names at this time.

Melissa, James, Sarah, Derek, Rachel, Daniel, Karen, Patrick, Angela, Brian

D-1. IF SOMEONE SHOWED ME THE PHOTOGRAPHS OF 10 PEOPLE AND TOLD ME THEIR NAMES ONCE, I COULD IDENTIFY 10 PERSONS BY NAME IF I SAW THE PICTURES AGAIN A FEW MINUTES LATER.

HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

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<td>I cannot do it</td>
<td>I can do it</td>
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<td>I can do it</td>
<td>100% sure</td>
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D-2. IF SOMEONE SHOWED ME THE PHOTOGRAPHS OF 10 PEOPLE AND TOLD ME THEIR NAMES ONCE, I COULD IDENTIFY 8 PERSONS BY NAME IF I SAW THE PICTURES AGAIN A FEW MINUTES LATER.

HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

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<td>I cannot do it</td>
<td>I can do it</td>
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D-3. IF SOMEONE SHOWED ME THE PHOTOGRAPHS OF 10 PEOPLE AND TOLD ME THEIR NAMES ONCE, I COULD IDENTIFY 6 PERSONS BY NAME IF I SAW THE PICTURES AGAIN A FEW MINUTES LATER.

HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)

<table>
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<tr>
<th></th>
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<th>10</th>
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<tr>
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<td>I can do it</td>
<td>Moderately certain</td>
<td>I can do it</td>
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</table>
D-4. IF SOMEONE SHOWED ME THE PHOTOGRAPHS OF 10 PEOPLE AND TOLD ME THEIR NAMES ONCE, I COULD IDENTIFY 4 PERSONS BY NAME IF I SAW THE PICTURES AGAIN A FEW MINUTES LATER.

<table>
<thead>
<tr>
<th>HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage)</th>
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D-5. IF SOMEONE SHOWED ME THE PHOTOGRAPHS OF 10 PEOPLE AND TOLD ME THEIR NAMES ONCE, I COULD IDENTIFY 2 PERSONS BY NAME IF I SAW THE PICTURES AGAIN A FEW MINUTES LATER.

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These questions ask you about your ability to remember the main points from a story. To help you answer these questions, here is a sample story. This is only an example; you will not be asked to remember this story at this time.

Sample story: Leroy is enjoying a holiday. He is staying with his family in Minneapolis, Minnesota. His oldest son, Arthur, works at the university there. His other son, Ronald and his family have come up from Chicago. There are five children and five adults staying in Arthur’s house. Leroy is staying in the ground floor guestroom. It is a little noisy. It is, however, conveniently located near a bathroom, the kitchen, and the dining room. The four bedrooms upstairs and the extra room in the basement are enough for everyone else. It is crowded, but it’s good to see the family.

E-1. IF I HAD JUST READ PART OF A STORY (ABOUT 10 SENTENCES) I COULD CORRECTLY REMEMBER THE MAIN POINTS FROM ALL 10 SENTENCES.

| HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage) |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 0 10 20 30 40 50 60 70 80 90 100 |
| I cannot do it | Moderately certain | I can do it | 100% sure | I can do it |

E-2. IF I HAD JUST READ PART OF A STORY (ABOUT 10 SENTENCES) I COULD CORRECTLY REMEMBER THE MAIN POINTS FROM 8 SENTENCES.

| HOW CERTAIN ARE YOU THAT YOU CAN DO THIS? (circle a percentage) |
|-------------------|-------------------|-------------------|-------------------|-------------------|
| 0 10 20 30 40 50 60 70 80 90 100 |
| I cannot do it | Moderately certain | I can do it | 100% sure | I can do it |
E-3.  IF I HAD JUST READ PART OF A STORY (ABOUT 10 SENTENCES) I COULD CORRECTLY REMEMBER THE MAIN POINTS FROM 6 SENTENCES.

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E-4.  IF I HAD JUST READ PART OF A STORY (ABOUT 10 SENTENCES) I COULD CORRECTLY REMEMBER THE MAIN POINTS FROM 4 SENTENCES.

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E-5.  IF I HAD JUST READ PART OF A STORY (ABOUT 10 SENTENCES) I COULD CORRECTLY REMEMBER THE MAIN POINTS FROM 2 SENTENCES.

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<td>I cannot do it</td>
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“We are studying cognitive activities, including everyday problems and word games. Today, I’d like to do several activities with you. The first two tasks are related because they are both mental activities.

The first activity involves coming up with as many solutions as possible for an everyday problem I will give you. You should listen carefully to each problem, and then provide as many possible solutions as you can. You should provide solutions you would be likely to try, and also solutions you probably would not adopt yourself.

Do you have any questions?

