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ORIGINAL INVESTIGATION

Prospective memory tasks related to goals and concerns are rated as more important by both young and older adults

Suzanna L. Penningroth · Walter D. Scott

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Abstract There has been little research on variables that affect importance ratings for real prospective memory tasks (e.g., remembering to take medications). Our primary purpose was to test a claim in the motivational-cognitive model of prospective memory, namely that prospective memory tasks highly related to a person's goals and concerns will be rated as more important. We also tested whether this relationship held in both young and older adults. A secondary purpose was to investigate age-related differences in the perceived importance of prospective memory tasks. Older adults and two younger adult groups completed a questionnaire that assessed current prospective memory tasks, their importance, and whether the tasks were related to participants' goals and concerns. As predicted, participants provided higher importance ratings for prospective memory tasks that were highly relevant to their personal goals or concerns, and this was true for both young and older adults. Task importance ratings did not differ for older adults and young college students; however, young nonstudents rated their prospective memory tasks as less important than the other two groups. In all three groups, females gave higher prospective memory task importance ratings than males. In conclusion, our findings suggest that the importance of a prospective memory task is partly determined by its goal-relatedness. This newly demonstrated link suggests important avenues for future research, including research on the mechanisms through which goals improve prospective memory performance.

Keywords Prospective memory · Motivation · Goals · Young adults · Older adults · Gender

Introduction

Prospective memory tasks are tasks to be performed in the future. Examples of naturally occurring prospective memory tasks (intentions) are remembering to take a medication, mail a birthday card, or turn off the stove after cooking. Prospective memory tasks are thus distinguished from retrospective memory tasks, which involve remembering past episodes or past information.

Successfully remembering to perform prospective memory tasks is important for independent living, yet, prospective memory errors are common, constituting about half of all instances of everyday forgetting (according to independent raters' coding of diaries of forgetting instances; Crovitz and Daniel 1984). In addition, older adults report more everyday memory failures (including both retrospective and prospective memory failures) and more concern over these failures than young adults (Cavanaugh et al. 1983). Not surprisingly, much of the research done on prospective memory to date has focused on identifying variables that improve remembering, especially variables that are effective for both young and older adults (e.g., Ihle et al. 2012).

One variable that has been repeatedly shown to enhance prospective memory performance is task importance. This link is well established. Specifically, higher task importance is associated with better performance in both young adult samples (e.g., Freeman and Ellis 2003; Kliegel et al. 2004; Kvavilashvili 1987; Szarras and Niedźwieńska 2011)

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S. L. Penningroth (✉) · W. D. Scott
Department of Psychology, Department 3415,
University of Wyoming, 1000 E. University Avenue,
Laramie, WY 82071, USA
e-mail: spenning@uwyo.edu

and older adult samples (e.g., Freeman and Ellis 2003; Ihle et al. 2012). There is even some evidence that task importance can benefit older adults more than young adults (e.g., Altgassen et al. 2010). However, few studies have investigated the variables that cause higher importance ratings for real prospective memory tasks (but see Penningroth et al. 2011). In the current study, we examined two hypothesized influences on the perceived importance of prospective memory tasks.

Are prospective memory tasks that are related to a person's goals and concerns perceived as more important?

Our primary aim was to test a key assumption of the Motivational-Cognitive Prospective Memory model (Penningroth and Scott 2007), which is summarized in Fig. 1. Central to the model is the notion that prospective memory performance is influenced by goal representations. Specifically, we argue that some prospective memories are associatively linked to higher goal representations and benefit from these goal connections by being more "motivated." It should be noted that, for our purposes, the category of "goals" includes not only goals that a person seeks to attain, but also the related construct of concerns, or mental representations of future states that a person is afraid of or worried about (Nurmi 1992). A major, although as yet untested, prediction of the model is that goal-related prospective memory tasks will be viewed as more important. For example, a 70-year old man who has high cholesterol might have the goal of reducing his cholesterol level. We would predict that prospective memory tasks related to this current goal, such as intentions related to diet and exercise (e.g., *sign up to play tennis*), would be seen as more important than intentions not related to a current goal. More specifically, prospective memory tasks related to *active* goals (i.e., ones more accessible in memory) should be perceived to be more important than other tasks. This predicted correlation is represented in Fig. 1 as the component (i.e., the box) at the top of the diagram depicting the larger model. It is important to test this correlation because, as seen in the rest of the model, greater task importance impacts all phases of the prospective memory task, with benefits including increased use of memory strategies, increased accessibility of prospective memory intentions, and increased effortful processing to aid retrieval. For a detailed description of other parts of this theoretical model, see Penningroth and Scott (2007).

