

This article was downloaded by:[Cherry, Katie E.]
On: 2 May 2008
Access Details: [subscription number 791905525]
Publisher: Routledge
Informa Ltd Registered in England and Wales Registered Number: 1072954
Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Aging & Mental Health

Publication details, including instructions for authors and subscription information:
<http://www.informaworld.com/smpp/title~content=t713404778>

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Online Publication Date: 01 March 2008

To cite this Article: Jackson, Erin M., Cherry, Katie E., Smitherman, Emily A. and Hawley, Karri S. (2008) 'Knowledge of memory aging and Alzheimer's disease in college students and mental health professionals', *Aging & Mental Health*, 12:2, 258 — 266

To link to this article: DOI: 10.1080/13607860801951861

URL: <http://dx.doi.org/10.1080/13607860801951861>

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Knowledge of memory aging and Alzheimer's disease in college students and mental health professionals

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(Received 24 January 2007; final version received 11 July 2007)

In this study, college students and mental health professionals completed the Knowledge of Memory Aging Questionnaire, Alzheimer's Disease Knowledge Test and the Fraboni Scale of Ageism before and after a lecture on normal and pathological memory issues in adulthood. Results confirmed that professionals were more knowledgeable about memory aging and Alzheimer's disease (AD) and less ageist than college students. Analyses of pre- and post-lecture response accuracy yielded comparable benefits in memory aging and AD knowledge for both groups. Correlation analyses provided modest evidence for the influence of ageist attitudes on the knowledge measures. Implications for memory education programs and psychology curriculum are considered.

Keywords: normal memory aging; pathological memory aging; metamemory; ageism

Introduction

As the population continues to age, mental health professionals will increasingly come into contact with older persons. Having accurate knowledge of the physical, cognitive and psychological changes that occur with age is imperative for professionals to best serve their elderly clients. Academic preparation that includes coverage of these age changes for psychology students who aspire to work in helping professions is an equally important consideration. Aging education has been regarded as important since the first White House Conference on Aging (1961) and educators as well as government agencies have identified the need for better training for those working with the aging population (Peterson & Wendt, 1990a, 1990b; Rosen, Zlotnik, & Singer, 2002). Understanding fundamental age-related cognitive changes is especially critical for students and professionals to have appropriate expectations for elderly persons and avoid ageist stereotypes that depict a negative image of cognitive capability in late life. An important challenge for gerontological researchers is to identify areas of strengths and weaknesses in knowledge of memory aging. This information could provide the basis for educational programs for students, caregivers and professionals who work with elderly adults (Mol, de Groot, Willems, & Jolles, 2006; Turner & Pinkston, 1993).

A critical component of adult cognition concerns the distinction between normal and pathological memory aging. Normal memory aging is the result of natural maturational processes, while pathological memory aging is due to non-normative factors, such as disease or trauma to the brain (Cherry & Smith, 1998). Forgetfulness is a common experience in everyday life. For older adults, lapses of memory may be

especially worrisome, raising concern over whether forgetfulness is signaling the onset of adult dementia (Commissaris, Verhey, Ponds, Jolles, & Kok, 1994; Reese & Cherry, 2004). Fear of pathological memory aging, especially Alzheimer's disease (AD), may undermine older adults' health status (Centofanti, 1998). Memory lapses in healthy older adults, however, are quite different in comparison to the severe memory dysfunction observed in persons with progressive dementia syndromes, such as AD (see Cherry & Plauche, 1996; Grober & Buschke, 1987).

