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Robin Lea West

Jane M. Berry
University of Richmond, jberry@richmond.edu

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Age Declines in Memory Self-Efficacy: General or Limited to Particular Tasks and Measures?

Robin Lea West and Jane M. Berry

The potential for lifelong learning has been demonstrated clearly in research on problem solving, prose recall, and other measures of mental skill (Reese & Puckett, 1993; Sinnott, 1989). However, there are factors that may serve as barriers to lifelong learning for older adults (see Arenberg, chapter 23 in this volume). Among others, these factors include age changes in attentional or memory capacity (e.g., Salthouse, 1991), declines in memory self-confidence or change in memory beliefs (e.g., Berry, West & Dennehy, 1989), and reduced opportunities for education and training (e.g., Rebok & Offermann, 1983). This chapter focuses on self-report or subjective beliefs about memory.

A growing literature points to the relationship between subjective factors (e.g., memory complaints, self-efficacy, locus of control) and age-related memory performance differences (Cavanaugh & Green, 1991; Hertzog, Dixon & Hultsch, 1990; Lachman, Steinberg & Trotter, 1987). One factor that has received considerable attention is self-efficacy, which is defined as an individual's level of confidence and assessment of his or her ability to perform successfully on a particular task or domain of tasks. Self-efficacy has been an important factor in investigations of aging and metamemory (e.g., Hertzog, Hultsch & Dixon, 1989), and an independent measure of memory self-efficacy, the MSEQ, has been developed and validated (Berry et al., 1989). Take together, the evidence indicates that global measures of self-efficacy show age differences, with older adults having less self-efficacy and greater concern about their performance than younger adults (Berry et al., 1989; Hertzog et al., 1989).

The existing literature, however, has not sufficiently explored two compelling questions: (1) the scope or generality of age differences in efficacy and (2) the nature of the relationship between older adults' lower memory self-efficacy and their lower memory task performance (see Berry & West, 1993). This investigation focuses on the former question.

Numerous authors have argued that efficacy per se is an important issue for investigation by gerontologists (Cavanaugh & Green, 1991; Hertzog, 1992). There are both theoretical and applied reasons for studying the breadth and depth of age differences in memory self-efficacy. Reduced efficacy could occur only for highly difficult tasks or only for unfamiliar tasks, or it could extend to more familiar, everyday memory activities, and even to simple memory tasks. Investigation of the generality of age decline in memory self-efficacy is important because a negative self-evaluation that is not limited but extends to many types of memory activities is more likely to have consequences for the individual's behavior, affecting memory performance in many contexts and situations (Bandura, 1977, 1986).

From an applied perspective, it is also important to examine the generality of lowered efficacy. Many investigators have suggested that self-doubt can lead to self-fulfilling failure; that is, a low self-evaluation could result in self-limiting actions that further reduce competence (e.g., Bandura, 1986). As a result, older adults' beliefs about memory have themselves become the focus of intervention research (Rebok & Balcerak, 1989; Weaver & Lachman, 1989; West, Bramblett, Welch & Bellott, 1992). To develop effective interventions, applied psychologists must know whether negative attitudes about memory among older adults are limited (existing only for specific types of tasks) or widespread. Self-evaluation instruments that assess general beliefs or single tasks cannot show whether efficacy judgments apply to a wide range of tasks and measures. More refined measures are needed to study generality. Before examining some data, a theoretical framework for efficacy aging will be outlined.

Self-efficacy refers to an individual's sense of mastery of particular tasks in a given behavioral domain. Personal efficacy evaluations are derived from past performance accomplishments, vicarious experience, social expectations, and physiological arousal. Efficacy evaluations are expected to serve as mediators between competence and performance, affecting a person's on-task behavior (Bandura, 1986).

There has been considerable discussion of the way in which aging may be related to lower self-efficacy. Age changes in memory performance can result in increased memory errors (i.e., performance accomplishments occur less often). In terms of self-efficacy, this age-related memory change leads to a reevaluation of personal capabilities. At the same time, stereotypes about aging (i.e., social expectations) lead older adults to question their abilities and to be vigilant about memory errors. When memory errors by older adults are noticed (including errors by themselves and by similar others), the societal stereotypes are reinforced. Thus, memory deficits and social stereotypes combine to reduce older adults' sense of efficacy. Theoretically, this reduced efficacy can result in avoidance of learning opportunities and reduced memory effort, which in turn limit performance capabilities. This interactive model has been explained elsewhere (Bandura, 1981, 1986). In the domain of phobic behavior, similar models have been tested extensively (e.g., Bandura, Reese & Adams, 1982), but there are relatively few studies of aging and memory. Rebok and Offermann (1983) have discussed how changes in self-efficacy might discourage older adults from participating in educational programs or might limit their opportunities to learn. In addition, the presence of age differences in general self-efficacy confirms aspects of this theoretical framework (Berry et al., 1989; Hertzog et al., 1989), as does evidence showing that lowered self-efficacy sometimes leads to reduced memory effort among older adults (see Berry & West, 1993).