We do not know of any past studies that have tested whether prospective memory tasks related to personal goals are judged to be more important. However, this prediction is consistent with contemporary goal theories in social psychology. First, there is abundant evidence that

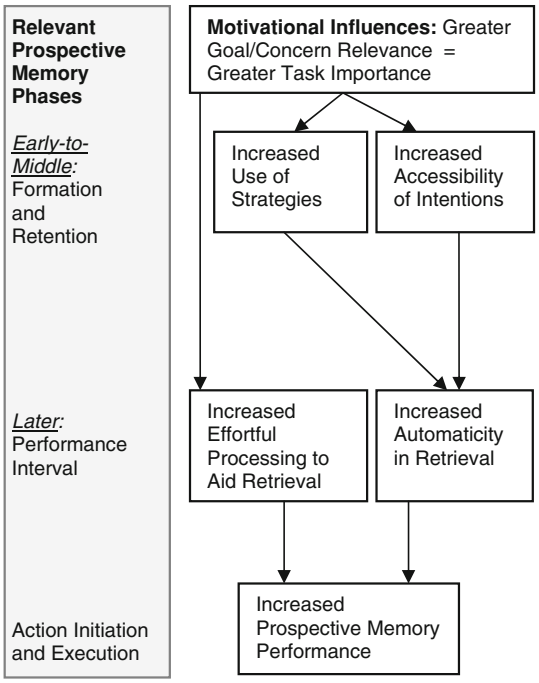

Fig. 1 The motivational-cognitive prospective memory model (Penningroth and Scott 2007)

goals are motivating. For example, goals provide a boost in effort and performance for actions tied to goal success (e.g., Bandura and Cervone 1983; Bargh et al. 1996; Sheeran et al. 2005b). Second, goals are linked to prospective memory tasks that promote their fulfillment. That is, prominent goal models (e.g., Austin and Vancouver 1996; Kruglanski 1996) view goals as embedded in a hierarchically organized associative network with life goals (e.g., *learn as much as possible*) at the highest end (Roberts et al. 2004), midlevel goals (e.g., *get a Ph.D.*) in the middle (Emmons 1989; Little 1983; Markus and Nurius 1986), and intentions or prospective memory tasks (e.g., *remember to work for two hours tomorrow on my dissertation*) at the lowest end (e.g., Sheeran et al. 2005b; Penningroth and Scott 2007). Supporting this view, there is evidence that goals produce top-down activation that boosts the accessibility and performance of related activities and intentions (Fishbach et al. 2004; Sheeran et al. 2005b). However, most of the studies done on prospective memory have not addressed links to higher goals, but instead have employed arbitrary prospective memory tasks assigned by the experimenter (see Gollwitzer and Cohen 2008). Therefore, in the current study, we addressed this limitation in the research by examining the link between goals and supporting prospective memory tasks, and specifically testing whether prospective memory importance reflects goal-relevance. More specifically, this main prediction was tested with two measures of two motivational constructs in an effort to demonstrate a replication of the effect in one

study. That is, we tested for the predicted positive association between perceived task importance and personal *goal*-relevance, and also between perceived task importance and personal *concern*-relevance.

Predictions for young versus older adults

We could not find any past research that would lead us to predict a different pattern of results for young versus older adults. Given that goals can influence a person's intentions through automatic processes (e.g., Aarts and Dijksterhuis 2000; Sheeran et al. 2005a), which show little to no decline with aging (e.g., Rogers 2000), a reasonable prediction would be that these effects should be similar for the two age groups. Therefore, our tentative prediction was that both young and older adults would rate their goal-related prospective memory tasks (and concern-related prospective memory tasks) as more important than other tasks.

Do older adults perceive prospective memory tasks as more important than young adults do?

A second, minor aim of our study was to examine the oft-stated claim that older adults are more motivated to perform prospective memory tasks than younger adults, that is, that age is positively correlated with perceived task importance (e.g., Patton and Meit 1993, Phillip et al. 2008; Rendell and Craik 2000). This higher motivation in older adults might be expected for several reasons. For example, compared to young adults, older adults score higher on levels of conscientiousness (e.g., Soto et al. 2011) and report more goals focused on generativity (e.g., *Do more work on quilts for the needy*; Penningroth and Scott, 2012). Studies using experimenter-assigned naturalistic tasks (e.g., mailing postcards or making a phone call) have found that older adults rate the task as more important than younger adults do (e.g., Kvavilashvili and Fisher 2007; Patton and Meit 1993). In fact, motivational differences between young adults and older adults have been posited as a key factor in explaining the "age prospective memory paradox" (e.g., Phillip et al. 2008). This paradox refers to the finding of prospective memory performance advantages for young adults on lab tasks, but advantages for older adults on naturalistic tasks (for a meta-analysis, see Henry et al. 2004). That is, for older adults especially, successful performance might depend on how important they perceive the prospective memory task to be (e.g., Altgassen et al. 2010; Kvavilashvili and Fisher 2007).

However, there have been few studies comparing younger and older adults on importance ratings for real prospective memory tasks (i.e., not experimenter-assigned tasks). Freeman and Ellis (2003) found no difference between young and older adults in rated importance of real prospective memory tasks. However, their young adult sample was composed entirely of college students. Similarly, Ihle et al. (2012) also found no age-related difference in importance ratings for real prospective memory tasks, although again their young adult sample consisted of "mostly" undergraduate students. Thus, research has shown two null results for age effects on importance ratings for real-life prospective memory tasks despite prior demonstrations of the effect for experimenter-assigned tasks (e.g., Kvavilashvili and Fisher 2007; Patton and Meit 1993). Therefore, additional research on age-related differences on real-life prospective memory tasks is warranted.

