Effects of Goal-Setting and Feedback on Memory Performance and Beliefs Among Older and Younger Adults

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This research examined the impact of goal-setting conditions on memory beliefs and performance among older and younger adults. After baseline recall and assessment of beliefs, participants were assigned to goal-setting, goals plus feedback, or control. Then, additional recall trials were followed by repeated memory beliefs assessments. For both younger and older adults, performance, motivation, and self-efficacy were affected positively by goal-setting. The impact of goals plus feedback was mixed and varied as a function of age and dependent measure. Success rates for reaching memory goals, which were low for the older adults, may have been a factor in these results. Adults’ self-set recall goals were predicted initially by baseline performance and self-efficacy. On the final trial, goals were predicted by last trial performance, self-efficacy, and control beliefs.

Self-regulatory processes have been examined in association with social learning theory (Bandura, 1997), goal theory (Locke & Latham, 1990), attribution theory (Weiner, 1985), and self theories (Dweck, 1999). Such processes can play an important role in performance maintenance and enhancement. In spite of their potential importance, some aspects of self-regulatory control have been investigated infrequently in the domain of cognition. Because cognitive performance across the lifespan is typically viewed as a function of basic intellectual ability and specific cognitive skills, investigation of self-regulatory processes such as strategies and performance monitoring has been common. These are directly related to performance. In contrast, effort, motivation, efficacy, implicit theories, and attributions reflect processes only indirectly related to cognitive skills, and their influence on cognition was largely ignored until recently. Cognitive aging researchers are now clearly interested in self-regulatory factors such as attributions and self-efficacy (e.g., Cavaugh, Feldman, & Hertogz, 1998; Hertogz & Dixon, 1994; Lachman, 1991; Welch & West, 1995). The purpose of this investigation is to further extend this line of research into the arena of goal theory. In the case of cognition, a goal is a planned future state in an ability domain—a specific performance goal, a learning goal, or an effort goal. These kinds of goals are central to an understanding of self-regulatory factors that may affect cognitive performance (Schunk, 1991).

Goal Theory

Goals represent standards for rate of performance, quality of work, or level of accuracy (Locke, 1968). Accuracy or rate are used more often because these indicators can be measured objectively (Pervin, 1989). Prior research has established that three characteristics of goals are related to their impact on performance (Pervin, 1989): specificity (objective and precise goals allow for measurement of goal progress), proximity (short-term objectives are more effective than distant goals), and difficulty (goals serve as incentives when they are above current performance but can be achieved). Goals can be assigned by teachers or supervisors or can be selected by individuals (Locke, Shaw, Saari, & Latham, 1981). When goals are set personally by the individual, they are influenced by self-efficacy as well as past performance (Bandura, 1989). Individuals will initially take action to reach their goals. However, ongoing commitment and task-related effort over trials depend on a number of factors (Bandura, 1997; Lee, Locke, & Latham, 1989; Locke & Latham, 1990; Schunk, 1991). If progress toward goals is perceived, participants continue to apply effort even as task difficulty increases. In contrast, if goals are set too high (either by the individual or some external source) and if progress toward these goals is not evident, dissatisfaction can occur (Bandura, 1989). Dissatisfaction, over time, is likely to lead to reduced self-efficacy and the end of persistent on-task behavior. Especially if self-efficacy is low, a lack of progress will be seen as an expected failure, and further effort will be seen as useless (Bandura, 1989, 1997).

These theoretical principles have been examined extensively in studies conducted by researchers in educational or work settings in which goals were assigned by experimenters (for reviews, see Bandura, 1989; Locke & Latham, 1990; Schunk, 1991). This research has shown that having a goal has performance advantages. People work toward achieving their goals (Bandura &
Cervone, 1983; Elliott & Dweck, 1988; Schunk, 1983); goal success results in higher self-efficacy after testing than before (Locke, Frederick, Lee, & Bobko, 1984; Schunk, 1983, 1984), and goals are related to ongoing effort or persistence (Stock & Cervone, 1990). Although most of the work has examined assigned goals, assigned and self-selected goals appear to be equally effective (Locke & Schweiger, 1979; Locke & Latham, 1990). These goal effects are assumed to operate through their impact on motivation (Bandura, 1997; Locke & Latham, 1990).

Goal progress can be monitored by means of explicit, external feedback or through internal mechanisms (individuals may monitor their own progress when outcomes are readily evaluated). External feedback may act as a moderator of goal effects. In general, the research on goal-setting suggests that conditions including both goals and feedback can be more effective for enhancing performance and efficacy than goal-setting that occurs without explicit feedback, although feedback effects can vary with specific conditions and types of participants (Bandura, 1989; Bandura & Cervone, 1983; Lee et al., 1989; Waldie & Mosley, 1996). If feedback shows poor progress, feedback should not contribute to higher efficacy or better performance on later trials (Bouffard-Bouchard, 1990).

**Aging Research**

To our knowledge, there is only one published empirical study on aging, goals, and memory. Stadtlander and Coyne (1990) asked older and younger adults to remember five-letter strings in a secondary memory task. Half of the participants set performance goals and received feedback on individual trial accuracy and overall goal progress. For both age groups, a control group (no goals, no feedback) showed less improvement in performance across trials than the goals + feedback group. Self-regulatory mechanisms that may be related to these effects, such as beliefs about abilities, were not explored, and it remains to be seen whether the same effect will occur with other cognitive measures.