Up to now, the research has focused on two types of memory self-report measures—prediction on single tasks and general measures based on factor scores from lengthy questionnaires. The single-task prediction studies have yielded some interesting data, showing, for example, that postdiction is more accurate than prediction (e.g., Devolder, Brigham & Pressley, 1990) and that older adults tend to overestimate their scores on specific tasks (e.g., Lachman & Jelalian, 1984). Single-task predictions, however, do not represent typical self-efficacy items (Berry & West, 1993), and they do not provide information concerning the generality of age declines in self-confidence across tasks or measures. The same is true for the more general approach that uses factor scores. The findings obtained with this approach have highlighted general age differences in memory self-evaluation (e.g., Cavanaugh & Poon, 1989; Hertzog et al., 1989; Zelinski, Gilewski & Anthony-Bergstone, 1990).

An alternative methodology, designed to examine the generality of age differences in memory self-efficacy, requires a task-specific questionnaire and multiple indicators of efficacy. Bandura, in fact, recommends this more refined analysis. He endorses the use of microanalysis of self-efficacy, rather than global, omnibus tests (Bandura, 1986). A task-specific, microanalytic approach requires that many different activities and multiple levels of difficulty are described within the same task domain, with an assessment of confidence for each task at each difficulty level. Such an approach permits the examination of individual task variations in efficacy.

THE MEMORY SELF-EFFICACY QUESTIONNAIRE

The Memory Self-Efficacy Questionnaire (MSEQ) permits microanalysis of self-efficacy, by reliably assessing a wide range of memory tasks at varying levels of difficulty (Berry et al., 1989). Many converging dependent measures can be gleaned from the MSEQ, but they have not been systematically studied with respect to the generality of age differences in efficacy and potential age-by-task interactions. In this paper, archival data compiled by the first author are used to examine these issues.

The breadth of age differences in self-efficacy can be revealed by examining self-efficacy across different types of memory tasks. The MSEQ is a paper-andpencil questionnaire used to obtain a memory self-evaluation for ten memory tasks (Berry et al., 1989, Study 1). The MSEQ describes four tasks from the domain of everyday memory (recall of a grocery list, object locations, phone numbers, and directions), four tasks from the domain of laboratory memory (word list, picture, digit, and route recall), and two filler tasks. A sample page from the MSEQ is given in Table 1. If age differences in memory self-efficacy are a general, widespread phenomenon, they should be present across all tasks in these two domains and thus show breadth or generality of effects.

At the same time, multiple dependent measures of efficacy can be used to examine the depth of age differences in memory self-efficacy. If age differences in efficacy are pervasive, they should be present on a number of different dependent measures derived from the MSEQ. The traditional measures proposed and used by Bandura are self-efficacy strength and level (Bandura et al., 1982). Subjects respond "yes" or "no" to indicate if they can perform the described memory task. The number of "yes" responses reflects self-efficacy level (SEL), which varies from 0 to 5 on each task. For each "yes" response, subjects are asked to circle a confidence value (10%–100%). These are averaged, with "no" responses counted as 0, to get a self-efficacy strength score (SEST). Thus, "no" responses act to lower SEST. SEST and SEL are expected to decrease with age.

Two other aspects of self-efficacy should be examined, to focus more on those tasks that adults feel capable of doing. The five items describing each task are presented in a descending hierarchy, with more difficult levels occurring first. CONF1 is the confidence value (10% to 100%) circled for the item representing the most difficult level to which the person responded "yes." CONF1 is expected to be higher when a person lacks secure beliefs in their abilities. That is, the uncertain person may show a response bias and not respond "yes" until confidence is high. This measure should be higher for older adults than younger adults, because older adults' abilities are changing. Changing abilities lead, in turn, to uncertainty and unstable self-evaluations (Bandura, 1981).

The second new measure is the person's average confidence for "yes" responses only, ranging from 10% to 100% (CONF-YES). CONF-YES can be compared to SEST. SEST is calculated for all responses at all levels (five levels for each task), and a "no" response is given a value of 0; CONF-YES is based only on "yes" responses, and the number of "yes" responses may vary from task to task. Items with responses of "no" are excluded. It should be noted that individuals who never respond "yes" on a given scale are considered as missing scores for that scale for CONF1 and CONF-YES.[1]

TESTS OF GENERALITY ACROSS TASKS AND MEASURES

Sample 1

To examine the issue of generality of self-efficacy ratings, we selected a sample of forty-eight older (60 to 80 years) and twenty younger (18 to 25 years) adults

Table 1
Sample Task Scale from MSEQ

PHONE Task

(5) -If I looked up 3 phone numbers in the phone book at the same time, I could remember 3 complete phone numbers.

NO YES 10% 20 30 40 50 60 70 80 90 100%

(4) -If I looked up 3 phone numbers in the phone book at the same time, I could remember 2 complete numbers.

NO YES 10% 20 30 40 50 60 70 80 90 100%

(3) -If I looked up 3 phone numbers in the phone book at the same time, I could remember 1 complete number plus the first 3 digits in one other phone number.

NO YES 10% 20 30 40 50 60 70 80 90 100%

(2) -If I looked up 3 phone numbers in the phone book at the same time, I could remember 1 complete number.