In particular, it might be informative to also assess young *nonstudents* to determine if they differ from either young college students or older adults on real prospective memory task importance. We are not aware of any studies that have compared the two young adult groups on this variable, and, therefore, we did not have a strong hypothesis about whether young nonstudents would differ from the other two adult groups. However, there were several reasons to support the tentative prediction that nonstudents would show lower ratings on this motivational variable than college students. First, past research has shown that people who do not attend college or do not plan to attend college score lower on other motivational variables (e.g., motivational beliefs such as resilience, self-confidence, and expectations for oneself) compared to people who attend college or plan to attend (e.g., Carpenter and Fleishman 1987; Eccles et al. 2004; Wood et al. 2011). Second, unpublished data from several studies in one of our labs revealed that young adult college students assign surprisingly high importance ratings for their real-life prospective memory tasks. For example, even for exhaustive listings of all tasks they could retrieve in 4 min (17 tasks on average), college students reported mean importance ratings of around 7 on a 10-point scale where ten indicated *very important*. Therefore, in the current study, the nonstudent group would need very high estimates of task importance to exceed those expected from the college group. In contrast, we would predict no difference in importance ratings between young college students and older adults because that outcome would replicate past findings (Freeman and Ellis 2003; Ihle et al. 2012).

Gender differences

Although a gender difference in prospective memory importance ratings has not been reported in the past, females might be expected to rate their tasks as more important for several reasons. First, research has revealed a female advantage on several motivational variables including higher scores on conscientiousness (Soto et al. 2011), greater certainty about career aspirations (Gutman and Schoon 2012), and a motivational boost to memory performance for

a list when it has a gender-matched label (e.g., a "grocery list" label; Colley et al. 2002). Second, females have shown advantages on other aspects of prospective memory that are correlated with higher importance ratings, including more successful performance rates (Ceci and Bronfenbrenner 1985; Huppert et al. 2000; Maylor and Logie 2010) and greater use of memory strategies (Penningroth and Scott unpublished manuscript; Soler and Ruiz 1996). Therefore, our tentative prediction for this hypothesis was that females would provide higher importance ratings for their real-life prospective memory tasks than males.

Present study

To examine possible goal-related influences on the perceived importance of prospective memory tasks, we administered a questionnaire to older adults and to two groups of younger adults: students and nonstudents. The questionnaire assessed current prospective memory tasks and their importance, personal goals and concerns, and whether their current prospective memory tasks were related to personal goals and concerns.

Method

Participants

The sample comprised 110 healthy adults. Table 1 displays sample characteristics, including basic demographic information for the two young adult samples, the combined young adult samples, and the older adult sample.

The young group consisted of two subgroups (see Table 1). First, the *young college* sample was made up of undergraduate students who participated as partial fulfillment of course requirements. They completed the questionnaire in college classrooms, in groups ranging in size from 2 to 20. Second, the *young nonstudent* sample was recruited from the local community through a variety of methods, including newspaper ads, flyers, and referrals. They were paid $10 for their participation. The only inclusion requirement (besides age) was that they were not currently enrolled college students. However, this group did contain seven individuals enrolled as students in an automotive training institute. The other 17 nonstudents reported a wide variety of occupations, including two home-makers, two custodians, two sales associates, one biologist, and one train conductor. The nonstudent participants completed the questionnaire either in a meeting room at the public library (more commonly) or in a college classroom (less commonly), in groups ranging in size from 2 to 15. The young nonstudents were slightly older than the college students (see Table 1), $t(67) = 4.34$, $p < .001$, $\eta_p^2 = .22$, and more of the nonstudents (25.0 %) than college students (2.2 %) were married,[1] $\chi^2(1) = 8.91$, $p = .003$ ($N = 69$).

Table 1 Demographic variables

	Young college subgroup	Young nonstudent subgroup	Combined young subgroups	Older adult subgroup
N	45	24	69	41
% Female	86.7	25.0	65.2	63.4
Age range	18–25	18–29	18–29	65–87
Age: Mean	18.82	21.29	19.68	75.39
Age: SD	1.40	3.32	2.53	6.01
Education: mean	13.56	14.42	13.86	14.26
Education: SD	1.08	2.30	1.65	2.73
Health: mean	4.07	4.17	4.10	3.99
Health: SD	0.62	0.48	0.57	0.71

Age was measured in years. *Education* was measured as reported number of years of education. *Health* was measured as a rating of perceived current health (1 = very poor; 5 = very good)

SD standard deviation

The older adults were all recruited during lunch at a community senior center that provides services for senior citizens, including social and recreational events, meals, public education, and home health services. They completed the questionnaire at lunch tables (during or after lunch), in small groups or alone, and received $5 in compensation. The older group included mostly retired people (78.0 %). About half were currently married (46.3 %), and the rest were divorced or widowed. All older adults were living independently, with the majority living in their own home or apartment (94.6 %) and the remainder living with a family member.