Although the effects of goal-setting on memory and aging remain relatively unexplored, related belief mechanisms have been examined in the aging literature. Considerable work on efficacy, for example, has established that memory self-efficacy is lower in older adults than in younger adults (e.g., Hultsch, Hertzog, & Dixon, 1987; Luszcz, 1993; Rebok & Balcerak, 1989; West, Dennehy-Basile, & Norris, 1996). Attributions about control are related to efficacy—high self-efficacy is likely to be associated with high internal control, whereas low self-efficacy may be related to judgments that ability is uncontrollable (Cavanaugh, 1996). Research on the locus-of-control concept suggests that older adults are at risk for decreased internal and increased external locus of control as it relates to cognitive and intellectual abilities (Baltes & Baltes, 1986; Lachman, 1991; Lachman & Leff, 1989; Lineweaver & Hertzog, 1998). For instance, older adults are less likely than younger adults to view performance as a function of controllable internal factors, such as effort, and strategy usage (Devolder & Pressley, 1992; Dixon & Hultsch, 1983; Fry, 1989; Lachman & Jelalian, 1984; Lachman, Steinberg, & Trotter, 1987).

The extant literature on age-related cognitive decline is also related to understanding how goal-setting may be related to memory in older adults. As Taylor and Pham (1996) noted, goal progress requires that individuals have a plan or process in mind to help them reach their goals. To what extent are older adults able to carry out an effective plan to reach a higher cognitive goal? To work toward a memory goal, they would need to muster additional mental effort to alter their on-task behavior, for example, to pay closer attention, use working memory more efficiently, use more strategies, and so forth. However, older adults may not know what needs to be done, and even if they know, older adults have cognitive deficits (Kausler, 1994) that might prevent them from improving their memory scores substantially.

**Current Investigation**

The aging literature on beliefs and abilities would suggest that older adults would be less likely than younger adults to feel confident, in control, and capable of accomplishing high memory goals (Berry & West, 1993). We would expect, then, that older adults would not respond to goal conditions in the same way as younger adults have responded in previous research.

Participants completed four trials of a shopping list recall task. After baseline testing, they were assigned to three conditions for additional recall trials: goal (individuals were asked to set a percentage performance goal on each trial), goals plus feedback (individuals set goals and were given explicit feedback for each trial by the experimenter), and control (no goal-setting, no feedback). Assessments of self-efficacy and related memory beliefs were completed after baseline testing and after the final trial. We used varying list lengths for the intervening trials to encourage people to actively consider their goals on each trial (Locke & Latham, 1990), with the final trial list matching the baseline trial list. These procedures permitted us to examine the impact of varying goal-setting conditions on beliefs and performance in younger and older adults. In addition, these data provided for the examination of factors that might influence the memory goals that individuals set at different ages.

In accordance with theoretical and empirical work in social cognition and goal theory, goal-setting for the younger adults should lead to higher motivation, performance, and efficacy, and feedback on goal progress should enhance these effects. The outcome may be different for older adults who tend to show lower memory self-efficacy, lower control beliefs, and memory deficits. Internal locus of control and moderate to high self-efficacy are considered to be prerequisites for a positive response to motivational conditions (Ryan, Sheldon, Kasser, & Deci, 1996), such as the goal conditions presented here. Also, lower feelings of control are associated with less motivation to improve (Bandura & Wood, 1989; Wood & Bandura, 1989). Thus, the response of the older adults is expected to be weaker. There are a number of ways in which a weaker response could manifest itself. Older adults might not respond to any goal conditions; older adults could show change for the goals condition and not for the goals + feedback condition if the feedback emphasizes their performance limitations; older adults could show a change in memory beliefs and not performance or vice versa (see West & Thorn, 2001).

**Method**

**Participants**

The 114 older participants, 69% women, were educated ($M = 12.8$ years of education, $SD = 2.3$), community-dwelling adults ($M = 70.7$ years of
age, SD = 4.9). The 104 younger adults, 68% women, were college and high school students (M = 18.7 years of age, SD = 1.1), with about 12 years of education (M = 12.3 years, SD = 1.3). There were no significant age differences in education. On a 10-point scale (with 1 as excellent health), both age groups reported themselves to be in good health, with younger adults feeling healthier overall, F(1, 216) = 14.0, p < .001, MSEE = 2.8, \( \omega^2 = .06 \) (older M = 3.5, SD = 2.0; younger M = 2.6, SD = 1.2). On the basis of questions about health and hospitalizations, 1 young and 7 older individuals with health problems that could affect memory (e.g., congestive heart failure, recent stroke, anticholinergic medications) were excluded from the original sample of 121 and 105, old and young, respectively.

**Materials and Procedures**

Participants completed four trials of a shopping list recall task. Measures of memory self-efficacy and other memory beliefs were administered after the baseline trial (free recall of a 24-item shopping list) and again after the final trial (free recall of a comparable 24-item shopping list). After the baseline test, groups of participants were assigned randomly to one of three goal-setting conditions for the remaining trials: goal-setting plus feedback, goals alone, or control. Three additional recall trials were completed after baseline to provide sufficient test experience for the goal conditions to have an effect. Final manipulation check and motivation items were administered, followed by questions that requested birth date, and demographic and health information. With the exception of the recall tests, all tasks were self-paced. All testing was completed in one session, lasting 1.25 to 2 hr.