NO YES 10% 20 30 40 50 60 70 80 90 100%

(1) -If I looked up 3 phone numbers in the phone book at the same time, I could remember the first 3 digits of one phone number.

NO YES 10% 20 30 40 50 60 70 80 90 100%

Note: The numbers in parentheses indicate the performance level represented by each item, with (1) as the lowest performance level. These numbers were not present on the actual questionnaire.

from a self-efficacy data archive. Participants ranged in education level from 8 to 20 years, with higher education levels for younger ($M = 15.2$) than older ($M = 12.2$) adults, $F(1,66) = 17.3, p < .0001, \omega^2 = .21$. As analyses using education as a covariate did not change the pattern of significant effects, the basic analyses without the covariate are reported below.

A preliminary multivariate analysis of variance (MANOVA) was conducted, with scores calculated across all four laboratory scales (e.g., total number of "yes" responses across the four laboratory scales yields a laboratory SEL score) and across all four everyday scales (e.g., confidence for all "yes" responses is averaged across the four everyday scales to yield an everyday CONF-YES score). One older adult responded "no" to all items on one scale and therefore was a missing case for CONF1 and CONF-YES (multivariate $N = 67$). Age (young-old) was a between-subjects factor and domain (laboratory, everyday) was a within-subjects factor in this MANOVA with the four dependent measures described above: SEL, SEST, CONF1, and CONF-YES. Significant effects were obtained for age (multivariate $F(4,62) = 5.9, p < .0001$) and domain (multivariate $F(4,62) = 12.1, p < .0001$), and there was no significant interaction, indicating that the pattern of age-group differences (younger adult scores higher than older adult scores) generalized across the two domains. Self-efficacy for the four everyday tasks was higher than that for the four laboratory tasks. Tasks from the two domains were then examined separately to evaluate generality across individual tasks.

Laboratory Domain. A mixed design MANOVA was used to investigate the potential interaction of age and task differences. The four dependent measures were SEL, SEST, CONF1, and CONF-YES, with age as a between-subjects factor and task as a within-subjects factor (word, picture, digit, and route scales). Pillai's Trace statistic was used for all multivariate F calculations. The MANOVA showed significant age effects (multivariate $F(4,62) = 4.9, p < .005$), no significant interaction of age and task, and significant multivariate differences across tasks ($F(12,582) = 6.2, p < .0001$).

Follow-up univariate tests were conducted to examine the effects of age and task on the individual dependent measures. These were mixed analyses of variance conducted for each dependent measure with age (between: old, young) and task (within: word, picture, digit, route) as independent variables. As expected, significant age differences in efficacy were obtained for SEL [$F(1,66) = 12.2, p < .001, \omega^2 = .10$] and SEST [$F(1,66) = 10.0, p < .005, \omega^2 = .08$]. Significant task differences (all dfs = 3,198) occurred for SEL ($F = 15.5, p < .0001, \omega^2 = .05$), SEST ($F = 23.7, p < .0001, \omega^2 = .07$), and CONF-YES ($F = 6.6, p < .0001, \omega^2 = .03$). In general, the digit efficacy scores were lower than scores for the other laboratory tasks in post hoc comparisons (see Table 2). The results showed no significant interactions of age and task for SEST, CONF1, or CONF-YES; but the interaction was significant for SEL ($F(3,198) = 3.82, p < .05$). The means are presented in Table 2. Post hoc comparisons using Tukey's tests ($p < .05$) revealed that this interaction was due

Table 2
MSEQ Means for Laboratory and Everyday Tasks

Laboratory Tasks	Young	Old	Everyday Tasks	Young	Old
		SEL (Range = 0 to 5)			
WORD[a]	4.2	3.2	GROCERY[cb]	4.6	3.5
PICTURE[a]	4.2	3.3	LOCATION[c]	4.6	4.0
DIGIT[b]	3.6	2.2	PHONE[ba]	4.2	3.1
ROUTE[a]	4.0	3.5	MAP[a]	3.8	2.9
		SEST (Range = 0 to 100)			
WORD[a]	68.4	49.2	GROCERY[b]	73.2	54.8
PICTURE[a]	64.8	52.2	LOCATION[c]	76.6	66.2
DIGIT[b]	51.5	32.0	PHONE[ab]	67.8	50.2
ROUTE[a]	60.6	50.4	MAP[a]	59.1	43.6
		CONF1 (Range = 10 to 100)			
WORD	56.0	58.5	GROCERY	55.5	60.0
PICTURE	51.0	61.5	LOCATION	58.5	66.0
DIGIT	46.5	57.9	PHONE	59.0	65.2
ROUTE	51.5	52.1	MAP	54.0	56.2
		CONF-YES (Range = 10 to 100)			
WORD[a]	79.9	76.4	GROCERY[ab]	79.1	78.2
PICTURE[a]	78.3	78.9	LOCATION[b]	81.9	81.4
DIGIT[b]	70.5	72.3	PHONE[b]	81.5	80.4
ROUTE[b]	74.8	70.3	MAP[a]	75.5	73.7

Note: Means that represent significant task differences for a particular variable have different superscript letters. A complete table, with standard deviations, is available upon request.

to the fact that the younger adults showed no task differences in SEL. Task differences were significant, however, for the older adults, who had lower SEL scores for digit than the other tasks.