Our primary objective in this research was to examine college student's and mental health professionals' knowledge of memory aging and AD as well as the improvement of their knowledge through education. To do so, we used the Knowledge of Memory Aging Questionnaire (KMAQ: Cherry, Brigman, Hawley, & Reese 2003) and the Alzheimer's Disease Knowledge Test (ADK: Dieckmann et al., 1988). Many studies have utilized the KMAQ to assess knowledge of normal and pathological memory aging in community-dwelling persons (Mol et al., 2006), police officers (Hawley, Garrity, & Cherry, 2005), college students and older adults (Cherry et al., 2003; Cherry, West, Reese, Santa Maria, & Yassuda, 2000; Reese, Cherry, & Copeland, 2000; Reese & Cherry, 2006) and very old adults (Hawley, Cherry, Su, Chiu, & Jazwinski, 2006). Knowledge of age-related cognitive changes in other service professions where there is considerable contact with elderly adults has not been previously addressed, nor how their knowledge levels compare to those of non-professionals. In order to fill this gap, the present study includes college students and mental health professionals. The ADK has been utilized in studies with undergraduate students (Karlin & Dalley, 1998;

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Sullivan & O'Connor, 2001), nursing and medical students (Beall et al., 1992), caregivers (Hébert, Leclerc, Bravo, Girouard, & Lefrancois, 1994) and AD family members, caseworkers, health and social service professionals (Gilleard & Groom, 1994). The level of AD knowledge of mental health professionals and psychology students has received less attention by comparison. In this study, students' and mental health professionals' response accuracy on the KMAQ and ADK were considered concurrently to broaden the assessment of people's knowledge of adult cognition.

Our second objective in this study was to determine whether ageist beliefs influence one's knowledge of memory aging and AD. Ageism, defined as discrimination based on age (Butler, 1969), impacts both practice and personal behavior towards older persons. We examined ageist attitudes in students and mental health professionals utilizing the Fraboni Scale of Ageism (FSA; Fraboni et al., 1990). We were also interested in the malleability of ageist beliefs through education. Stuart-Hamilton and Mahoney (2003) found that FSA scores were negatively correlated with Palmore's (1977) Facts on Aging Questionnaire prior to a training workshop on age awareness, implying that those with greater knowledge of aging may hold less ageist attitudes. Other evidence has shown that college students' age was negatively correlated with FSA total scores, suggesting that ageist attitudes decline

with increased life experience (Kalavar, 2001). To our knowledge, no previous research has examined the influence of ageist attitudes on the KMAQ or the ADK. We included the FSA in this study to provide new evidence bearing on this issue.

To summarize, participants' responses to the KMAQ, ADK and FSA were compared before and after a two-hour lecture on normal and pathological memory aging issues in adulthood. Mental health professionals may have greater opportunities to acquire factual information about issues related to memory aging and adult dementia than students do as a result of their clinical training and experience. Therefore, we expected that the mental health professionals would be more knowledgeable than the students about normal and pathological memory aging issues. Such an outcome would further establish the content validity of the KMAQ (see Cherry et al., 2000, Exp. 1). We also expected that the groups would be empirically differentiated on the ADK test, favoring the mental health professionals. Additionally, professionals were expected to show lower levels of ageism on the FSA than the students because of their academic training and experience. A time of test effect was anticipated, where response accuracy on the KMAQ and ADK would be greater at post-test compared to the pre-test, an outcome that would confirm the

Table 1. Pre- and post-lecture mean KMAQ scores as a function of group and question type.

Group/question type/DK option	Pre-lecture		Post-lecture		Mean
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
College students					
Normal	0.69	0.14	0.75	0.16	0.72
DK normal	0.06	0.08	0.02	0.05	
Pathological	0.69	0.12	0.78	0.14	0.74
DK pathological	0.08	0.11	0.02	0.04	
Mental health professionals					
Normal	0.78	0.07	0.83	0.09	0.81
DK normal	0.04	0.06	0.01	0.03	
Pathological	0.88	0.08	0.94	0.06	0.91
DK pathological	0.02	0.06	0.01	0.02	

Note: Entries are proportion correct.

Table 2. Pre- and post-lecture mean ADK scores as a function of group.