Testing was completed in age-segregated groups of 5 to 15 people. All instructions were printed on the protocols, and the instructions were also read aloud. Two to four experimenters were present in each group, depending on its size, to help participants understand and follow instructions. Groups of participants were randomly assigned to list version A or B for the baseline trial, to lists of varying length for the intervening trials, to one of the three goal-setting conditions, and to one of three different counter-balanced orders for assessment of memory beliefs. Because of random assignment by group, there was no specific control over the exact age or gender of individuals assigned to the three goal-setting conditions. There were no age differences among the three goal-setting conditions (p > .50). Among the younger group, there were 33 assigned to the control group (27% men), 33 in goals (33% men), and 38 in the goals-feedback condition (34% men). Among the older group, there were 38 assigned to the control group (35% men), 35 in goals (26% men), and 41 in the goals-feedback condition (28% men). Chi-square analyses evaluating the distribution of gender across age groups and condition groups showed no significant differences (all ps > .20).

**Memory and Procedures**

**Memory tests.** The lists were derived from a large pool of grocery items. Research assistants visited grocery and discount stores and listed all unique items found, minus brand names. This process generated over 1,000 potential product names. For the lists used here, two-word combinations were permitted, such as chicken soup or green beans, but three-word combinations were not used (soft taco shells). To select the list items, research assistants first agreed on categories for the items, making the categories as narrow as possible (e.g., citrus fruits and berries were separate categories and were not subsumed into a general fruits category). Nine raters, varying in age from 20 to 56 years, then evaluated each product in the list pool as a high, moderate, or low frequency exemplar of these narrowly defined categories. Only those items that were rated as high by at least seven of nine raters were included in the final pool of approximately 600 items, representing categories of various sizes. An A version and a B version of each of 5 lists (14, 18, 24, 28, and 34 items) were then created with comparable category substructures (e.g., the A list of 24 items had two 5-item categories, three 4-item categories, and 2 uncategorized items, as did the B list of 24 items). Baseline and final trials always used 24-item lists. All participants were given two other list lengths for the intervening trials, randomly assigned to groups. We used varying list lengths to encourage people to actively consider their goals on each trial (Locke & Latham, 1990).

Each list was typed (font size 16 for ease of reading). Study time varied, depending on list length; participants received 5 s of study time per item, resulting in study times varying from 1 min 10 s (14-item list) to 2 min 50 s (34-item list). Participants were told they would receive “1 to 3 minutes to study.” All typed lists were presented in a notebook, with opague pages separating the lists. After the test instructions were given and all questions were answered, participants opened the notebook to the first list, and the timing began. When the timer rang, participants closed the notebooks and wrote the recalled items on a separate protocol sheet. Recall was self-paced with a maximum time limit set of 5 min (this time limit was enforced in only two cases, with older adults given the longest list). After each individual finished writing the recalled items, an experimenter reviewed the protocol to confirm that the handwriting was legible. Every participant had each recall protocol reviewed by the experimenter (see below). The dependent measure was the percentage correct for recall.

**Memory beliefs.** In addition to assessing self-efficacy, individual memory beliefs questions were administered. The decision not to use a more comprehensive memory beliefs scale was based on time considerations (testing required more than 1.5 hr, on average). The positive and negative anchor points for the 7-point Likert scales were designed separately for each item; positive anchor points occurred either at the right or at the left of the scale to avoid response bias effects. During scoring, the scale scores for the beliefs measures were reversed, as needed, so that a higher score represented a higher self-evaluation (e.g., higher internal control) on all items. Participants were asked to evaluate “How important was it, to you, to perform well on the memory task?” (importance). This question was included as a possible indicator of motivation. Participants were also asked to identify the “main cause or main reason” for their performance that day. Once the primary cause was identified, participants then rated this primary cause, in terms of control (“How much control over this Number 1 cause . . .”). Feelings of control, rather than internality, per se, are the more critical issue vis-à-vis causal attributions and aging (see Cavanaugh, 1996; Fry, 1989).

Four scales of the Memory Self-Efficacy Questionnaire (MSEQ; Berry, West, & Dennehy, 1989) were presented—memory for text, names, shopping lists, and stories). Each scale had five questions, representing five levels of difficulty for one task, presented in descending order. Individuals responded yes or no to indicate whether or not they could perform that task at that level. If they responded yes, they were asked about their confidence (varying from 10% to 100%). A number of different measures can be derived from the MSEQ (West & Barry, 1994). The dependent measure here was self-efficacy strength (SEST, average confidence across all scales with no responses scored as 0), which was used as an overall indicator of efficacy. Scores on the four scales were averaged because, in factor analysis, the MSEQ factors as a single scale (Berry, West, & Cavanaugh, 1996) and shows similar age relationships across scales and moderate to high intercorrelations among scales (Berry et al., 1989; West & Barry, 1994). The four scales in this data set were moderately intercorrelated, with pairwise correlations varying from \( r = .47 \) to \( r = .60 \), and an average scale score intercorrelation of \( r = .53 \). Internal consistency reliability was good, whether evaluated with the four scale scores (\( N = 4 \)) entered into the reliability analysis (alpha = .81) or evaluated with each individual question (\( N = 20 \)) entered (alpha = .91) into the analysis.

There has been some variation in the literature with respect to whether efficacy and beliefs assessments are administered before or after memory tests. In those cases where efficacy was assessed both before and after testing, significant differences were apparent; typically, self-efficacy was lower after performance than before (Berry et al., 1989; Dittman-Kohli,
Lachman, Kliegl, & Baltes, 1991; West et al., 1996). When baseline assessments of beliefs occur before testing and are then compared with assessments conducted after testing, individual reactions to testing, per se, contribute to the differences between the two assessments, regardless of any other intervening conditions that are examined. Because we were interested in change as a function of conditions, not as a function of testing per se, it was important that the baseline assessments of beliefs were administered after initial testing but before the goal-setting condition manipulation occurred.