Materials and procedure

All participants completed the questionnaire in less than 30 min.

Listing of real-life prospective memory tasks

In the first section of the questionnaire, instructions stated *This section asks you about remembering to do something. This includes appointments, tasks, and other things you want to remember to do.* Thus, no time-frame was indicated for the upcoming tasks. Participants listed five specific examples of things they wanted to remember to do.

[1] We did not consider these small demographic differences important for comparing young subgroups on the minor hypotheses because the size of the age difference was small (approximately two years on average, i.e., 19 vs. 21 years old) and we had no reason to believe that marital status would systematically increase or decrease the perceived importance of everyday prospective memory tasks.

They were instructed to not list habits or activities that they would do automatically like sleeping or brushing their teeth (Freeman and Ellis 2003).

Importance ratings for prospective memory tasks

In the second section, respondents circled an importance rating (i.e., low, low–medium, medium, medium–high, or high) for each of the five prospective memory tasks they had listed. These ratings were converted to numbers (1–5) for analyses.

Listing of current goals and concerns

In the third section, instructions directed respondents to list *up to four current goals (that is, your goals, hopes, plans, or dreams).* Following this, instructions directed respondents to list up to four current concerns, that is, *things you are currently afraid of or worried about.*

Indicating whether prospective memory tasks were related to goal or concern categories

In order to evaluate whether prospective memory tasks were goal-related, we pursued a broad rather than specific strategy designed to be sensitive to goal-relatedness. Therefore, in the fourth section, participants indicated whether each of the five prospective memory tasks listed in the first section was related to any of their personal goals or concerns (not just the ones they had listed). Specifically, the questionnaire asked about 15 goal/concern categories: *your profession/occupation*, *your property/possessions*, *your health*, *the health of others*, *your children's lives*, *marriage/relatives*, *your education*, *travel*, *leisure activities*, *retirement*, *terrorism/war*, *world issues*, *friendship*, *self/personal growth*, and *other*. Eight categories were used by Nurmi (1992) (i.e., *profession/occupation, health, the health of others, children's lives, education, travel, leisure activities,* and *retirement*) and the rest were adapted slightly from categories used by Nurmi (1992). More specifically, participants indicated the goal/concern relevance of their prospective memory tasks by completing a table which had 5 rows and 15 columns. That is, they first recopied the five prospective memory tasks they had listed in the first section into the five rows. The 15 goal/concern category labels (e.g., *your profession/occupation*) appeared as column headings. Then, participants were instructed:

> Read the first example you copied into the table below. Judge whether it's directly related to your personal goals or concerns in each category …. That is, first, consider whether the example you wrote is related to a goal or a concern you have for your profession or occupation. If it is related to that type of goal, circle "goal" in that column. If it is related to that type of concern, circle "concern" in that column. Then, do the same thing for the next goal/concern category, property/possessions. Continue across the row, doing the same for all categories…Therefore, for each example you listed, you will circle between 0 and 15 related goal categories, and between 0 and 15 related concern categories. You may circle both "goal" and "concern" for the same category.

Assessing demographic variables

The fifth section of the questionnaire assessed demographic variables (see Table 1).

Coding

Classifying listed goals and concerns into content categories

Two independent raters (blind to age-group status) coded the goals and concerns participants had listed. Each listed goal or concern was classified into one of 15 content categories (see above). Final coding agreement was high for the two raters, with 89 % agreement for goals and 91 % agreement for concerns, and discrepancies were resolved through discussion.

Determining if prospective memory tasks were highly goal-related and highly concern-related

We describe the procedure for determining whether a task was highly goal-related, but an analogous process was used to determine whether a task was highly concern-related. We used a fairly conservative method for defining prospective memory tasks as highly goal-related. That is, the tasks had to meet two criteria: (1) the participant indicated that the prospective memory task was related to a specific goal category (from the 14 original categories, omitting the *other* category); and, (2) that goal category had to be highly accessible for the participant. Goal categories were defined as highly accessible if the participant had listed a personal goal in that category. For example, the prospective memory task *go to Chemistry study group* would be classified as highly goal-related if (1) the participant had specified that that task was related to his or her goals for education, and (2) the participant had listed at least one current goal that was categorized as an education goal by the raters. Therefore, the variables highly goal-related and highly concern-related described prospective memory tasks and were within-subject variables.