Group/score	Pre-lecture		Post-lecture	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
College students				
Total correct	7.46	2.76	9.49	2.74
Total bias	1.41	2.26	2.46	2.31
Mental health professionals				
Total correct	13.20	3.09	15.46	2.33
Total bias	1.07	1.66	0.75	1.00

Note: Entries are number correct.

Table 3. Pre- and post-lecture mean FSA scale scores as a function of group.

Group/score	Pre-lecture		Post-lecture	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
College students				
Total	66.79	10.13	69.29	12.63
AL	24.41	5.23	24.98	6.82
D	18.90	3.16	19.81	4.07
AV	23.47	4.71	24.50	4.39
Mental health professionals				
Total	60.07	8.34	59.82	9.61
AL	21.73	3.94	21.04	4.26
D	16.73	2.77	17.18	4.33
AV	21.60	4.67	21.61	4.47

Notes: AL = antilocution, D = discrimination, AV = avoidance.

sensitivity of both measures to instruction. Of greater interest is the possible influence of ageist attitudes toward older adults as a contributing factor in one's knowledge of memory aging and AD. We expected that those endorsing ageist attitudes on the FSA would be less knowledgeable about memory aging and more likely to incorrectly answer the KMAQ questions that tap stereotypical images of diminished cognitive competence in late adulthood.

Methods

Participants

In all, 100 individuals participated in this study. There were 70 undergraduate students (53 females, 17 males) enrolled in a Psychology course at Louisiana State University. The mean age of the undergraduate participants was 21.03 years ($SD=3.37$) with a range of 18 to 41 years. The 30 mental health professionals (11 females, 19 males) were attendees at the annual meeting of the Louisiana State Psychological Association in Baton Rouge, LA. The mean age of the mental health professionals was 53.72 years ($SD=10.95$) with a range of 33 to 77 years.

Materials and procedure

Knowledge of Memory Aging Questionnaire

The KMAQ is a 28-item true/false/don't know measure of laypersons' knowledge of memory changes in adulthood for educational or research purposes. Half of the questions address knowledge of normal memory changes that occur in later life as a result of maturational processes (i.e. normal memory aging). The other half address knowledge of pathological memory changes that may be due to non-normative factors that affect memory functioning in older adults (i.e. physiological or psychopathological conditions, pharmacological agents and/or adult dementia), resulting in normal and pathological subscales. In addition, the KMAQ contains four stereotype items whose correct answer is in conflict with commonly held

ageist stereotypes. Analyses of these items permits inferences on whether stereotypical views of adult cognition may be contributing to participants' KMAQ responses (Hawley et al., 2006). Initial work on the psychometric properties of the KMAQ yields evidence of convergent and discriminant validity (Cherry et al., 2000). Subsequent work has demonstrated satisfactory internal consistency reliability (0.76), though somewhat lower than standard conventions (0.80), probably due to the diversity of topics that represent normal and pathological aging (Cherry et al., 2007).

Alzheimer's Disease Knowledge test

The ADK is a 20-item measure of knowledge of Alzheimer's disease that includes items presented as multiple choice questions with a correct response, three distractors and a 'don't know' option to discourage guessing. Past research confirms that the ADK possesses adequate internal consistency reliability, ranging from 0.71 to 0.92 (Dieckmann et al., 1988).

Fraboni Scale of Ageism

The FSA is a 29-item self-report measure based on attitudes rather than actual behaviors, where each item is rated on a 4-point scale from 1 (strongly agree) to 4 (strongly disagree). Fraboni et al. (1990) showed the FSA to have adequate overall internal consistency reliability (0.86). Numerous scales of ageism focus primarily on stereotypes, myths and misconceptions of aging. However, we chose the FSA because Fraboni et al. added an affective component to more fully capture the construct of ageism based on Allport's (1958) five level model of prejudice. That is, the FSA includes three of the five original forms of prejudice, namely, antilocution (derogatory speech and antagonism), avoidance (minimize social contact with older adults) and discrimination (active exclusion of disliked group).