Goal-setting conditions. After baseline, groups of participants were assigned randomly to a goal-setting condition for all remaining trials: goal-setting plus feedback (goals-FB), goals alone (goal), and no goal-setting, no feedback (control). Participants in all conditions were informed about the number of items on the next shopping list. In the goals-FB condition as well as the goal condition, participants were then asked to set a goal, from 10% to 100%. Each goal selection was matched with an explanation of the percentage, for example, “I will work to remember 7 out of every 10 items,” for 70%. The test trial immediately followed after the goals were set. These goal-setting conditions met the critical goals criteria of specificity (a percentage correct was set—this is a measurable and objective goal), proximity (goals were set for the next trial only), and difficulty (the directions specified that individuals should “set a goal which will be difficult, but not impossible, for you to achieve. Then, I want you to work toward this goal”).

No external feedback was given to the control or goal groups. In all conditions, an experimenter picked up each individual’s recall protocol when they were finished writing and carefully examined the recalled list to control for any possible anxiety, positive feelings, or both associated with having one’s responses reviewed by an experimenter. In the control and goal conditions, the experimenters then returned the list without comment (except for an occasional request to clarify the handwriting). However, in the goals-FB condition, the recall protocol was scored when it was reviewed. On a new page in the protocol, the experimenter recorded the percentage goal the individual selected for that trial and the percentage correct recall for that trial and then pointed out this written information in a private conversation with the individual. Thus, feedback was given before goal-setting occurred for the next trial. The feedback was stated in a positive, encouraging way, “you scored 60%, that’s good, you met your goal,” for individuals who met their goals or exceeded them. Feedback was neutral for individuals whose performance was below their individual goal for that trial, “This was your goal (pointing). You scored 60%.”

Final questions. After testing, we asked participants whether they were “motivated to perform well” (motivation), with responses on a Likert scale ranging from 1 (highly motivated) to 7 (not motivated at all). As a manipulation check, regardless of condition assignment, all participants were also asked how often they set goals for the memory activities, on a 1 (never) to 7 (every time) Likert scale.

Results

Preliminary Analyses

To confirm that random assignment resulted in comparable groups, we examined baseline scores on list versions A and B. These were not significantly different. There were also no baseline recall differences between individuals assigned to the three goal-setting conditions. Initial analyses revealed no significant differences in the baseline beliefs measures or final beliefs measures as a function of counterbalanced order for the beliefs questions, so this variable was not included in subsequent analyses. Finally, assigned variations in list length for the intervening trials had no impact on baseline or final trial performance and were not considered further.

For the manipulation check question asking individuals whether they had set goals, responses were examined as a function of age (younger, older) and goal-setting condition (control, goal, goals-FB). Individuals in the goal and goals-FB conditions reported setting goals more often than the control participants, F(2, 211) = 17.3, p < .0001, MSE = 3.3, ω² = .14. Age did not affect whether goals were set, and there was no significant interaction.

On a 1 (never) to 7 (every time) scale, the mean for the goal group was 5.2 (SD = 1.6; M = 5.2 younger; M = 5.3 older), and the mean for goals-FB was 5.3 (SD = 1.6; M = 5.7 younger; M = 4.9 older). The mean for the control group was 3.75 (SD = 2.2; M = 3.6 younger; M = 3.9 older). These means suggested that some individuals in the control condition set goals on some trials, as is often the case in this kind of research. As Locke and Latham (1990) suggested, there is an implied “do your best” goal in most testing situations. It was assumed that any spontaneous goal-setting occurring in the control condition would make it more difficult to confirm our hypotheses; that is, it would tend to make the goal, goals-FB, and control groups more similar. Therefore, all participants in the control condition were included in the analyses, even those individuals who sometimes had goals in mind.

Primary Analyses

The primary data analyses examined between-subjects factors of age (older, younger) and goal-setting condition (control, goal, goals-FB) and a within-subjects factor of trial (baseline, final trial) for measures of performance and beliefs. For participants in the two goal conditions, the data provided for an examination of goals and goals in relation to performance, using factors of age and goal-setting condition (goal, goals-FB) across three trials (goals were set on the two intervening trials and the Final trial). We used regression analyses to predict goals and performance. Post hoc comparisons for condition effects were based on 95% confidence intervals in SPSS 10.0 analyses. We examined significant interactions in detail using simple main effect tests (p < .05).

Trial Effects: Baseline Versus Final Trial

Recall. Using a mixed design, we compared the baseline and final trials, with factors of goal-setting condition and age group, to examine hypotheses about the impact of goal-setting on performance. On the shopping list recall scores, there were significant effects of age, F(1, 212) = 78.6, p < .0001, MSE = 430.0, ω² = .27; and trial, F(1, 212) = 10.7, p < .001, MSE = 80.7, ω² = .05; as well as interactions of Age × Trial, F(1, 212) = 6.8, p < .01, MSE = 80.7, ω² = .03; and Condition × Trial, F(2, 212) = 5.8, p < .005, MSE = 80.7, ω² = .05. Younger adults performed higher than older adults at baseline and at the final trial according to post hoc tests. Overall, final trial scores were higher than baseline, but the Age × Trial interaction was shown to be due to a significant improvement from baseline to final trial for the younger adults and not the older adults. There was a significant change in recall from baseline to final trial only for the goal condition. No other tests were significant.

These interactions were superseded by a significant three-way interaction of age, goal-setting condition, and trial, F(2, 212) = 4.5, p < .01, MSE = 80.7, ω² = .04. There were significant age differences on all conditions and all trials on post-
young adult and older adult conditions. We performed a MANOVA to assess
whether age, goal-setting condition, and their interaction predict important and control items after the baseline test and again after the final trial. We evaluated these three variables in a multivariate analysis of variance (MANOVA) with age and goal-setting condition as between-subjects factors and trial (baseline vs. final) as a within-subjects factor. The MANOVA revealed main effects for age, F(3, 210) = 35.8, p < .0001, and a downward trend in performance (approaching significance at p = .07) across trials in the goal condition. 