Results

Preliminary analyses

We ran preliminary analyses to test whether the younger adult group (collapsing young students and nonstudents) and older group differed on three demographic variables: education level, perceived health, and gender composition.[2] Table 1 shows the descriptive statistics. When the older adults were compared to the combined young adult groups, no differences were found. That is, there were no differences on years of education, $t(106) = 0.95$, $p = .34$, $\eta_p^2 = .01$; perceived overall health, $t(104) = 0.90$, $p = .37$, $\eta_p^2 = .01$; or gender composition $\chi^2(1) = 0.04$, $p = .848$ ($N = 110$). When the three subgroups were compared, they were equivalent on education and perceived health, but they did differ on gender composition, $\chi^2(2) = 26.05$, $p < .001$ ($N = 110$). The highest percentage of females was in the young college group, which was higher than in the older group, $\chi^2(1) = 6.29$, $p = .012$ ($N = 86$). Finally, the older group showed a higher percentage of females than the young nonstudent group, $\chi^2(1) = 8.94$, $p = .003$ ($N = 65$).

Are prospective memory tasks that are highly related to a person's goals and concerns perceived as more important?

Our primary purpose was to test whether prospective memory tasks that were highly related to one's goals or concerns would be rated as more important than other prospective memory tasks, as is predicted in the Motivational Cognitive Prospective Memory model (Penningroth and Scott 2007). We also tested whether these predictions held for both young and older adults. Data for three participants (one older adult and two college students) were dropped because they did not follow directions, leaving 107 participants. The dependent variable representing prospective memory task importance was computed as the average importance rating across the participant's listed prospective memory tasks.[3] To allow the within-subjects comparison of prospective memory tasks related or not related to goals (or concerns), we only included participants who had at least one task that was highly related to a goal (or concern) category and at least one that was not. This resulted in a sample of 65 participants (27 young college students, 17 young nonstudents, and 21 older adults) for analyses on tasks highly related to goals, and a sample of 52 participants (25 young college students, 14 young nonstudents, and 13 older adults) for analyses on prospective memory tasks highly related to concerns.

Importance ratings for prospective memory tasks highly related to goals

We conducted a mixed 2 (goal-relatedness of prospective memory task: highly goal-related vs. not) × 3 (subgroup: young college students vs. young nonstudents vs. older adults) ANOVA. Figure 2 displays the results. As predicted, prospective memory tasks that were highly related to personal goals were rated as more important ($M = 4.27$, $SD = .75$) than prospective memory tasks that were not highly related to personal goals ($M = 3.74$, $SD = .80$), $F(1, 62) = 11.83$, $p = .001$, $\eta_p^2 = .16$.[4]

The interaction between goal-relatedness of the prospective memory task and subgroup was not significant (see Fig. 2), $F(2, 62) = 1.38$, $p = .261$, $\eta_p^2 = .04$, indicating that this pattern of higher importance ratings for goal-relevant prospective memory tasks was repeated in all three adult subgroups, that is, in both young adult subgroups and the older adult subgroup. However, it should be noted that because of the small sample sizes for the three adult subgroups, the statistical power to detect an interaction effect was low (.26). However, the conclusion that different age groups show the same increase in importance ratings for goal-relevant prospective memory tasks is further supported by results obtained after combining the two young adult subgroups. That is, a 2 (goal-relatedness of prospective memory task: highly goal-related vs. not) × 2 (age-group: young adults vs. older adults) ANOVA also showed no significant interaction effect, $F(1, 63) = 0.53$, $p = .468$, $\eta_p^2 = .01$, with almost identical increases in importance ratings for goal-relevant prospective memory tasks in young adults (not goal-related $M = 3.75$, $SD = .82$; goal-related $M = 4.21$, $SD = .77$) and older adults (not goal-related $M = 3.71$, $SD = .78$; goal-related $M = 4.21$, $SD = .77$).[5]

Importance ratings for prospective memory tasks highly related to concerns

We conducted a mixed 2 (concern-relatedness of prospective memory task: highly concern-related vs. not) × 3 (subgroup: young college students vs. young nonstudents

[2] Four older adults were missing data for these demographic questions (two had missing data for education level and overall health level; two were missing only overall health level).

[3] Almost all participants (96.3 %) listed five tasks, as requested. Four participants, all older adults, listed less than five (i.e., one listed three tasks, two listed two tasks, and one listed one task).

[4] We also successfully replicated the predicted main effect using a nonparametric test that only assumed ordinal scaling for importance ratings (Wilcoxen signed rank test, $p = .001$). We thank Hans-Werner Wahl and an anonymous reviewer for this suggestion.

[5] We also tested whether gender interacted with goal-relatedness, but the interaction was not significant ($F < 1$).

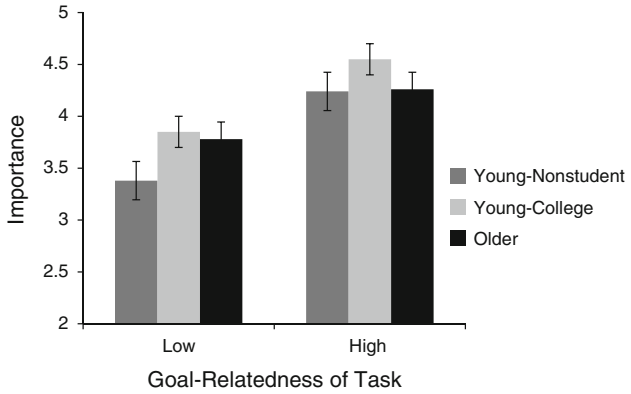

Fig. 2 Mean importance ratings for prospective memory tasks by goal-relatedness of task and subgroup. *Error bars* represent one SE