Participants completed the KMAQ, ADK and FSA initially to obtain baseline-level performance. A lecture on memory aging was given by the second author that

Table 4. Correlations among the KMAQ, ADK and FSA totals and scales.

Variable	1	2	3	4	5	6	7	8	9
1. Group	–								
2. KMAQ normal	0.40***	–							
3. KMAQ pathological	0.64***	0.31***	–						
4. KMAQ stereotype	0.39***	0.57***	0.46***	–					
5. ADK total	0.68***	0.25**	0.47***	0.25**	–				
6. FSA total	–0.31**	–0.12	–0.26**	–0.25**	–0.35***	–			
7. FSA antilocution	–0.25**	–0.10	–0.28**	–0.25**	–0.28**	0.84***	–		
8. FSA discrimination	–0.31**	–0.22*	–0.23*	–0.30**	–0.40***	0.65***	0.36***	–	
9. FSA avoidance	–0.18	–0.01	–0.11	–0.05	–0.180	0.81***	0.47***	0.32***	–

Notes: Group was coded as a dichotomous variable where 1 = college students and 2 = professionals. * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$. KMAQ = Knowledge of Memory Aging Questionnaire. FSA = The Fabroni Scale of Ageism. ADK = Alzheimer's Disease Knowledge test.

provided a broad coverage of normal and pathological changes in memory in adulthood. The second administration of the KMAQ, ADK and FSA was given immediately following the conclusion of the lecture.

Results

Overview of scoring and analyses

For the KMAQ, separate proportion scores were calculated for each participant by dividing the number of correct normal and pathological memory aging items by the total in each category (14) minus the number of don't know (DK) responses in each category. Proportions of DK responses in each category were calculated by dividing the number of DK responses by the total items in each category (14), although the frequency of DK endorsement was too low to merit statistical analysis in this study. Means appear in Table 1. For the ADK, the total score was calculated by summing the total number of items correct. Bias scores were also calculated, where positive bias scores reflect the tendency to underestimate the severity of the disease and negative bias scores reflect the tendency to overestimate the severity of the disease. A score of 1 was assigned for each positively biased answer, a score of -1 was assigned for each negatively biased answer and a score of 0 was assigned for each correct or unbiased answer. Total bias scores were calculated by summing these scores for all items. Means appear in Table 2. For the FSA, three separate scale scores were calculated for antilocution (10 items), discrimination (9 items) and avoidance (10 items), where higher scores indicated a higher degree of ageism. Total scores were calculated by summing the three subscales. Means appear in Table 3.

Analyses of variance (ANOVAs) were conducted to examine group and time of test effects in KMAQ, ADK and FSA scores. In all cases where significant ANOVA effects were obtained, pairwise comparisons (t -tests) were conducted to pinpoint the locus of

significant differences. Correlation analyses were conducted to examine interrelationships among the KMAQ, ADK and FSA total and scale scores.

Analyses of KMAQ

Proportion of correct responses

We conducted a $2 \times 2 \times 2$ mixed ANOVA on the proportion correct scores with group (students, professionals) as a between group factor and question type (normal, pathological) and time of test (pre-test, post-test) as repeated measures factors (see Table 1). Results yielded a group main effect favoring the mental health professionals who had greater knowledge of memory aging than did the students, with means of 0.86 and 0.73, respectively, $F(1, 89) = 49.53$, $p < 0.001$. The main effect of question type was significant owing to the greater accuracy for pathological memory aging items than normal items, $F(1, 89) = 26.88$, $p < 0.001$. Means, in order, were 0.82 and 0.76. The time of test main effect was significant, $F(1, 89) = 24.87$, $p < 0.001$. Mean response accuracy was greater at post-test (0.83) compared to pre-test (0.76), confirming the sensitivity of the KMAQ to instruction. Interpretation of these effects was qualified by a significant Group \times Question Type interaction effect, $F(1, 89) = 15.19$, $p < 0.001$. Pairwise comparisons confirmed that response accuracy was no different for the normal and pathological memory aging items for the students, whereas the mental health professionals were more accurate on the pathological compared to the normal items.