Figure 1. Percentage correct for list recall on the baseline and final list-recall trials as a function of age and goal-setting condition. Y = younger adults; O = older adults.

The univariate analyses showed that age differences, with higher scores for the younger adults, were significant for SEST, F(1, 212) = 68.5, p < .0001, MSE = 353.4, \( \omega^2 = .24 \). A significant Condition \times Trial interaction for SEST, F(2, 212) = 3.4, p < .05, MSE = 39.6, \( \omega^2 = .03 \), was based on comparable means at baseline for the three groups (M = 46.8, SD = 14.6 for goals; M = 46.1, SD = 13.8 for control; M = 48.2, SD = 17.2 for goals-FB) but significant differences at final trial between the control and the goals groups, with goals-FB in between (goals = 48.8, SD = 16.5; control = 44.6, SD = 14.3; goals-FB group = 46.7, SD = 18.5). Self-efficacy for the goals group increased, but SEST declined for the other two groups. As described earlier, decreases in self-efficacy after testing are common in the literature, but individuals in the goal condition were able to counter the usual trend and show some improvement. This effect did not vary as a function of age group (see Table 1).

On the control measure, scores were significantly higher for the younger adults, F(1, 212) = 5.6, p < .025, MSE = 4.4, \( \omega^2 = .03 \), and the Age \times Trial interaction was significant, F(1, 212) = 6.9, p < .01, MSE = 1.6, \( \omega^2 = .03 \), because of younger adults reporting significantly higher control at final trial than older adults, with no age differences at baseline. Also, older adults reported significantly less control on the final trial than at baseline, and younger adults showed a nonsignificant increase in control (see Table 1).

Importance was significantly higher for the older adults, F(1, 212) = 23.6, p < .0001, MSE = 3.1, \( \omega^2 = .10 \); ratings of importance increased from baseline to final trial, F(1, 212) = 11.4, p < .001, MSE = 0.55, \( \omega^2 = .05 \), and there was a significant Age \times Trial interaction, F(1, 212) = 3.8, p < .05, MSE = 0.55, \( \omega^2 = .02 \). Post hoc tests showed that younger adults significantly increased their ratings of importance on the final trial, as compared with baseline, but older adults showed no change on this measure (their data may be at ceiling). No other differences were significant (see Table 1).

Goals

We examined goals by using MANOVA for the three trials that included goal-setting (Trial 2, Trial 3, and the final trial). Control condition participants were not included in this analysis. There were significant differences in goals as a function of age, F(3, 141) = 7.8, p < .0001, \( \omega^2 = .14 \), but no difference in goals as a function of goal-setting condition, as expected. The univariate analyses showed that younger adults set their goals higher than older adults on all goal-setting trials, Trial 2 F(1, 143) = 19.0, p < .0001, MSE = 317.3, \( \omega^2 = .12 \); Trial 3 F(1, 143) = 18.7, p < .0001, MSE = 292.0, \( \omega^2 = .12 \); and final trial, F(1, 143) = 17.8, p < .0001, MSE = 326.1, \( \omega^2 = .11 \) (see Figure 2). The younger adults set their average goals at M = 70.4, SD = 15.9, with mean goals of 73.7, 70.0, and 67.5 on Trial 2, Trial 3, and the final trial, respectively. In contrast, older adults set their average goals at M = 57.5, SD = 15.7, with means of 60.7, 57.4, and 54.5 on Trial 2, Trial 3, and the final trial, respectively. Both age groups showed a slight downward trend in goal levels across trials.

Because of a relative lack of information about goals in memory aging research, we ran regressions to identify the factors predicting the personal goals set by participants. We entered these variables simultaneously so that the impact of each factor was considered with all other factors covared: age, percentage correct recall, SEST, control, and importance. This set of predictor variables was first checked for multicollinearity problems, and the tolerance values were all well above the acceptable range. First, baseline
scores were examined to predict the initial goals set for Trial 2, before feedback was obtained. Using this method, $R = .55$ for predicting goals at Trial 2, $F(5, 146) = 12.3, p < .0001$, and the adjusted $R^2 = .28$. In this equation, goals on Trial 2 were predicted significantly by baseline performance, $\beta = .36, p < .001$, and by baseline self-efficacy, $\text{SEST}, \beta = .23, p < .01$. Age did not predict goals when these other factors were entered simultaneously.

Similarly, the goals set on the final trial were regressed on the same set of variables (assessed at the final trial), and the results were significant, $R = .67, F(5, 146) = 22.6, p < .0001$, adjusted $R^2 = .42$. Those factors significantly related to the final trial goals were performance on the immediate preceding trial, $\beta = .40, p < .001$, and final trial $\text{SEST}, \beta = .32, p < .001$, and control, $\beta = .17, p < .01$. None of the other factors were significant.

**Goal Success**

The findings regarding performance in the goals-FB condition suggest that older adults may not respond to goal conditions in the same way as younger adults. Alternatively, conditions that appear to be motivating for younger adults may not motivate older adults who are not performing as well. To further understand these results, we reexamined the data with a goal success factor as an indicator of whether or not individuals succeeded in meeting their goals. Thus, only goals and goals-FB groups were included.