Fig. 3 Mean importance ratings for prospective memory tasks by concern-relatedness of task and subgroup. *Error bars* represent one SE

vs. older adults) ANOVA (see Fig. 3). As predicted, prospective memory tasks that were highly related to personal concerns were rated as more important ($M = 4.40$, $SD = .66$) than prospective memory tasks that were not highly related ($M = 3.71$, $SD = .80$), $F(1, 50) = 15.62$, $p < .001$, $\eta_p^2 = .24$.[6]

As was the case for the goal-relatedness variable, the concern-relatedness variable showed no interaction with subgroup, $F(2, 49) = 0.49$, $p = .614$, $\eta_p^2 = .02$. However, in this case, the absence of an interaction effect appeared to reflect a true lack of subgroup differences, with no possibility that it was instead due to insufficient power due to small sample sizes. As can be seen in Fig. 3, all three subgroups showed higher importance ratings for prospective memory tasks that were highly concern-related. Also, the results obtained after combining the two young adult samples showed the same absence of an interaction effect. That is, a 2 (concern-relatedness of prospective memory task: highly concern-related vs. not) × 2 (age-group: young adults vs. older adults) ANOVA also showed no significant interaction effect, $F(1, 50) = 0.79$, $p = .380$, $\eta_p^2 = .02$, with increased importance ratings for concern-relevant prospective memory tasks in both young adults (not concern-related $M = 3.68$, $SD = .79$; concern-related $M = 4.44$, $SD = .62$) and older adults (not concern-related $M = 3.78$, $SD = .87$; concern-related $M = 4.26$, $SD = .78$).[7]

[6] We also successfully replicated this predicted main effect using a nonparametric test that only assumed ordinal scaling for importance ratings (Wilcoxen signed rank test, $p < .001$). We thank Hans-Werner Wahl and an anonymous reviewer for this suggestion.

[7] We also tested whether gender interacted with concern-relatedness, but the interaction was not significant ($F < 1$).

Do older adults perceive real-life prospective memory tasks as more important than young adults do?

Our secondary purpose was to investigate whether age was related to perceived importance of prospective memory tasks. Prospective memory task importance was again computed as the average importance rating across the participant's listed prospective memory tasks. A between-groups ANOVA comparing the three subgroups showed a main effect of subgroup,[8] $F(2, 104) = 3.72$, $p = .028$, $\eta_p^2 = .07$. These results are displayed in Fig. 4 and Table 2. As predicted, the prospective memory importance ratings were equivalent for older adults and young college students, $t(81) = 0.80$, $p = .427$, $\eta_p^2 = .01$. In contrast, young nonstudents rated their prospective memory tasks as less important than both older adults, $t(62) = 2.69$, $p = .009$, $\eta_p^2 = .11$, and young college students, $t(65) = 2.08$, $p = .042$, $\eta_p^2 = .06$.

Gender differences in perceived importance

As can be seen in Table 2, prospective memory task importance ratings were higher for females than males, $t(105) = 2.09$, $p = .040$, $\eta_p^2 = .04$. Because importance ratings differed by gender and the subgroups differed in their gender proportions, we needed to rule out the possibility that the differences found between the three subgroups were due to a gender confound. We rejected this alternative explanation for two reasons. First, in a 2 (gender) × 3 (subgroup) ANOVA, the interaction between gender and subgroup was not significant, $F(2, 101) = 0.51$, $p = .603$, $\eta_p^2 = .01$. Second, the pattern of differences

[8] We also successfully replicated this predicted main effect using a nonparametric test that only assumed ordinal scaling for importance ratings (Kruskal–Wallis test, $p = .031$). We thank Hans-Werner Wahl and an anonymous reviewer for this suggestion.

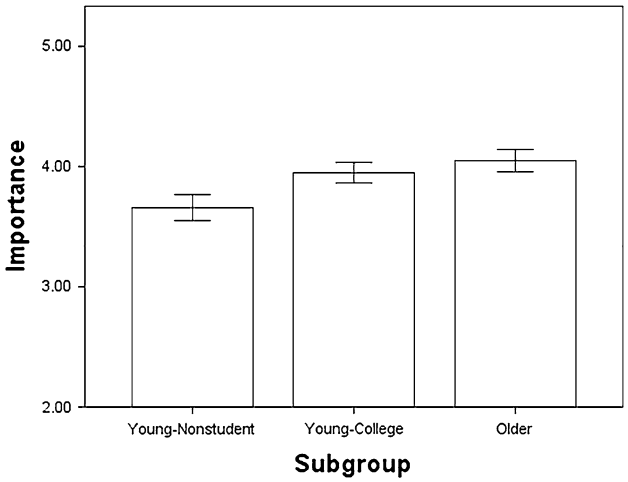

Fig. 4 Mean importance ratings for prospective memory tasks by subgroup. *Error bars* represent one SE

between the three age-related subgroups was consistent across both gender groups. That is, for both males and females, older adults and young college students showed numerically higher prospective memory task importance ratings than young nonstudents (see Table 2). Therefore, both subgroup status and gender were related to prospective memory importance ratings, but these effects were independent.