Proportion of stereotyped question responses

To determine whether stereotypical views of adult cognition may be contributing to participants' responses on the KMAQ, we conducted a follow-up analysis on the proportion correct scores for items Q3, Q13, Q14 and Q27 as a function of group and time of test. These items were selected because the correct answer is in conflict with commonly held ageist

Table 5. Correlations among FSA scores and memory knowledge.

	<i>r</i>	<i>r</i> for students (<i>n</i> = 70)	<i>r</i> for professionals (<i>n</i> = 30)
FSA total			
KMAQ pathological	-0.26**	-0.10	-0.06
KMAQ stereotype	-0.25**	-0.17	-0.01
ADK total	-0.35***	-0.15	-0.37*
FSA antilocution			
KMAQ pathological	-0.28**	-0.18	-0.09
KMAQ stereotype	-0.25**	-0.20	-0.05
ADK total	-0.28**	-0.08	-0.39*
FSA discrimination			
KMAQ pathological	-0.23*	-0.04	-0.07
KMAQ stereotype	-0.30**	-0.26*	0.06
ADK total	-0.40***	-0.30*	-0.21

Notes: ^aBecause one participant did not report his/her age, these analyses are based on 99 cases; ^bAnalyses are based on 100 cases; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; KMAQ = Knowledge of Memory Aging Questionnaire; FSA = The Fabroni Scale of Ageism. ADK = Alzheimer's Disease Knowledge test.

stereotypes (Hawley et al., 2006). For example, consider these questions that presume a universal decrementalist view of adult cognition: 'Regardless of how memory is tested, younger adults will remember far more material than older adults' (Q3, false), and 'Memory training programs are not helpful for older persons, because the memory problems that occur in old age cannot be improved by educational methods' (Q27, false). Analyses yielded a significant group main effect favoring the mental health professionals who showed a high level of accuracy on these items compared to the students, with means of 0.90 and 0.73, respectively, $F(1, 89) = 15.57$, $p < 0.001$. This finding implies that the professionals' responses to the normal memory aging items were not likely to have been influenced by commonly held, ageist stereotypes that portray a negative image of cognitive competence in late life. The time of test main effect was significant, $F(1, 89) = 15.28$, $p < 0.001$. Mean response accuracy was greater prior to (0.86) than after the lecture (0.77) on these items.

Analyses of ADK test

We conducted separate 2×2 mixed ANOVAs on the total correct and bias scores with group and time of test as factors (see Table 2). Results yielded a significant group effect where the professionals' mean total score (14.33) exceeded the students' mean (8.48), $F(1, 89) = 111.19$, $p < 0.001$. The time of test main effect was significant where the post-test mean (12.48) exceeded the pre-test mean (10.33), $F(1, 89) = 51.25$, $p < 0.001$. Regarding the ADK bias scores, professionals (0.91) showed significantly less positive bias than students (1.94), $F(1, 89) = 7.52$, $p < 0.01$. A significant Group \times Time of Test interaction effect also occurred, $F(1, 89) = 6.45$, $p < 0.01$. Students' mean bias score increased at post-test (2.46) relative to pre-test (1.41), a significant difference ($p = 0.001$).

In contrast, the professionals' mean bias score was somewhat lower at post-test (0.75) compared to pre-test (0.96), but not significantly so ($p = 0.41$). Students' bias scores were no different from the professionals' prior to the lecture ($p = 0.45$). The significance of the interaction, then, appears attributable to the increase in students' bias scores relative to the professionals at post-test ($p < 0.001$).