Initially, it seemed important to replicate the performance data using only the two goals conditions to confirm that the interactions would still occur when the control group was excluded from the analysis. We reran the analysis for the memory test data with only the two goal conditions and obtained essentially the same results as before, with age ($p < .0001$) and trial ($p < .0001$) significant and significant interactions of Age $\times$ Trial ($p < .001$), Goal-Setting Condition $\times$ Trial ($p < .05$), and Age $\times$ Condition $\times$ Trial ($p < .05$). These results demonstrated that the interactions were still evident with only the goal-condition groups included and the significance levels were similar.

Further analyses could then be made of goals in relation to performance. One useful way to examine goal success is to compare average goals with average performance for the three trials that involved goal-setting. When this was done, 87 participants from the two goal-setting conditions had levels of average performance that were lower than their goals, and 60 participants performed successfully, at, or above their average goal. The distribution of this goal success variable was lopsided with respect to age, with 41 young and 19 old in the successful group, but it was balanced with respect to goal-setting condition, with 31 successful participants in the goals-FB condition and 29 in the goal condition. It is important to note that success, in this case, was determined by the relationship between goals and performance; it was not just an indicator of high scores. To determine whether the expected changes in performance occurred for those who were successful, we used this new variable, goal success, to reexamine performance, with factors of trial and age group also included.

These results showed significant effects for trial, $F(1, 139) = 20.0, p < .0001, \text{MSE} = 76.5, a^2 = .13$; age, $F(1, 139) = 37.5, p < .0001, \text{MSE} = 339.6, a^2 = .21$; and goal success, $F(1, 139) = 25.8, p < .0001, \text{MSE} = 339.6, a^2 = .16$, with higher percentage correct recall scores for the young group.

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### Table 1

**Memory Beliefs Means Across Test Trials**

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<th>Variable</th>
<th>Baseline</th>
<th>Final</th>
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<td>$M$</td>
<td>$SD$</td>
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<td><strong>SEST</strong></td>
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<tr>
<td>Young</td>
<td>54.3</td>
<td>13.2</td>
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<tr>
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**Note.** Motivation was not assessed directly at baseline. SEST = self-efficacy strength; goals-FB = goal-setting plus feedback.
for the successful group, and for the final trial. These effects were superseded by significant interactions for Trial × Age, $F(1, 139) = 5.4, p < .025, MSE = 76.5, \omega^2 = .04$, and Trial × Goal Success, $F(1, 139) = 3.9, p < .05, MSE = 76.5, \omega^2 = .03$. The interaction of trial and age replicated the performance data presented earlier (see Figure 1). The interaction of trial and goal success can be seen in Figure 3. Virtually no improvement from baseline ($M = 51.0, SD = 14.4$) to final trial ($M = 52.6, SD = 17.5$) occurred for the group that was not accomplishing their self-selected goals, whereas the successful group significantly improved their scores over trials (from baseline $M = 64.5, SD = 16.1$, to final $M = 72.4, SD = 15.9$). Given the uneven distribution of successful individuals across age groups and the strong effect of goal success on final trial performance, it is likely that the older adults failed to show performance improvements across trials in the goals-FB group because they received feedback showing that they were not reaching their goals.

To explore goal success further, we performed this same analysis with the three beliefs measures—SEST, control, and importance—to determine whether goal success led to positive changes in beliefs. First, the earlier analyses of beliefs were repeated with only the two goal conditions, with no control group. For the most part, these univariate analyses replicated those done earlier, showing significant effects of age ($p < .0001$) and Condition × Trial ($p < .05$) for SEST; significant effects of age ($p < .0001$), trial ($p < .001$), and Age × Trial ($p < .025$) for importance; and significant effects of Age × Trial ($p < .025$) for control. However, they varied from previous analyses in that there was no significant age difference for the control variable when the control group was excluded. In addition, a new effect occurred here as well—a significant Age × Trial interaction for SEST, $F(1, 143) = 4.6, p < .05, MSE = 43.6, \omega^2 = .02$—that was not evident on the beliefs analyses completed earlier. The pattern of results was not the same with the control group removed, but we proceeded anyway, with caution, to examine beliefs in relation to goal success.

To determine whether the expected changes in beliefs occurred for those who were successful, we used goal success to reexamine beliefs in a MANOVA, with factors of trial and age group also included. This analysis replicated the prior MANOVA reported for beliefs with respect to trial, $F(3, 141) = 3.1, p < .05$; age, $F(3, 141) = 31.6, p < .0001$; and the Trial × Age interaction, $F(3, 141) = 2.9, p < .05$, although the effects were somewhat smaller. In terms of goal success, the new variable added here, there were no significant main effects or interactions for goal success. Thus, goal success had no significant impact on beliefs or changes in beliefs across trials.

To explore goal success further, we examined goal-setting in relation to whether goals on the previous trial had been met. Recall that goals, in general, showed a tendency to decrease across trials. Thus, we would expect that individuals who had just successfully reached their goals would either maintain their same goals or increase them. The dependent measures used in this goal success analysis were goal-change3 (goals set on Trial 3 — goals set on Trial 2) and goal-change4 (goals set on Trial 4 — goals set on Trial 3). We examined these two measures with factors of age, goal-setting condition, and a trial-specific goal success variable defined by whether individuals met their goal on that specific trial. For example, goal-success2 reflects whether or not goals were met on the second trial. If they were, we should expect goal-change3 to be positive, indicating that higher goals were set on the third trial. Goal-success2, age, and condition were factors in examining goal-change3. For goal-change4, we used goal-success3, age, and condition as factors. Control group participants were not included because they did not set goals.