Discussion

Real prospective memory tasks vary in importance. For example, the intention *to check that my neighbor is doing okay* might be rated as more important than the intention to *mow the lawn.* Our primary purpose was to investigate a major prediction of the Motivational Cognitive Prospective Memory model (Penningroth and Scott 2007), namely that prospective memory tasks with links to accessible personal goals and concerns would be perceived as more important. A secondary purpose was to test if younger and older adults differ on overall importance ratings for their everyday tasks, and to explore possible gender differences in importance ratings.

The relevance of goals and concerns for prospective memory task importance ratings

Our primary purpose was to test whether prospective memory tasks that are highly relevant to a current goal or concern are perceived as more important than other prospective memory tasks. This was the first study to examine this issue. Results showed that, as predicted, people rated prospective memory tasks that were highly related to goals or concerns as more important than prospective memory tasks that were not. For example, one participant had the task of *keeping my doctor's appointment*, which was highly relevant to her health goals. She rated this task as more important than *raking the leaves,* which was not highly related to any of her goals.

Table 2 Importance ratings for prospective memory tasks, by subgroup and gender

	Gender					
	Female		Male		Total	
	M	(SD)	M	(SD)	M	(SD)
Subgroup						
Young college	3.96	(0.55)	3.84	(0.50)	3.95	(0.56)
Young nonstudent	3.63	(0.61)	3.67	(0.51)	3.66	(0.53)
Older	4.15	(0.61)	3.86	(0.68)	4.05	(0.58)
Total	4.00	(0.59)	3.76	(0.53)	3.92	(0.58)

The dependent variable was the mean importance rating across the prospective memory tasks the participant listed. Importance ratings ranged from 1 (low) to 5 (high)

This result provides support for an important assumption in the Motivational Cognitive Prospective Memory model (see Fig. 1; Penningroth and Scott 2007). Specifically, this model proposes that some prospective memory tasks are embedded in hierarchical goal networks, possessing associative links to higher order goals and concerns. As a result, goal/concern-related prospective memories will be viewed as more important (see Fig. 1). Higher importance, in turn, promotes better performance rates (e.g., Freeman and Ellis 2003; Ihle et al. 2012; Kliegel et al. 2004; Kvavilashvili 1987).

We did not anticipate age-related differences in the relationships between task importance and relevance to goals or concerns, and no differences were found. Therefore, we conclude that the motivational benefit seen for prospective memory tasks related to a person's personal goals and concerns applies to both young and older adults. Consequently, we would speculate that other aspects of the Motivational Cognitive Prospective Memory model (Penningroth and Scott 2007) should apply to young and older adults alike. Specifically, for both age groups, greater goal-relevance for prospective memory tasks is predicted to lead to (1) increased effortful processing to aid retrieval, (2) increased use of strategies, (3) increased accessibility of prospective memory intentions, (4) increased automaticity in retrieval (via #2 and #3), and (5) improved memory performance. Future studies that test interactions between age and these other hypothesized motivational/cognitive mechanisms would contribute to a more complete and ecologically valid explanation of prospective memory. Thus, we hope that our initial demonstrations spur further research along these lines.

These results also suggest several practical applications, including interventions to improve prospective memory performance. Because goal-related tasks and concern-related tasks are more important, more motivating, individuals might try to link their prospective memory tasks to their goals or concerns. For example, a woman who has diabetes might form the intention to buy more low-carbohydrate foods during the next shopping trip. Our results suggest that she might be more motivated to do so (and consequently more successful) if she links this prospective memory task to her higher concerns about poor health and the possibility of having to live in a nursing home.

Age-group differences in prospective memory task importance ratings

Our secondary purpose was to examine basic age-group differences in motivation. Would young adults and older adults assign different importance ratings to their real prospective memory tasks? Results showed that the answer depends on the composition of the young adult group. That is, as expected, we found equivalent importance ratings for older adults and young college students. Both rated their prospective memory tasks as fairly high in importance, with average ratings of approximately 4 (medium–high importance). Examples of prospective memory tasks reported by young adults in college included (*inform my professors I'll be gone next week for soccer* and *eye doctor's appointment on Tuesday*). Examples of prospective memory tasks reported by older adults included (*call my grandkids* and *take my medications at the proper time*). This finding of equivalent importance ratings for older adults and a younger group composed of mainly or only college students replicates the results reported by Freeman and Ellis (2003) and Ihle et al. (2012). However, we also assessed young adults who were not college students, providing the first published evidence on motivation for real prospective memory tasks in this population. We found that these young adults rated their prospective memory tasks as less important than older adults and less important than young college students, though it should be noted that all three subgroups gave fairly high importance ratings (ranging from approximately 3.7 to 4.00 on a 5-point scale; see Table 2). Examples of tasks reported by the young nonstudents were *pick up my son's birthday cake* and *see the movie 'Rent'*.