To summarize the results for the laboratory domain, there were significant task differences on two measures for the younger adults and on three measures for the older adults. Age differences were present for the traditional measures that reflected the total pattern of "yes" and "no" responses on the MSEQ (age differences in SEL and SEST scores were significant on all tasks), but not for the other confidence measures based only on "yes" responses (CONF-YES and CONF1).

Everyday Domain. A mixed design MANOVA examined the four dependent measures (SEL, SEST, CONF1, and CONF-YES) as a function of task (grocery, location, phone, and map—within-subjects) and age (young or old—between-subjects). Significant age differences were evident on these everyday measures [multivariate $F(4,63) = 4.9, p < .005$]. Multivariate task differences [$F(12,591) = 4.1, p < .0001$] were also significant, but not the interaction of age and task.

Scores for the everyday tasks were then examined with univariate mixed analyses of variance, in separate analyses for each dependent measure (SEL, SEST, CONF1, CONF-YES) using age (between) and task (within) factors. The pattern of effects was similar to that obtained in the laboratory domain.

Task differences (all $df = 3,198$) were evident for SEL ($F = 12.0, p < .0001, \omega^2 = .06$), SEST ($F = 13.7, p < .0001, \omega^2 = .07$), and CONF-YES ($F = 5.0, p < .005, \omega^2 = .02$), but not CONF1. In general, the map task showed the lowest self-efficacy and location the highest (see task differences indicated in Table 2). No age by task interactions were significant, indicating that age effects were generally consistent across the four everyday tasks.

With respect to age differences, the older adults had lower efficacy on both measures that reflected the total pattern of "yes" and "no" responses: for SEL, $F(1,66) = 16.0, p < .0001, \omega^2 = .10$; for SEST, $F(1,66) = 10.4, p < .005, \omega^2 = .07$. The other measures, CONF1 and CONF-YES, showed no age differences in efficacy.

These results show that self-efficacy varies considerably among individual tasks within the domains of everyday and laboratory memory. Task differences were evident, but patterns of age differences did not change across tasks. For most laboratory and everyday tasks, older adults showed lower self-efficacy whenever they were asked a simple "yes-no" question about their ability to perform a task. At the same time, these older adults were not less confident than younger people in their ability to perform those tasks to which they responded "yes." Whereas the traditional measures showed consistent age effects, the two new measures of confidence did not. In both domains, this group of older adults did not show higher confidence than younger adults on their first "yes" response (CONF1), nor did they show overall lower levels of confidence on the tasks that they felt that they could perform (CONF-YES).

Although age differences in CONF1 scores were expected, this measure did not vary significantly as a function of age. The means in Table 2 show that the trend was in the predicted direction, with older adults showing higher levels of confidence for their first "yes" on picture, digit, location, grocery, and phone tasks than the young. However, the overall difference was not significant.

The results from Sample 1 demonstrated an interesting qualification for age differences in efficacy. The four dependent measures did not converge to show consistently lower efficacy. Although older adults feel that they cannot perform at a level as high as that endorsed by younger people and are less confident overall, their confidence is not substantially lower than that of the young for the tasks that they feel they *can* perform (those marked "yes"). These results validate the importance of examining multiple measures and multiple tasks to clarify the relationship between aging and efficacy.

These results provide a useful illustration, but replication is needed. It is possible that the findings were due to the particular set of task descriptions that were used on the MSEQ. For example, five of the eight tasks represented relatively simple memory tests, with ten to twelve items to recall. It is possible that more difficult tasks would yield age by task interactions. A second analysis was therefore conducted with a new sample, and new task descriptions, to further examine the generality of efficacy aging across tasks and measures.

Sample 2

The second archive sample was limited to individuals who had finished high school and not yet college, to make the older (N = 68, mean age = 67.3, mean education = 13.2 years) and younger (N = 68, mean age = 18.7, mean education = 12.6) adult subject groups more comparable. Unlike Sample 1, overall educational differences in this sample favored the older group [$F(1,135) = 11.2, p < .001, \omega^2 = .08$]. Analyses using education as a covariate resulted in a similar pattern of effects. Therefore, the results reported here are based on the analyses without the covariate.

A larger number of subjects was included in this sample, as compared to Sample 1, to increase the power of the statistical tests. Also, the memory task descriptions were modified to ensure that the observed domain and aging effects were not limited to the particular task descriptions used on the MSEQ. The A-MSEQ was administered. In comparison to the MSEQ used in the first study, the task descriptions in the A-MSEQ generally describe more difficult tasks. For instance, the grocery scale in the A-MSEQ described an eighteen-item grocery list (task descriptions are given in Berry et al., 1989, Study 3), whereas the MSEQ grocery scale described a twelve-item list. We expected higher self-efficacy scores for the younger participants on the two traditional self-efficacy measures (SEL and SEST) and on the new measure of confidence, CONF-YES. As explained previously, confidence for the first "yes" response, CONF1, was expected to be higher for the old than for the young.