Analyses of FSA

We conducted separate 2×2 mixed ANOVAs on the FSA total and scale scores with group and time of test as factors (see Table 3). For the FSA total scores, means for the students (68.04) and professionals (59.95) were significantly different, $F(1, 88) = 11.44$, $p = 0.001$. For the antilocution scale, the students' mean (24.70) exceeded the professionals' mean (21.39), a significant difference, $F(1, 88) = 6.65$, $p = 0.01$. For the discrimination scale, students' mean (19.36) was higher than the professionals' mean (16.96), $F(1, 88) = 10.45$, $p = 0.002$. For the avoidance scale, means for the students (23.99) and the professionals (21.61) significantly differed, $F(1, 88) = 6.38$, $p = 0.01$. In addition, the time of test effect was significant in the analysis of avoidance scores, $F(1, 88) = 5.00$, $p = 0.03$, owing to the higher mean post-test score (23.06) relative to the pre-test mean score (22.54). The Group \times Time of Test interaction effect was non-significant.

Relationships among memory knowledge, AD and ageism measures

Correlation analyses were conducted on the pre-lecture memory knowledge measures (KMAQ normal, pathological, stereotype scores), ADK total score and the FSA total and scale scores to address

the second aim of the study which concerned the influence of ageist attitudes on knowledge of memory aging and AD issues. Pre-lecture scores were selected for inclusion in these analyses because a significant time of test effect was observed for the KMAQ and ADK. As can be seen in Table 4, group was positively correlated with the knowledge measures and negatively correlated with the ageism measures, confirming that the professionals were more knowledgeable and held less ageist attitudes than the college students, as expected.

Of particular interest are the correlations among the KMAQ, ADK and FSA scores. Normal KMAQ scores were not significantly correlated with the FSA scores with the exception of the discrimination scale, although the r -value was small ($r = -0.22$). By comparison, the negative correlations among the KMAQ pathological scores and the FSA total were larger (r 's of -0.23 to -0.28), as were the negative correlations among the KMAQ stereotype and the FSA scores (r 's of -0.25 to -0.30). The largest correlations occurred for the ADK total and FSA total, antilocution and discrimination scores (r -values ranged from -0.28 to -0.40). These correlations are admittedly modest in size, but nonetheless compatible with prior research where correlation coefficients for the FSA and the Facts on Aging Quiz (Palmore, 1977) have ranged from -0.28 (Fraboni et al., 1990) to -0.33 (Stuart-Hamilton & Mahoney, 2003).

The results of the correlation analyses reported above imply that greater knowledge of pathological memory aging and AD is associated with reduced endorsement of ageist attitudes on the FSA total, antilocution and discrimination scales. Interpretative caution is warranted, however, because the mental health professionals were older than the college students, as expected given their educational attainment and professional experience. Prior research has shown that response accuracy on the KMAQ is greater for community-dwelling older adults (persons over age 60) than college students (Cherry et al., 2003; Reese & Cherry, 2006; Reese et al., 2000). Ageist attitudes may also decrease with age and accumulated life experiences, irrespective of educational attainment and professional experience (Kalavar, 2001; Rupp, Vodanovich, & Credé, 2005). Because we were concerned that the observed relationships among memory knowledge, AD and ageist attitudes may be merely reflecting age differences, we calculated separate correlations for students and professionals (see Table 5). For the students, only the FSA discrimination scale remained significantly correlated with the KMAQ stereotype score ($r = -0.26$) and ADK total score ($r = -0.30$). For the professionals, the FSA total and ADK total scores were significantly correlated ($r = -0.37$), as were the FSA antilocution and ADK total score ($r = -0.39$).

Discussion

Professional experience and instruction effects on memory aging and AD knowledge

Our first finding was that the mental health professionals had a higher level of knowledge of memory aging issues and AD than did the students. While not surprising, this is nonetheless an important result with noteworthy measurement implications. That is, the present findings add to the content validity of the KMAQ and ADK in that both questionnaires empirically discriminated two groups whose knowledge would be expected to differ *a priori* based on their academic training and clinical experience. Further, the significant correlation between the ADK total scores and the KMAQ pathological scores observed here ($r = 0.47$, see Table 4) provides new convergent validity evidence for the KMAQ.