For goal-change3, the results showed a significant effect of goal-success2, with a large difference in goal change from Trial 2 to Trial 3 for those who reached their goals ($M = 2.7$) as opposed to those who did not reach their goals ($M = -9.0$), $F(1, 139) = 38.6, p < .0001, MSE = 125.2, \omega^2 = .22$. The interaction of age and condition was also significant. Younger adults showed no significant differences in goal-change3 as a function of condition (in the goal condition, $M = -5.9$, and in the goals-FB condition, $M = -2.9$), but older adults showed a significant difference in goal-change3 in the goals-FB condition ($M = -4.3$) compared with the goal condition ($M = -5.5$), $F(1, 139) = 4.3, p < .05, MSE = 125.3, \omega^2 = .03$. That is, the older adults set their goals lower on Trial 3 than on Trial 2 in the goals-FB condition but retained essentially the same goals in the goal condition. For goal-change4, the effect of goal-success3 was the only significant effect, $F(1, 139) = 8.4, p < .005, MSE = 128.3, \omega^2 = .06$, showing a significant difference in goal change ($M = -5.1$) between those who had not reached their goals on the previous trial and those who had ($M = 44$). With no interaction between goal change and condition for goal-success3, these results suggest that the older adults in the goal condition were not aware of whether they were meeting their goals on Trial 2 but that younger adults, and older adults on Trial 3, may have had a general idea of how they were doing even without explicit feedback. Or, perhaps those who saw some improvement over time in their scores set higher goals without feeling the need to get external feedback on their exact percentage correct.

Finally, to further examine the impact of goal success, we conducted a regression analysis to predict final trial performance by using indicators of ability (baseline scores), age (in years), goal success (as a dichotomous dummy variable), and final trial beliefs measures for SEST, control, and importance. Using simultaneous entry for all dependent variables, this regression was significant, $R = .83, F(6, 210) = 79.4, p < .0001$, adjusted $R^2 = .68$. Those factors significantly related to the final trial performance were
baseline recall, $\beta = .50, p < .0001$; goal success, $\beta = .21, p < .0001$; age, $\beta = -.13, p < .01$; final trial SEST, $\beta = .20, p < .0001$; and control, $\beta = .14, p < .001$. Importance was not a significant predictor. This regression result is notable in that goal success, memory self-efficacy, and control were significant predictors of final trial scores even when list performance and age were covaried.

Motivation

Consistent with goal theory, self-reported motivation to perform well at the end of the study was significantly lower in the control condition ($M = 4.4, SD = 1.7$) than in the two goal conditions (goal $M = 5.1, SD = 1.5$; goals-FB $M = 5.0, SD = 1.4$), $F(2, 212) = 3.8, p < .025$, $MSE = 2.3, \omega^2 = .03$. There were no significant age differences (see Table 1). As expected, correlations indicated that importance (as assessed at the final trial) was strongly related but not equivalent to motivation (assessed only at the final trial). The correlation between these two final trial measures is $r = .52$, and with age variance partialed out, $r = .53$.

Discussion

Investigations of goal-setting can bring researchers closer to understanding self-regulatory mechanisms related to memory. A substantial literature in educational and work settings shows that goal-setting has positive effects on performance, motivation, and self-efficacy and that positive feedback often enhances these effects (Locke & Latham, 1990). In this research, we expected these effects to be replicated for younger adults in the domain of memory, but we thought that a different pattern might occur for older adults. In this study, the impact of goal-setting was small but reliable. Performance was positively affected by goal-setting for both age groups, and self-efficacy and motivation were higher after setting goals. As in previous research, goals were consistently predicted by efficacy and prior performance outcomes.

As expected, the response to the goal conditions was weaker for the older adults than the younger adults, even though significant interactions with age did not occur for all measures. After testing, both older and younger adults showed higher motivation in both goal-setting conditions and higher self-efficacy in the goal condition, compared with the control group. On other variables, younger adults showed more positive changes. Performance feedback resulted in higher scores for the younger adults, but the performance advantage for goal-setting was lost to the older adults who received feedback. It is likely that this occurred because the feedback in this research was realistic and not always positive. In keeping with goal theory (Bandura, 1997; Locke & Latham, 1990), goal-setting increased efficacy, motivation, and performance, but feedback primarily led to higher scores when that feedback was positive. With respect to other variables, younger adults set higher goals than older adults, maintained their sense of control over memory during testing rather than showing declines, as the older adults did, and rated their performance as more important on the final trial than the baseline trial.\(^1\)

This weaker response to the testing and goal-setting conditions on the part of the older adults may have occurred for a number of reasons. One explanation might be that older adults do not respond to goal-related motivational conditions. The data do not support that explanation because the older adults responded to the goal condition, showing significant increases in performance and self-efficacy and higher posttest motivation in that condition compared with control. The differential response to the manipulation for the two age groups occurred primarily in the goals-FB condition and appeared to be a function of the type of feedback they received, with about half as many older adults as younger adults showing improvement in scores over trials and receiving feedback indicating that goals were met. How might older adults have reacted to feedback indicating that they were not achieving their goals? We have evidence that they lowered their subsequent goals after feedback. We can speculate on a number of other possibilities, with respect to goal theory. It could be that older adults increased their effort in the goal condition but were not inclined to put forth effort when the feedback suggested that current efforts were not successful. Alternatively, it could be a result of variations in goal commitment. For the older adults, the feedback was typically not showing goal progress. In previous research, when feedback did not reflect progress toward goals and when self-efficacy and control beliefs were lower, goal commitment was weaker (Locke et al., 1984). Finally, it is also possible that the feedback that the older adults received, showing little or no progress toward their goals, could have activated self-stereotyping processes. Activation of age stereotypes can affect performance (Levy, 1996; Rahhal & Hasher, 1998). Future research that includes explicit measures of goal commitment, effort, and stereotyped beliefs would help to determine which explanation holds the most promise for understanding the response of older adults to goals-FB conditions.

