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How ageing and social factors affect memory

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Abstract

Objectives: to explore the relationships between lifestyle and memory, and determine whether social factors influence memory.
Methods: the relationship between memory and lifestyle was examined in 497 adults aged 25-80 years, using the Metamemory in Adulthood questionnaire. We asked about sports activity and perceived activity, participation in voluntary organizations and social contacts.
Results: activity and frequent contact with friends and family were related to higher memory capacity scores. Those with higher capacity scores were also younger, had better health and a stronger internal locus of control. In contrast, people with higher anxiety scores had more symptoms and less education, and were more externally oriented.
Conclusions: people who consider themselves socially and physically active also consider their memory capacity to be good and are less anxious about their memory than less socially and physically active people. Perceived memory change appears to be predominantly influenced by ageing, whereas memory capacity and memory anxiety are more influenced by social factors.

Keywords: *ageing, lifestyles, locus of control, metamemory, social factors*

Introduction

Activity theory states that lifestyle activities are necessary for successful ageing [1, 2]. Conceptually, lifestyle consists of two components: 'life conduct', expressed in personal choices, and 'life chances', the opportunities available to realise these choices [3–5]. Cognitive functioning in old age may be facilitated by an active lifestyle. While many age differences in memory performance are attributed to intellectual activity and educational level, declining cognitive performance in old age may specifically relate to both cognitive style (e.g. attitudinal and motor-cognitive flexibility), specific lifestyle variables (e.g. the absence of an active lifestyle or a breakdown of family ties), socio-economic status and social interaction. Contradictory demands and a diversity of stimuli seem to stimulate cognitive activity [6–10]. Active conduct in a demanding environment may help to maintain cognitive fitness throughout life [11–13].

Social network theory suggests that interactions with other people, mostly of the same status or age group and/or lifestyle, is beneficial [14, 15]. The social benefits may extend to cognitive performance. Active people may be better equipped to evaluate their cognitive functioning continuously. A good health and perceived internal locus of control may be beneficial to cognitive performance, although results are inconsistent [6, 8, 16–21]. In sum, three categories of variables are hypothesized to be related to cognitive performance: lifestyle, social network and locus of control. There are, however, few reports on different patterns of these variables across different components of self-rated components of memory abilities. We have studied the relationship of these variables to different components of metamemory (the self-knowledge and self-belief in one's own memory functioning [22, 23]). The instrument used here asks respondents to rate their memory capacity, change in memory functioning and related feelings of stress and anxiety.

Methods

The sample was derived from the second panel of the Maastricht Aging Study, a large-scale longitudinal study

Table 1. Zero-order correlations of metamemory variables and predictor variables ($n = 497$; $P < 0.001$ in bold)

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Capacity	37.6	7.3	–																	
2. Change	32.7	8.2	**0.50**	–																
3. Anxiety	31.4	8.5	**−0.36**	**−0.68**	–															
4. Age	53.8	16.9	**−0.27**	**−0.50**	**0.26**	–														
5. Sex (female)	1.5	0.5	0.12.	0.06	0.07	−0.01	–													
6. Education	3.1	1.4	**0.18**	**0.28**	**−0.27**	**−0.47**	−0.08	–												
7. Subjective health (complaints)	4.8	4.2	**−0.23**	**−0.38**	**0.39**	**0.17**	0.13	**−0.23**	–											
8. Partner	0.8	0.4	0.00	0.07	−0.05	−0.13	−0.14	0.01	−0.09	–										
9. Children	1.8	0.4	**−0.18**	**−0.24**	**0.16**	**0.38**	0.07	**−0.27**	0.09	**0.31**	–									
10. Work	0.5	0.5	0.09	**0.27**	**−0.18**	**−0.50**	−0.11	**0.32**	**−0.17**	0.04	**−0.18**	–								
11. HLC internal	11.2	1.6	**0.16**	0.13	−0.10	**−0.19**	−0.09	0.03	**−0.15**	−0.07	**−0.16**	0.11	–							
12. HLC chance	10.5	1.6	**−0.18**	**−0.30**	**0.25**	**0.39**	−0.00	**−0.30**	**0.18**	0.05	**0.15**	**−0.23**	0.01	–						
13. HLC physician	10.2	1.5	**−0.21**	**−0.37**	**0.28**	**0.49**	−0.13	**−0.33**	**0.20**	−0.04	**0.19**	**−0.25**	−0.10	**0.38**	–					
14. Clubs participation	0.9	0.7	−0.02	−0.04	0.01	0.04	0.04	0.02	−0.03	−0.09	0.02	0.02	−0.01	0.08	−0.01	–				
15. Hours of sports	1.9	3.0	0.02	0.05	−0.02	−0.05	−0.09	**0.19**	−0.14	0.00	−0.03	−0.01	−0.01	−0.05	−0.01	0.13	–			
16. Active person	6.9	1.5	0.14	0.10	**−0.17**	0.13	−0.06	0.15	**−0.22**	0.03	0.04	−0.04	0.06	0.03	0.01	−0.22	**−0.28**	–		
17. Frequency contacts network	2.8	1.2	0.13	0.10	−0.09	−0.08	−0.09	−0.01	−0.00	−0.11	−0.09	−0.05	−0.01	−0.09	−0.04	−0.00	−0.03	−0.00	–	
18. Size network	2.4	0.8	0.02	**0.12**	**−0.17**	−0.14	−0.01	**0.21**	**−0.15**	−0.02	−0.08	0.06	−0.02	−0.06	−0.12	−0.05	0.15	0.12	**0.30**	–