Okay here is the first problem:

A person finds that meetings of the members of her condominium association are disrupted by a lot of disagreements and arguing among the members. She wants to improve the tone of the meetings. What could she do?

Are you ready for the next problem?

Okay here it is:

A person who lives alone wants to see his children, nieces, and nephews more frequently. What could he do?

Are you ready for the last problem?

Okay here it is:

A person is having a blood analysis with a very inexpert physician who, after many trials, is not able to find the right position for inserting the needle into his or her arm. The person experiences much pain as a result. What could she/he do?”
APPENDIX D
INCIDENTAL LEARNING TASK

“I will read you a question followed by a word, which we will call the game word. You will respond yes or no, depending on whether the game word fits with the question. For example, if I said ‘Is the word a color? BLUE’, you would say ‘yes’ because blue is a color. In this case, blue is the game word. Let’s try a few examples:

(Read the question, wait 2 seconds, then read the word. Wait 2 seconds after participants’ response to read the next question. Circle the participants’ response (yes/no). If participant seems not to understand the instructions, read instructions again and/or repeat an example if need be.)

(Example 1):
“Is the word an article of clothing? SHIRT

Good. In this case, shirt is the game word.

(Example 2):
Does the word fit in the sentence:
“She walked across the _____”? TEAPOT

Good. Please listen carefully because I cannot repeat any words. Do you have any questions? Are you ready? Let’s begin.

1. Is the word a type of fruit? CHERRY

2. Is the word something used for cleaning? SPONGE

3. Does the word fit in the sentence:
“She spilled the ______”? MOON

4. Does the word fit in the sentence:
“She placed the ______ on the table”? CUP

5. Is the word a type of farm animal? SHEEP

6. Is the word associated with medicine? NURSE

7. Does the word fit in the sentence:
“He met a ______ in the street”? FRIEND

8. Does the word fit in the sentence:
“He is going to buy a ______”? CLOUD

9. Is the word a group of people? TRIBE
10. Is the word a type of tool? **DRILL**
   **YES**  **NO**

11. Is the word a type of flower? **RULER**
   **YES**  **NO**

12. Does the word fit in the sentence:
   “The ring had a _____ in it”? **DIAMOND**
   **YES**  **NO**

13. Does the word fit in the sentence:
   “The _____ was delivered yesterday”? **PACKAGE**
   **YES**  **NO**

14. Does the word fit in the sentence:
   “Near her bed she kept a _____”? **CLOCK**
   **YES**  **NO**

15. Does the word fit in the sentence:
   “She cooked the _____”? **DOOR**
   **YES**  **NO**

16. Is the word something you can wear? **GLOVE**
   **YES**  **NO**

17. Is the word something large? **ELEPHANT**
   **YES**  **NO**

18. Is the word associated with school? **TEACHER**
   **YES**  **NO**

19. Is the word the opposite of white? **PUMPKIN**
   **YES**  **NO**

20. Is the word a form of transportation? **TRAIN**
   **YES**  **NO**

21. Does the word fit in the sentence:
   “The _____ frightened the children”? **MASK**
   **YES**  **NO**

22. Does the word fit in the sentence:
   “The ripe _____ tasted delicious”? **PEAR**
   **YES**  **NO**

23. Does the word fit in the sentence:
   “The man threw a ball to the _____”? **CHILD**
   **YES**  **NO**

24. Is the word a part of the body? **GRASS**
   **YES**  **NO**

25. Does the word fit in the sentence:
   “She put her_____ in the basket”? **BOOK**
   **YES**  **NO**

26. Does the word fit in the sentence:
   “The _____ is torn”? **DRESS**
   **YES**  **NO**

27. Is the word associated with vacation? **BEACH**
   **YES**  **NO**

28. Is the word something hot? **FLAME**
   **YES**  **NO**
29. Does the word fit in the sentence: 
“Late at night, she takes a ______”? BATH

30. Does the word fit in the sentence: 
“He went out to lunch with the ______”? EAGLE

31. Is the word something you can hold? TELEPHONE

32. Is the word something you use to eat? SPOON

33. Does the word fit in the sentence: 
“She brought a ______ to work today”? RAINBOW

34. Does the word fit in the sentence: 
“The squirrel likes to hide in the ______”? TREE

35. Is the word a type of beverage? MILKSHAKE

36. Is the word a form of communication? POCKET

37. Does the word fit in the sentence: 
“The children play on the ______”? SIDEWALK

38. Does the word fit in the sentence: 
“Her favorite meal is ______”? BREAKFAST

39. Is the word a dangerous animal? CHAIR

40. Does the word fit in the sentence: 
“In the ________, she likes to swim”? SUMMER
APPENDIX E
CAUSAL BELIEFS SCALE

“Please indicate on a scale of 1 to 10 how well you think you did on the memory tasks today, where 1 is Excellent and 10 is Very Poor. How well did you do on the memory task?”