As before, preliminary analyses were used to see if domain differences interacted with age. A multivariate analysis was conducted using the four dependent measures (SEL, SEST, CONF1, CONF-YES). Each dependent measure used a summary value calculated across the four scales within the everyday domain or the laboratory domain. The multivariate analysis showed main effects for age [multivariate $F(4,117) = 10.2$, $p < .0001$] and domain [multivariate $F(4,117) = 28.8$, $p < .0001$] and no interaction. Age effects generalized across both domains.

Laboratory Domain. Task analyses were then conducted, examining tasks from the two domains separately. Multivariate analyses were conducted first, followed by univariate analyses. The MANOVA used four dependent measures—SEL, SEST, CONF1, and CONF-YES—examined across age groups and four tasks within the laboratory domain (word, digit, cubicles, and wordpair). Ten older adults and one younger adult were missing values for at least one task scale for CONF1 or CONF-YES because they responded "no" to all five items on that scale. This reduced the multivariate sample to 125 cases. There were significant age group differences [multivariate $F(4,120) = 8.2$, $p < .0001$] and task differences [multivariate $F(12,1104) = 10.8$, $p < .0001$], but no significant interaction.

Mixed analyses of variance with age as a between-subjects factor and task as a within-subjects factor were then carried out in univariate analyses, one analysis for each dependent measure. No age-by-task interactions were significant, but task differences were significant for each analysis: for SEL, $F(3,402) = 26.4$, $p < .0001$, $\omega^2 = .07$; for SEST, $F(3,402) = 42.3$, $p < .0001$, $\omega^2 = .11$; for CONF-YES, $F(3,369) = 23.6$, $p < .0001$, $\omega^2 = .06$; and for CONF1, $F(3,369) = 3.5$, $p < .02$, $\omega^2 = .01$. Post hoc analyses of these task effects showed that wordpair self-efficacy was generally higher than digit and cubicles self-efficacy (see significant task differences noted in Table 3).

The self-efficacy measures for the four laboratory tasks also showed significant age group differences: for SEL, $F(1,134) = 8.2$, $p < .005$, $\omega^2 = .03$; for CONF-YES, $F(1,123) = 7.2$, $p < .01$, $\omega^2 = .03$; and for CONF1, $F(1,123) = 30.8$, $p < .0001$, $\omega^2 = .07$, but not for SEST, $p < .10$. As predicted, the older adults had higher CONF1 and lower SEL scores than the younger adults. Contrary to expectation, CONF-YES values were actually higher for the older adults than for the younger adults. That is, considering only those tasks to which individuals responded "yes," the old showed higher levels of confidence than the young.

Everyday Domain. Multivariate analyses showed significant age group differences across the four dependent measures for the everyday tasks [multivariate $F(4,125) = 11.9$, $p < .0001$], significant task differences [multivariate $F(12,1149) = 7.1$, $p < .0001$], and no significant interaction.

The four tasks in the everyday domain—grocery, location, route, and phone—were also examined with mixed univariate analyses of variance using four tasks (within) and two age groups (between). Separate analyses were conducted for each dependent measure. Task differences were present on SEL [$F(3,402) =$

Table 3
A-MSEQ Means for Laboratory and Everyday Tasks

Laboratory Tasks	Young	Old	Everyday Tasks	Young	Old
		SEL (Range = 0 to 5)			
WORD[b]	3.8	3.3	GROCERY[c]	4.0	3.4
DIGIT[a]	3.2	2.9	PHONE[b]	3.6	3.1
CUBICLES[ab]	3.5	3.0	LOCATION[a]	4.4	3.8
WORDPAIR[c]	4.3	3.7	COUPLES[a]	4.4	3.6
		SEST (Range = 0 to 100)			
WORD[b]	54.2	51.3	GROCERY[b]	57.3	51.9
DIGIT[a]	42.3	43.4	PHONE[b]	55.0	48.6
CUBICLES[a]	44.1	40.0	LOCATION[a]	62.9	58.8
WORDPAIR[c]	63.5	56.7	COUPLES[a]	66.7	57.4
		CONF1 (Range = 10 to 100)			
WORD[ab]	40.0	54.9	GROCERY[a]	43.1	56.7
DIGIT[ab]	38.2	55.5	PHONE[b]	53.5	63.1
CUBICLES[a]	35.4	51.8	LOCATION[a]	41.5	57.4
WORDPAIR[b]	43.4	56.4	COUPLES[ab]	45.4	60.8
		CONF-YES (Range 10 to 100)			
WORD[b]	72.2	76.6	GROCERY	72.8	78.1
DIGIT[a]	62.2	72.7	PHONE	76.0	77.8
CUBICLES[a]	62.8	68.1	LOCATION	71.3	76.1
WORDPAIR[b]	73.7	77.2	COUPLES	74.8	77.8

Note: Means that represent significant task differences have different superscript letters. A complete table, with standard deviations, is available upon request.

21.4, $p < .0001$, $\omega^2 = .06$] on SEST [$F(3,402) = 11.2$, $p < .0001$, $\omega^2 = .03$]; and on CONF1 [$F(3,384) = 6.6$, $p < .0001$, $\omega^2 = .02$]. Efficacy was generally lowest for the phone task and highest for recall of locations and couples' names (see Table 3).