Although our data do not allow us to answer the question of why young adults not in college view their everyday prospective memory tasks as lower in importance than the other two subgroups, we offer several speculative explanations. Our Motivational Cognitive Prospective Memory model (Penningroth and Scott 2007) would predict that these differences in perceived importance are due to the young nonstudent group (1) possessing fewer prospective memory tasks linked to goals, or (2) having the same number of links to goals, but with weaker links or weaker goal strength. Future studies might address these possible explanations. Further, we note that the three groups did not differ in exhibiting the main predicted effect. That is, they viewed goal/concern-related prospective memory tasks as more important than other prospective memory tasks.

The pattern of association between task importance ratings and goal/concern-relatedness has implications for future research on prospective memory. For instance, researchers would be advised to consider the nature of the samples when testing age-group differences on motivation and performance. When assessing real prospective memory tasks at least, any performance advantage observed for older adults over young college students would not appear to be attributable to greater motivation in the older adults. In contrast, a performance advantage observed for older adults over young nonstudents might be explained (at least in part) by motivational differences.

The current results do not shed light on reasons for the age-prospective memory paradox (i.e., the age-related performance disadvantage seen in lab tasks but advantage seen in naturalistic tasks). That is, if we had found that older adults rated their tasks as more important than young college students (the comparison group used in most studies that have demonstrated the paradox), then the results would have been in line with a motivational explanation for the age-related improved performance on naturalistic tasks, but this was not the case. Recent research by Schnitzpahn et al. (2011) on possible mechanisms underlying the paradox has revealed that motivation can play a role, but the most important mechanism for predicting age benefits on the naturalistic task was lower absorption in ongoing daily tasks in older adults. Additional research on these and other possible mechanisms would be informative.

Gender differences in task importance ratings

By their own reports, females would seem to consider their prospective memory tasks to be more important than the tasks males have set for themselves. In addition, this pattern was observed in each of the three subgroups: older adults, young college students, and young nonstudents. It is possible that the higher ratings provided by females reflect a social desirability demand characteristic. That is, perhaps due to societal expectations (real or imagined), females might feel more obligated than males to report that their intentions are important to them. One suggestion for future research would be to attempt a replication, but with reduced demand characteristics. For example, importance ratings for a task might be embedded in a list of other

ratings to disguise the focus of investigation (e.g., see Penningroth and Scott unpublished manuscript). However, other findings on gender differences would suggest that the female advantage in perceived task importance is real. For example, females have been shown to score higher than males on conscientiousness (Soto et al. 2011), on the amount of memory strategies used for prospective memory tasks (Penningroth and Scott unpublished manuscript), and on success in remembering to perform prospective memory tasks (e.g., Maylor and Logie 2010).

Limitations

A major limitation of our study is the correlational nature of our finding that prospective memory tasks perceived as related to goals/concerns are viewed as more important. In our Motivational Cognitive Prospective Memory model (Penningroth and Scott 2007), we argue that it is the goal/concern-relatedness of a prospective memory task that *causes* that intention to be perceived as more important. Of course, further experimental work is necessary to provide stronger support for the causal role of goal/concern-relatedness. Specifically, future experimental designs could manipulate goal/concern accessibility to determine if associated prospective memory tasks are then viewed as more important. However, one advantage of the descriptive nature of our study is its ecological validity. That is, we found that real prospective memories associated with real goals or concerns were viewed as more important.

A second limitation in the current study was the use of a cross-sectional design to compare age groups. While this would not affect our conclusions or the implications for future research procedures, the possibility of cohort effects prevents us from concluding that age-related differences (or similarities) observed are the direct result of aging, and not other variables correlated with age. Another potential limitation was that the older adults sampled were living independently and constituted a fairly healthy subset of adults in that age range. Therefore, their everyday prospective memory tasks and related goals and concerns might differ from older adults who are in poor health or not living independently. However, a strength of this study was the use of two young adult samples, including a nonstudent sample, as comparison groups for the older sample.

Conclusion

In conclusion, our examination of motivational variables in real prospective memory tasks revealed several interesting relationships. Young and older adult age groups reported equivalent importance ratings for their prospective memory tasks. However, a subset of the younger group, young adults not currently in college, rated their tasks as lower in importance compared to the two other groups. Most importantly, we found evidence supporting a hypothesized link in the Motivational Cognitive Prospective Memory model (Penningroth and Scott 2007). That is, as predicted, prospective memory tasks that were highly related to either personal goals or personal concerns were rated as more important than other prospective memory tasks. We suggest that motivational variables play an important part in a person's repertoire of everyday prospective memory tasks, and this is true for both young and older adults. Therefore, to support a more ecologically valid descriptive model of prospective memory, researchers need to attend to "hot," motivational influences. In particular, we concur with recommendations that the field of prospective memory research would benefit from more studies that address the role of higher goals (e.g., Gollwitzer and Cohen 2008; Penningroth and Scott 2007).

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