1 2 3 4 5 6 7 8 9 10

Excellent Very Poorly

What do you think was the most important cause of your memory performance today?

______________________________________________________________________

______________________________________________________________________

You said that _______________________________ was the most important cause of your memory performance. Is that correct?

Think about this cause. The next set of questions concern your impressions or opinions of this cause of your performance. I will ask you to tell me whether you strongly agree, agree, disagree, strongly disagree, or have no opinion for each statement. Are you ready?

Here is the first statement:

1. ______________ (insert cause) reflects an aspect of the situation.

1 2 3 4 5

Strongly Agree Agree No Opinion Disagree Strongly Disagree

2. ______________ (insert cause) is manageable by you.

1 2 3 4 5

Strongly Agree Agree No Opinion Disagree Strongly Disagree
3. _________________ (*insert cause*) is something permanent.

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<th>4</th>
<th>5</th>
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<tr>
<td>Strongly Agree</td>
<td>Agree</td>
<td>No Opinion</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
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4. _________________ (*insert cause*) is something you cannot regulate.

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<td>Disagree</td>
<td>Strongly Disagree</td>
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5. _________________ (*insert cause*) is something over which others have control.

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<td>Disagree</td>
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6. _________________ (*insert cause*) is outside of you.

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<td>Disagree</td>
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7. _________________ (*insert cause*) is variable over time.

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<td>Disagree</td>
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8. _________________ (*insert cause*) is something over which you have power.

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<td>Disagree</td>
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</table>
9. ___________________ (insert cause) is changeable.

1 2 3 4 5
Strongly Agree Agree No Opinion Disagree Strongly Disagree

10. ___________________ (insert cause) is not under the power of other people.

1 2 3 4 5
Strongly Agree Agree No Opinion Disagree Strongly Disagree

11. ___________________ (insert cause) is something about you.

1 2 3 4 5
Strongly Agree Agree No Opinion Disagree Strongly Disagree

12. ___________________ (insert cause) is something other people can regulate.

1 2 3 4 5
Strongly Agree Agree No Opinion Disagree Strongly Disagree
APPENDIX F
STORY RECALL TASK

Tom was exhausted but proud that he had finished the longest race of his life. Completing the ten kilometer run of the Belleville Summer Festival had not been easy. He had the fastest time of the senior group. A newspaper photographer had taken a picture of him as he crossed the finish line. Even if it did not appear in the Belleville Gazette he could get a copy. It would look great in the scrapbook he'd been keeping since he started jogging. That was nine years ago when he was fifty-two. When he looked around he saw many people coming over to congratulate him, even some younger men he had beaten. One of the race officials came over to see how he felt. There were almost two hundred and fifty amateur runners from all over Percival County. At least thirty of the runners were over fifty-five years old and another fifty were between forty and fifty-five. The race organizers were well prepared for any emergency. Fortunately, today there had been no problems. The medical tent and the nurses weren't needed, but everyone drank lots of water. The temperature at race time was about eighty degrees Fahrenheit. Before the race Tom's wife, Elaine, told him to quit running if he began to overheat. A cool breeze from the north made the running seem easy. The course was beautiful. It wound through the trees and around a lake on the Shadow Hills Golf Course. The runners had been seeded according to their previous experience and performance. Those who were seeded highly were allowed to start at the front of the pack. Tom thought it was fair that the young, strong women and men didn't get caught in the massive crowd. Because of no official previous experience, Tom was seeded nearly last. This fact made him even more proud of his fine showing.

Rote Memory Questions:

1. What was the name of the main character in the story?
2. At what age did the man start jogging?
3. How long was the race?
4. What was the temperature at race time?
5. Who took the runner’s picture?
6. In what county did the race take place?
7. What was the name of the main character's wife?
8. How many runners were in the race?
Conceptual Memory Questions:
1. How were the runners organized in the race?
2. What made the main character especially proud of his performance in the race?
3. Why was it OK with the main character if his picture did not appear in the paper?
4. What did the main character’s wife tell him before the race?
5. Why did the race official come over to the main character at the end of the race?
6. How did the runners avoid becoming overheated during the race?
7. What safety precautions did race officials take during the race?
8. Describe the scenery on the race course.
William and Mildred are camping again this summer in the Upper Peninsula of Michigan. Each year they drive from their home near Pittsburgh, Pennsylvania, to their favorite Michigan resort. They have been spending their summers here for twenty-three years. They always rent the same cabin. It is sunny in the morning and shady in the afternoon. While William goes fishing in one of the nearby lakes or streams, Mildred reads magazines or novels, or works on her knitting. Sometimes they get up before dawn and go bird watching together. Afterwards, they go back to their cabin for a hot breakfast. All the park rangers know them by name. They enjoy getting to know the families that visit the park for the first time. They also enjoy getting reacquainted with the families that come to the park regularly. This summer there is another older couple from Indiana visiting the park, too. William and Mildred have invited them over to dinner tonight. William caught seven pan-sized trout this morning and has already cleaned and cooled them. Together with the four he put on ice yesterday, there should be enough fish for everyone. He just finished peeling sixteen small potatoes and slicing one very strong onion. Mildred will prepare her special home fries. She just finished shucking eight ears of sweet corn. The other couple, the Wilsons, promised to bring something for dessert. William and Mildred treasure the opportunity to have feasts like this with new or old friends. It is one thing that brings them back to the resort every year. They also like the clean fresh air, the warm relaxed atmosphere, and the chance to enjoy the outdoors. They dearly love their home in Pennsylvania, but every year they look forward to their Michigan vacation. It is a place where all their desires are fulfilled.