With respect to knowledge of memory aging, analyses of KMAQ data yielded group, question type and time of test main effects and a significant Group \times Question Type interaction. Professionals were more accurate on the pathological compared to the normal memory aging items, whereas students' response accuracy did not differ by question type. This finding replicates Cherry et al. (2000, Exp. 1) where the original version of the KMAQ (without the DK response option) was used and extends our earlier results to include the effects of instruction. With respect to knowledge of AD, group and time of test effects were observed for the ADK total scores (Sullivan & O'Connor, 2001). Analyses of the ADK bias scores yielded a positive response bias for the students, which increased in size after instruction relative to their pre-test scores. Alzheimer's Disease Knowledge test bias scores for the professionals were lower by comparison and did not significantly differ from pre- to post-test, as discussed next.

Our second finding was that response accuracy on the knowledge measures improved with instruction, confirming that memory aging and AD knowledge is amenable to change for college students and professionals alike. Both groups showed significant improvement in response accuracy following a lecture on normal and pathological memory aging issues, confirming that the KMAQ and ADK were sensitive to instruction. On the KMAQ, the magnitude of improvement was proportional across groups and question type. In a study with college students only, Cherry et al. (2000, Exp. 3) found that pre-test/post-test gains were significantly greater on pathological scores than normal memory aging items using the original KMAQ (with no DK response option). In the present study, students' mean DK responses decreased from pre- (0.08) to post-test (0.02) on the pathological items while their mean proportion correct on these items increased by 0.09. By comparison, mean DK responses for the normal items showed a smaller decrease from pre- (0.06) to

post-test (0.02) and a smaller increase in mean proportion correct (0.06, see Table 1). Together, the reduction in DK responses coupled with numerically higher proportion correct scores for the pathological items at post-test are compatible with Cherry et al.'s (2000, Exp. 3) differential benefit of instruction for students' knowledge of pathological memory aging issues. However, unexpectedly, mean response accuracy for stereotypical items was greater prior to than after instruction. One possible explanation for this finding may be that the instruction brought to light facts about memory aging which were decrementalist in nature, prompting participants to endorse these stereotype-related items that concern declines in memory with aging. Further research would be desirable to provide a more definitive analysis of this possibility before firm conclusions would be warranted, however.

Analyses of the ADK total scores yielded group and time of test effects, as noted earlier. Our findings are in line with Hébert et al. (1994) who showed that caregivers' ADK scores increased after participating in a study group compared to controls. For the ADK bias scores, a significant Group \times Time of Test interaction occurred where the positive bias increased significantly for students after the lecture and the bias decreased slightly for the mental health professionals (see Table 2). One explanation for this outcome is that the instructional material may have prompted students to view AD with greater optimism than before the lecture. By comparison, the same lecture material may have encouraged a more realistic view of AD for the mental health professionals. Overall, our findings are consistent with Beall et al. (1992) who found that nursing and medical students scored well on the ADK compared to previously reported undergraduate and graduate students' scores (i.e. Dieckmann et al., 1988). Beall et al. (1992) also found that nursing students showed more positive bias than did the medical students, a finding they attributed to medical students' clinical training and role modeling of clinical preceptors.

On a broader note, our findings underscore the importance of providing educational information on memory aging and AD in an undergraduate curriculum as well as in initial and ongoing clinical training in mental health and aging. Educational programs and workshops that focus on improving knowledge of memory aging and adult dementia are imperative for those in the mental health field who are likely to come into contact with the older adult population given the national demographic trends of increasing numbers of older adults in today's society and in the future. Understanding the distinction between normal and pathological memory aging has important implications for service provision and referrals as well. Because normal memory aging deficits are sometimes amenable to intervention and remediation, a more complete knowledge of the

characteristics of normal memory aging is crucial for service providers and other professionals who work with elderly clientele (see Cherry & Smith, 1998, for discussion).