Given how little we know about goal-setting in memory tasks across adulthood, it is also possible that older and younger adults were not setting goals in the same way. Perhaps older adults set their standards too high—in effect, setting themselves up for failure. Even though the older adults’ goals averaged about 58%, significantly below that of younger adults (averaging around 70%), two-thirds of the older adults did not meet their goals. In other words, they were not setting their goals at achievable levels. Although goals do not appear to respond over trials in the same way as predictions (West & Thorn, 2001) such goal calibration difficulties could be related to factors that also influence the memory predictions that adults make when monitoring performance over trials (see Dunlosky & Hertzog, 1998), such as anchoring and overestimation (for an extended discussion of factors related to age differences in monitoring, see Cavanaugh et al., 1998; Connor, Dunlosky, & Hertzog, 1997). It would be interesting, in future studies, to relate goal-setting to more traditional prediction measures to examine these issues.

Motivation is used in a number of different ways in this research. When goals are set and individuals subsequently show higher scores for efficacy and performance, this result represents, theoretically, an effect of increased motivation (Locke & Latham, 1990), whether measured or not. At the same time, in this research, we used some individual items to assess self-reported motivation directly—importance measured at baseline and after testing and

\(^1\) Older adult ratings of importance may be at ceiling—their mean score is 5.5, and the standard deviation is 1.3, so a score of 6.8 is 1 standard deviation from the mean, leaving little room for change (the highest possible score is 7) for the older adults.
the motivation item administered after testing. These items were correlated with each other but did not always show the same effects of age and condition; for example, there were age differences on the importance item but not on motivation. As work proceeds to further understand motivational factors that may influence memory, many different indicators of motivation should be evaluated, with the goal of creating a reliable scale that assesses memory-related motivation. In the extant literature, self-efficacy measures vary with domain and test experience (e.g., West et al., 1996), and control measures vary with domain (e.g., Lachman, 1991) and situation (Blanchard-Fields, 1996; Skinner, 1991). Motivation measures may show similar effects.

This investigation was limited by the use of group testing. Further understanding of the mechanisms governing the relationship between goals, beliefs, and memory may be gained through individual testing. With group testing, it was not possible to measure some factors that may play a role in the observed effects—effective goal-directed behaviors might include increased recall time, more competent organization and clustering, increased attention during encoding, and so forth. We did not measure individual recall times or attention to the stimuli. In addition, we were not able to examine clustering because participants were free to write their recalled items in any order (traditional measures of clustering require that recall protocols show the order of recall, with points given only when items from the same category are recalled adjacent to each other). Participants who increased their scores were likely to be approaching the task in a different way from those who did not increase their scores (Gollwitzer & Bargh, 1996; Taylor & Pham, 1996). Individual think-aloud protocols, more sophisticated assessments of strategic efforts during encoding (e.g., sorting of items into categories), or both would be fruitful for evaluating individual planning and on-task behavior, to further explore process-level variables that may be related to these results.

The self-efficacy data fell in line with expectations by showing a significant Trial X Condition interaction. Also, age differences in self-efficacy occurred, as in prior research (Hertzog, Dixon, Schulenberg, & Hultsch, 1987; Luszcz & Hinton, 1993; West & Berry, 1994). In contrast, self-efficacy was not affected by goal success, as one would expect. It may be that some participants were not feeling positively even after meeting their goals because, in their eyes, they had set their goals fairly low. It is not possible to test this notion with the current data. However, in previous comparisons of high and low experimenter-set goals, the goal-setting literature shows that gains in self-efficacy are more likely to occur when high goals are achieved (Locke & Latham, 1990). Without normative data on the appropriate level for goal challenge on list recall tasks, we cannot determine whether individuals were setting their goals at high or low levels in this study. Additional investigation would be needed to examine this issue. Other beliefs measures in this research also did not consistently show the expected effects. The items assessing control and importance may not have shown sufficient response variability to react to the impact of the manipulation. Alternatively, these individual items may not have been amenable to change because they were fairly general in tone ("how important was it, to you, to perform well on the memory task?"), rather than asking about a specific task at a specific time.

The focus of this research was not on memory performance, nor was it on the processes of encoding and retrieval, per se; the focus was on conditions that would lead to goal-related motivational effects in memory. This research extended previous literature by demonstrating that many well-established findings can be replicated in the domain of memory. Prior literature suggests that goal-setting can push people to perform better and that positive feedback can boost these effects (e.g., Bandura, 1989). As expected, we showed small but reliable effects for condition or Condition X Trial interactions for efficacy, performance, and motivation, and stronger effects on performance for those individuals receiving positive feedback. The goal-setting literature also suggests that goals are correlated with self-efficacy, performance (e.g., Bandura & Schunk, 1981), and control (Schunk, 1991). These predictions from goal theory were supported for the most part. Initial goals were predicted by efficacy and performance. Those who did not meet their goals set lower goals on the next trial than those who had goal success, and final trial goals were predicted by efficacy, performance, and control. At the same time, these results demonstrated that older adults may not respond to feedback in the expected way, especially if the feedback is not positive, and that beliefs do not always respond positively to goal achievement. Expanded investigations of goals, feedback, and memory beliefs would shed additional light on the ways in which these self-regulatory processes can alter the memorizing potential of adults at different ages.

References


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