On the everyday measures, age differences were present on SEL [$F(1,134) = 15.3$, $p < .0001$, $\omega^2 = .05$] and on SEST [$F(1,134) = 5.0$, $p < .03$, $\omega^2 = .02$] and approached significance on CONF-YES [$F(1,128) = 3.8$, $p = .053$], with younger adults having higher scores than older adults. Also, CONF1 values were significantly higher for the older adults, as expected [$F(1,128) = 21.5$, $p < .0001$, $\omega^2 = .06$]. These results for the everyday domain were in line with our predictions.

Summary. The results for Sample 2 are consistent with those done earlier, showing virtually no age-by-task interactions, even with more difficult tasks described and a larger N for the analysis. In spite of substantial variation in efficacy as a function of task differences, when age differences occur, they are generally present across all tasks.

Age group differences, with higher self-efficacy for the young, were present in both samples on the traditional measures of SEL and SEST (see Table 4 data summary). The one exception was laboratory SEST in Sample 2. (It is not clear why this result was different.) Age differences, however, were just the opposite on the new measures of confidence, reflecting only "yes" responses. In every case, CONF1 and CONF-YES for the older adults were as high as for the young, and sometimes more so (in Sample 2 only). This supports the view that older adults may not always demonstrate reduced efficacy uniformly across measures, and that researchers should examine multiple measures of efficacy.

In both samples, consistent and significant differences in efficacy responses occurred across tasks; but older and younger adults appeared to react to these task differences in the same manner, because age differences, when they occurred, were significant across all tasks. The results for SEL were similar in both samples. There were, however, some differences in the results from the two samples. Laboratory SEST did not show age differences in Sample 2 even though it had in Sample 1. The expected age variation in CONF1, with higher scores for older adults, occurred only in Sample 2. CONF-YES showed age differences only in Sample 2 and only on the laboratory measures. Finally, task differences in CONF1 and CONF-YES varied in the two samples.

It seems important, then, to explore these sample differences. First of all, the samples varied in educational level, which may have contributed to the outcome, although it is unlikely. Years of education is not highly correlated with memory self-efficacy (West & Bellott, 1990), and the analyses using education as a covariate led to essentially the same pattern of results.

The differences could be attributable to the changes in task difficulty. The twelve-item grocery list and ten-item location recall task described on the MSEQ given to Sample 1 were generally easier than those described on the A-MSEQ (both eighteen-item tasks). The means for most variables on the grocery and

Table 4
Summary of Significant Effects

Sample	Age		Task		Age x Task	
	LAB	EV	LAB	EV	LAB	EV
SAMPLE 1						
Multivariate	*	*	*	*	--	--
SEL	*a	*a	*	*	*	--
SEST	*a	*a	*	*	--	--
CONF1	--	--	--	--	--	--
CONF-YES	--	--	*	*	--	--
SAMPLE 2						
Multivariate	*	*	*	*	--	--
SEL	*a	*a	*	*	--	--
SEST	--	*a	*	*	--	--
CONF1	*b	*b	*	*	--	--
CONF-YES	*b	--	*	--	--	--

*$p < .05$

Note: The letter "a" reflects higher scores for the younger adults than for the older adults, whereas the letter "b" was used when the older adults scored higher.

location tasks were also somewhat higher for the MSEQ than for the comparable A-MSEQ measures (compare Tables 2 and 3). The changed task descriptions could account for the variations in outcome.

Another possibility is that the samples were different because of their recruitment. The younger adults were volunteers in Sample 1 and introductory psychology students in Sample 2. Some of the Sample 1 older adults had been recruited for memory training and some had been recruited for research, whereas all of the Sample 2 elderly were recruited for a research study. However, previous research suggests that this older adult recruitment difference should not result in significant response variation on memory self-report measures (Berry et al., 1989; Scogin, Storandt & Lott, 1985).

To investigate sample differences, an analysis was done using only the picture task scale. The MSEQ and A-MSEQ items for the picture task were identical, which was the only scale for which the task description was the same on both questionnaires. A MANOVA was conducted using the four dependent measures for the picture task with between-subjects factors of age group and sample ($N = 204$). Significant multivariate differences were present for age [multivariate $F(4,197) = 10.0, p < .0001$] and for sample [multivariate $F(4,197) = 4.2, p < .005$], but not for the interaction. Sample 2 showed higher self-efficacy than Sample 1 in subsequent univariate tests with SEL and SEST, but not the other two measures. At least on this one scale, sample differences did not interact with age. It is not clear what impact these sample differences may have had on the age differences for other scales used in these analyses, because no other scales were identical on the two questionnaires.

The findings can be summarized thus: (1) age differences did not interact with differences between self-efficacy in the laboratory and everyday domains; (2) age differences did not interact with individual task differences; (3) age differences were not present on all measures of self-confidence, but were present on most measures related to "yes-no" responses about ability to perform a specific memory activity; (4) sample differences did not interact with age effects; and (5) sample and task differences were clearly significant and warrant further study.