HLC, health locus of control.

of cognitive ageing in relation to biological, medical and psychosocial factors [24]. The Maastricht Aging Study draws from a registration network of general practitioners in the Netherlands, containing demographic and health characteristics of more than 60 000 patients from 15 general practices and 42 practitioners. Subjects included in the register are representative of the south Netherlands population. Exclusion criteria are those medical conditions that may interfere with normal cognitive functioning [25].

The sample, stratified for age and sex, consisted of 497 persons aged between 25 and 82 (mean age 53 years). Two-hundred and fifty-two (51 %) were women and 245 were men. Respondents were equally distributed among age categories (27% were aged 25–40, 25% were aged 41–55, 25% were aged 56–70 and 23% were aged 71–82). Level of education ranged from primary school (14%) to university (20%). Those included had no acute illnesses. Seventy-eight percent of the sample had a partner and 80% had children. Of those under 65 years, 62% had a full-time or part-time job [24].

To measure metamemory, the abridged version of the Metamemory in Adulthood (MIA) questionnaire was used [23, 26, 27]. The original instrument consists of seven subscales, three of which were used in this study: memory capacity, memory change and memory anxiety. Memory capacity ($\alpha = 0.84$) refers to a person's perceived memory functioning in daily life. The scale consists of 12 items, such as: 'I am good at remembering names' (5 = agree strongly, 1 = disagree strongly) and 'I am good at remembering birthdays'. Memory change ($\alpha = 0.91$) consists of 12 items, such as: 'I can remember things as well as always' and 'I'm less efficient at remembering things now than I used to be'. High scores indicate little memory change. Memory anxiety ($\alpha = 0.88$) refers to perceived feelings of stress and anxiety and consists of 12 items, such as: 'I get upset when I cannot remember something' and 'I find it harder to remember things when I am upset'.

For lifestyle conduct, two measures were used: sports activities and perceived activity. Sports activities were measured by asking respondents how many hours a week they usually spent on physical exercise (range 0–18 h, mean 2). Perceived activity was measured by summing answers to two five-point scales: on whether they considered themselves to be active and how active they were in comparison to other people of the same age. The life chances component of lifestyle was determined by asking whether they participated in one or more voluntary organizations (clubs, social activities, music). Network characteristics were measured by asking: (i) how many friends and family members they could rely on for private matters (1 = nobody; 4 = 10 people and more) and (ii) how often they had had contact with one or more of these people in the last few months (1 = never; 5 = daily). Subjects were also asked whether they lived with a partner, had children, had a full-time or part-time paid job.

Subjective health status was measured with the Inventory of Subjective Health [28–31]. The abridged inventory consists of 21 items concerning specific complaints, such as 'Do you often have pains in the chest?' and 'Do you often have palpitations?'.

A nine-item version of the Health Locus of Control instrument was used [32]. Each dimension—internal, chance and physician orientation—was represented by three items, based on the highest loadings in a Dutch validated translation of the instrument [33, 34].

Table 2. Hierarchical regression analysis of metamemory variables and predictor variables ($n = 497$)

	Memory capacity		Memory change		Memory anxiety	
Variables	β	Cum. R^2	β	Cum. R^2	β	Cum. R^2
Age	−0.17[c]		−0.34[c]		0.00	
Sex (female)	0.15[c]		0.10[a]		0.02	
Education	0.06	0.09[c]	0.00	0.24[c]	−0.10[a]	0.08[c]
Subjective health (complaints)	−0.17[c]	0.13[c]	−0.28[c]	0.34[c]	0.29[c]	0.19[c]
Partner	0.03		0.03		−0.05	
Children	−0.10		−0.06		0.05	
Work	−0.07	0.14	0.01	0.34	−0.02	0.19
HLC internal	0.09[a]		0.01		−0.03	
HLC chance	−0.06		−0.08		0.11[a]	
HLC physician	−0.03	0.15	−0.09	0.34[a]	0.13[b]	0.21[c]
Clubs participation	−0.04		−0.03		−0.01	
Hours sports	−0.04		−0.02		0.09[a]	
Active person	0.17[c]	0.16[b]	0.09[a]	0.35	−0.13[b]	0.23[a]
Frequency contacts network	0.11[b]		0.04		−0.06	
Size network	−0.09	0.17[a]	−0.00	0.35	−0.06	0.23

[a]$P < 0.05$; [b]$P < 0.01$; [c]$P < 0.001$.
HLC, health locus of control.