Rote Memory Questions:

1. What was the name of the husband in the story?
2. What was the name of the wife in the story?
3. Why does the couple sometimes wake up early?
4. In what state is the couple’s home?
5. How does the couple get to the resort?
6. How many summers has the couple gone to the resort?
7. What state was the new couple from?
8. Where do William and Mildred go after birdwatching?
Conceptual Memory Questions:

1. Name one thing that brings the couple back to the resort every year.
2. Why do all the park rangers know them by name?
3. Describe the weather at the resort.
4. Name one activity the husband enjoys doing at the resort.
5. Name one activity the wife enjoys doing at the resort.
6. In addition to catching the fish, how did the husband contribute to the meal?
7. How did the wife contribute to the meal?
8. Why did the couple invite the couple from Indiana over for dinner?
“Some people are able to use special techniques to help them remember. For the last part of our phone call, we are interested in finding out the MAIN methods you used. You may have concentrated on the words while you were listening, and did not do anything else. Or you may have tried many different other methods to improve your learning. Either way is fine. We are interested only in finding out the MAIN techniques you used to help you remember the story. I will now read you a list of memory techniques. For each, you should tell me ‘NO’ to indicate that you did not use the technique at all during the story learning task, ‘YES A LITTLE’ to indicate that you used it sometimes, or ‘YES A LOT’ to indicate that you used it a lot.

1. Concentrated and paid attention to each part of the story.
2. Made sure you knew the main idea of the story.
3. Repeated each main event of the story over and over to yourself.
4. Mentally noted who, what, where, when, and why for the story.
5. Made an effort to mentally note the names and places in the story.
6. Picked out words that were related to the main idea of the story and repeated these to yourself.
7. Mentally put the critical events of the story in chronological order, like a timeline, and practiced thinking about the story in order.
8. Focused on the personal meaning of the story, such as whether it was happy or sad, or whether the story could happen to a friend of yours.
9. Related the story to a personal experience that you have had.
10. In your mind, pictured each individual person and place.
11. In your mind, pictured the events of the story in a video, as they unfolded.
12. Did you use any other method that I did not mention?

Of those techniques, which two do you think you used the most?

OK. Of these two techniques you said that you used the most, which do you think helped you remember the story more?”
LIST OF REFERENCES


BIOGRAPHICAL SKETCH

Erin Hastings received her Bachelor of Arts in psychology from the University of Virginia in 2000. She completed her Master of Education degree at Marymount University in 2002, which led to a brief career teaching fifth grade in Oakton, Virginia. After several years of teaching, Erin decided to return to graduate school to study child development at George Mason University.

During the first semester at George Mason, Erin was required to take a class on lifespan development, which inspired her passion for the study of adulthood and late life. She completed a practicum at the Alzheimer's Association, and graduated with her Master of Arts degree in psychology from George Mason University in 2006 with the intent to pursue a PhD in adult development at the University of Florida. During her time at the University of Florida, Erin has received several national awards including the American Psychological Association (APA) Division 20 Award for Completed Research for her study entitled “The relative success of a self-help and group-based memory training program for older adults,” as well as an APA Dissertation Research Award. At the University of Florida, she has also been awarded a Grinter Fellowship, the Leighton E. Cluff Award for Aging Research, the Gerber Developmental Psychology Research award, and was the nominee from the area of Developmental Psychology for the Pioneer Award (best overall student in the Department of Psychology). Her dissertation research was supported by an institutional Kirchstein National Research Service Award training grant funded by the National Institute on Aging to the University of Florida.

Erin’s primary research interest focuses broadly on maximizing cognitive function in late life. Specifically, she has focused on methods to maximize learning and memory in older adulthood, especially through non-ability factors such as memory self-efficacy.
In the future, she is particularly interested in pursuing a career examining applied intervention work.