IMPLICATIONS FOR SELF-EFFICACY IN FUTURE RESEARCH

Using two samples from a data archive, this paper explored the issue of generality of age-related differences in self-efficacy. The findings demonstrated that age differences in self-efficacy generalize across different types of memory tasks, but they do not generalize across different indicators or measures of memory self-efficacy. Generalization across samples was strong for the two traditional measures of self-efficacy—self-efficacy level and strength.

Generalization across Measures

The findings reported here illustrate that age differences in self-efficacy are not pervasive phenomena, extending to all types of measures, but occur on some measures of efficacy and not others. SEL, SEST, CONF1, and CONF-YES did not show the same age patterns. Older adults believe themselves capable of performing fewer tasks than younger people; in most research, including this study and others, the standard variables of self-efficacy level and strength did show age declines. However, confidence is not always lower for older adults than for younger adults. If, in their opinion, a task can be accomplished (they respond "yes"), older adults' confidence can be as high as that of younger people. These results are consistent with the results of some metamemory studies showing that feeling-of-knowing and confidence ratings are often comparable across age groups (e.g., Perlmutter, 1978; Rabinowitz, Ackerman, Craik & Hinchley, 1982). These findings suggest that researchers should be careful about making conclusions about age differences in efficacy that are based only on single indicators of memory self-evaluation. There is considerable measurement variation in the aging pattern. The nature of the question that is asked and the methodology for calculating efficacy may be just as important as the age of the subjects in one's sample. Sophisticated studies of the impact of the item and design features of memory self-evaluation questionnaires are much needed.

The measure differences were particularly apparent for the more-educated older adults in Sample 2, whose confidence was equal to or even higher (CONF-YES on laboratory tasks) than that of the young even though they responded "yes" significantly less often. It could be argued that older adults who are not familiar with laboratory tasks may be overconfident because of lack of experience. If that were the case, we would expect overconfidence to be more likely for the less educated older participants in Sample 1. That was not the case. Alternatively, perhaps the more-educated Sample 2 group had a strong sense of their limitations (lower SEL than the young) but also knew that some skills remained and therefore showed strong confidence in their ability to perform tasks at less-difficult levels. We may speculate then, that this group may be willing to participate in educational programs and to undertake new learning challenges that are self-paced or moderate to low in difficulty. At the very least, this population would not be expected to reject new learning opportunities "out of hand" because of low overall confidence.

Generalization across Tasks

When age differences in efficacy do occur, they are not affected greatly by task variation. The pattern of age effects was comparable across a wide range of tasks, including tasks from everyday and laboratory domains (MSEQ and A-MSEQ) and encompassing tasks of very different types—list recall, spatial memory, digit span, and so on. This suggests that age-related reductions in efficacy probably extend to a wide range of cognitive activities and learning situations.

Two important conclusions follow from this task generality. One is that age-related changes in memory self-efficacy are a general phenomenon. In particular, reduced efficacy level does not apply only to laboratory tests but extends to everyday types of memory activities. Efficacy differences across age would be expected, therefore, to extend to many cognitive activities and could affect adults' perceptions of their opportunities and potential for new learning in structured classroom settings as well as in more unstructured everyday learning situations (e.g., going to hear guest speakers at one's church). Older adults, especially those with lower self-efficacy, would be expected to choose memory-related activities less often and would be expected to show less persistence and effort in memory activities. Such behavioral concomitants of lower memory self-efficacy would be likely to lead to further deterioration of memory skills and a future reduction in participation in learning experiences. This potential downward spiral in memory skill and memory involvement may be prevented with intervention programs (discussed below).

A second conclusion relates to research design issues. These results show that, when examining variations in memory self-efficacy as a function of age, it is not problematic to use a subset of possible memory tasks to study age effects (as long as multiple dependent measures are included). If a researcher is interested in particular task differences, assessment of efficacy for these memory tasks would, of course, be necessary. But any age declines in efficacy observed with a selected group of tasks are likely to apply in a comparable way across a wide range of tasks, as demonstrated here.

Further examination of the relationship between performance and efficacy, and between performance improvement and efficacy change, is needed to understand the practical importance of variations in efficacy that occur as a function of age, task, measure, and sample. It is not clear, for instance, if declines in self-efficacy occur during middle age or only later in life. Sample differences may affect outcome. Also, it is not clear if stereotypes about aging lead to reduced efficacy before changes in skills occur or if changes in skills precede the development of negative self-perceptions. Longitudinal work is needed to explore the latter issue.

Implications for Intervention Programs

Pragmatically, these findings with respect to generality have implications for intervention. If the results had shown lower efficacy for older adults on all measures, it would suggest the value of an intervention focusing solely on efficacy. However, the results did not show this pattern. Instead, older adults endorsed fewer task levels, and fewer difficult task levels, with "yes." This suggests that interventions need to address the development of skills and greater mastery of more difficult tasks.