Ageist attitudes: relationships to memory aging and AD knowledge

Our third finding was that the college students' endorsed more ageist attitudes than did the mental health professionals on the FSA. This result was not surprising in that today's society is largely youth-oriented with subtle and overt expressions of ageism readily observed. For instance, everyday behaviors perceived as courtesy or lightheartedness towards older persons may be manifestations of discriminatory or stereotypical attitudes (Palmore, 1999). The finding that mental health professionals had lower FSA total and subscale scores may be due to their training and clinical experience, in that those with greater knowledge of aging may hold less ageist attitudes (Stuart-Hamilton & Mahoney, 2003). Other evidence has shown that college students' age was negatively correlated with FSA total scores, suggesting that ageist attitudes decline with increased life experience (Kalavar, 2001; Rupp et al., 2005).

Finally, there was modest evidence to indicate that ageist attitudes influence memory aging and AD knowledge (see Table 5). For college students, the FSA discrimination scale was negatively correlated with the KMAQ stereotype score ($r = -0.26$) and ADK total score ($r = -0.30$). Thus, a stronger endorsement of discriminatory behaviors toward older adults was associated with lower accuracy on the KMAQ questions that tap into stereotyped views of adult cognition and knowledge of AD for students, but not professionals. However, negative correlations were observed for FSA total and ADK total scores ($r = -0.37$), as well as FSA antilocution and ADK total scores ($r = -0.39$) for the professionals, implying that they, too, may be susceptible to ageist influences on their knowledge of AD. Interpretative caution is warranted, because the FSA is primarily a measure of attitudes rather than actual behaviors. Future research where actual ageist behaviors are taken into account would be desirable to permit firmer inferences on the role of ageism and knowledge of memory aging and AD in students and mental health professionals.

Our results have several implications for current views of ageism as a construct and social phenomenon. With respect to theoretical implications, we found that the FSA discrimination scale showed the strongest correlations with the knowledge measures overall, relative to the other scales and total score. According to Fraboni et al.'s (1990) original formulation, the discrimination scale taps into cognitive aspects of ageism, whereas the antilocution and avoidance scales presumably measure the affective aspects of ageism. Our findings are consistent with this formulation, in

that the strongest correlations with the knowledge measures were observed for the cognitively focused discrimination scale. The affectively focused avoidance scale was not significantly intercorrelated with the knowledge measures reported here. Regarding practical implications, academic preparation that includes coverage of the multidimensional nature of ageism for college students is another important consideration. Educational materials and programs in college and university settings where accurate information about ageism is disseminated could serve to counteract stereotypes that may result in negative interpersonal interactions between younger and older adults, such as patronizing talk.

In closing, our results have shown that mental health professionals have more extensive knowledge than do students about normal and pathological memory aging issues and AD. Students' knowledge of adult cognition may be limited to their observations or personal experience with individuals, such as elderly relatives, neighbors and/or friends. As a result, they may be more vulnerable to the fallacy of over-interpreting single case experiences, relative to professionals. The pattern of outcomes for the knowledge measures observed here is consistent with this notion. Future research to systematically examine the role of prior experience with normal and memory-impaired elderly adults is needed to permit firmer conclusions on the dynamic relationships among personal experience and knowledge of memory aging and AD.

Acknowledgements

This research was supported by grants from the Louisiana Board of Regents through the Millennium Trust Health Excellence Fund [HEF(2001-06)-02] the National Institute of Aging P01 AG022064. This support is gratefully acknowledged. We thank Shay Randle for her help with data collection and Brittany Ostarly for her assistance with data scoring. Karri S. Hawley is now at the Department of Veterans Affairs, Rehab R & D Center, VAMC, 1670 Clairmont Rd, Deatur, GA 30033-4004.

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