Self-efficacy theory and related intervention research outline an approach that may be quite useful (Bandura, 1977, 1986). Emphasis is placed on successful performance as a way of boosting efficacy. Beginning with less-difficult levels of a task, individuals are taught how to perform the task, with modeling and/or strategy training. Once success is achieved at the less-difficult task level, the person is presented with a more-difficult task. When that is mastered, higher levels of difficulty are presented (Bandura et al., 1982). This mastery-oriented approach to intervention permits the person to build confidence through successes and to face, eventually, more difficult challenges. This process has been used with some success with phobics (Bandura et al., 1982), children with math problems (see Schunk, 1989), and college students having low memory self-efficacy (Bellott, 1991). A mastery-oriented intervention program can work with older adults as well (see West et al., 1992). By starting with less-difficult forms of a memory task, efficacy and skills can both be improved. An even stronger intervention program would combine mastery-oriented training with discussion of memory beliefs (to reduce negative self-perceptions and encourage positive self-perceptions) so that memory beliefs will change as skill levels change (see

Bellott, 1991; West et al., 1992). Also, it may be beneficial to begin intervention programs before the older years, as a preventive measure.

Theoretical Implications

One important theoretical question in the self-efficacy framework is the relative influence of performance accomplishments, as opposed to societal beliefs, on age changes in efficacy. Although both factors probably work together to reduce self-efficacy and although both are expected, theoretically, to have some influence, one may have more influence than another. Bandura (1977) has suggested that performance accomplishments, social persuasion, arousal, and vicarious experience are the primary determinants of self-efficacy, with performance accomplishment having the strongest overall influence on self-perceptions. Our analyses did not address this issue directly, but we can speculate about the relative influence of these four factors. If changes in efficacy across the adult life span are based largely on stereotyping, or beliefs about the inevitability of age decline in memory, lower memory self-efficacy for older adults ought to generalize across a wide range of tasks. If changes in efficacy with age are based largely on performance or observations of specific memory failures on specific tasks (one's own failures and the failures of peers), there ought to be considerable variation in efficacy evaluations as a function of task and age-by-task variation. In these data, task-related variation in memory self-efficacy was present, but it did not interact with aging, as one might expect it to do if performance on each task is considered independently.

It is possible, then, that the similarity of efficacy responses across tasks for the two age groups might be a reflection of more global processes at work. One such potential global process is stereotyping about aging. Older adults who accept the negative stereotypes may have reduced personal confidence in their abilities regardless of their own personal experience with memory successes or failures (see Camp & Pignatiello, 1988). Or they may observe the failures of their older peers and make an assumption about themselves—"That's me in a few years." If social stereotypes about memory aging affect many people, they would be expected to affect self-perceptions of memory skills as well as one's potential for new learning. The influence of stereotypes would be general, rather than task-specific, which could partially account for the lack of task-by-age interactions in efficacy.

Another potential global process that would affect all types of tasks would be a decline in the functioning/efficiency of a memory process that has an impact on a wide range of memory tasks. One example of such a process is working memory. If working memory deficits are the primary factor accounting for age declines in memory, as some investigators have posited (Salthouse, 1991) and if self-evaluations reflect actual performance change, then the lack of age-by-task interactions could be related to the influence of this process deficit on a wide range of tasks. As we indicated earlier, longitudinal research is needed to establish the relative influence of stereotyping and actual performance decline on older adults' efficacy evaluations over time, to see if actual performance decline precedes or follows changes in attitudes toward one's abilities.

Conclusions

The study of memory self-evaluation and aging has a checkered history, moving from an initial fascination in self-report questionnaires and metamemory measures as proxy measures for memory to a loss of faith in these instruments because (1) metamemory measures of task and strategy knowledge seldom show age changes (e.g., Perlmutter, 1978) and (2) self-report measures were inconsistent predictors of actual performance (e.g., Sunderland, Watts, Baddeley & Harris, 1986). This period of doubt was followed by a recent resurgence in interest, based on the notion that memory self-evaluation, and memory self-efficacy in particular, are intriguing in their own right and worthy of systematic study. This research has explored one of the many issues that have not been examined in this area, namely, the generality of age declines in memory self-efficacy. Our examination with two memory self-efficacy questionnaires suggests that the observed patterns of aging generalize across task domains and specific task types, but not across measures. Further investigation is needed to confirm these findings and to understand more about how memory self-efficacy can affect an older person's potential for lifelong learning.

NOTES

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1. These particular measures were selected because they represent typical measures used in self-efficacy research or because they represent varying types of self-report information to be gleaned from the MSEQ, that is, number of tasks that can be accomplished and confidence on all tasks or a particular subset of tasks. Preliminary examination of other potential measures revealed that the alternative measures were highly correlated with at least one of these four measures. For instance, it is possible to calculate a measure by multiplying one's confidence by the difficulty level of the item. In fact, this measure, and others, were calculated; but they are not included here because the alternative measures correlated over .90 with one or more of the other measures used here and would therefore contribute little to the analysis.

Reliability was calculated across the ten task scales and was acceptable for Sample 1: SEL alpha = .93, SEST alpha = .94, CONF1 alpha = .85, and CONF-YES alpha = .92.

Reliability was acceptable across the ten task scales for Sample 2: SEL alpha = .90, SEST alpha = .89, CONF1 alpha = .88, and CONF-YES alpha = .90.

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