Statistical analysis

Statistical analysis involved the Pearson product moment correlation matrix of all variables. Next hierarchical multiple regressions were conducted on the MIA subscales. The order of entry of the variables proceeded logically from conditioning objective background (age, sex, education) and a subjective (health complaints) social characteristic through the intervening variables of objective social roles and subjective health loci of control to the explanatory lifestyle conduct and opportunity. Colinearity diagnostics for the final hierarchical model using the conditioning index and variance proportions associated with each variable were negative [35].

Results

People with better subjective memory functioning were younger, healthier, better educated, and less externally oriented (Table 1). Older people were less well-educated, reported more health problems, were more likely to have children and were more often externally oriented (both health locus of control chance and physician orientation) than younger people. People with a higher level of education were less externally oriented (both chance and physician orientation), more often employed and less likely to have children. They reported fewer health complaints and had a more extensive social network.

Memory capacity

Perceived memory capacity was largely related to age, gender and health (Table 2): younger people, women and people with fewer health complaints had higher memory capacity scores than older people, men and people with more health problems. People who had frequent contact with friends and family had higher memory capacity scores than did people who had less frequent contact. Also, both people who considered themselves to be active and people who had a higher internal locus of control had higher memory capacity scores. Demographic variables and health were the major contributing variables, explaining 13% of variance. Other variables added about 5% of variance after health, age and gender had been introduced.

Memory change

Age and health predicted whether a person believed his or her cognitive performance had declined. Other variables together only explained about 1% of variance, which was mainly due to gender and activity lifestyle: women and active people were less likely to think that their memory capacity had declined. Individuals with a strong chance and physician orientation tended to have lower memory change scores, but this was not statistically significant.

Memory anxiety

Subjective health status was the main predictor of memory anxiety, explaining 11% of variance, followed by education, health locus of control, external orientation (both chance and physician orientation) and activity lifestyle. Thus, people with more health complaints, a lower level of education or a stronger external orientation were more anxious about their cognitive performance. Again, people who considered themselves to be more active were less uncertain about their cognitive performance.

Discussion

While subjective health status was found to be the most important and consistent predictor across metamemory components, active lifestyle and the opportunity structure are related to specific metamemory subscales. In general, people who consider themselves socially and physically active also consider their memory capacity to be good and are not so anxious about their memory. Rating oneself as an active person was the only significant lifestyle predictor of all three components of metamemory.

Surprisingly, more objective measures of an active lifestyle conduct were not related to metamemory, even though those who considered themselves active spent twice as much time on sports activities (2.8 h *versus* 1.3 h). The self-perception of being an active person seems more important for predicting metamemory than the number of hours actually spent on physical activities. A person's perceptions, independent from their objective reality, are real in their psychological and social consequences [36]. Frequent contact with friends and family increased the chance that a person considered his or her memory capacity to be good. This finding is supported by recent experimental evidence that the relative frequency of contact with relationships contributes to cognitive functions such as attachment [36, 37]. People with an internal locus of control reported a higher memory capacity, while people with a more external locus of control reported more memory anxiety [20]. Those who are younger, have better health and a stronger internal locus of control also perceive themselves to have a good memory capacity. The opposite is true for perceived memory anxiety. Perhaps disadvantaged people, as indicated by poor health, low education and no control over their environment, also have more problems with their cognitive capacities [38].

Differences were also found in terms of which metamemory components are influenced by social factors. For example memory change was found to be almost exclusively related to age and health status. Where social factors do play an important role, however, is in the present evaluation of cognitive capacities indicated by capacity and anxiety. One

should be cautious, however, with this interpretation given the limitations of the study design. There can be considerable differences across cohorts in experiential factors relevant for objective functioning and presumably for subjective functioning as well [39–41].

Finally, responses given by both older and younger adults reflect emotional and personality variables such that straightforward analyses can give misleading results [42]. For instance, people with a generally positive view of themselves and their world usually give positive answers [43]. However, this may hold only under specific conditions. Devolder and Pressley [44] found that the over-optimistic predictions reported by elderly subjects on cognitive performance can be related to less use and self-appraisal of memory strategies. Our data suggest that this over-optimism may be more a compensatory response embedded in a lifestyle with fewer strategic opportunities and less strategic behaviours. Given methodological limitations, our results demonstrate that metamemory variables in themselves deliver rich data which can help to specify sociological variables to define subgroups of the older people that are vulnerable to cognitive decline. Increasing an elderly person's social participation might facilitate successful ageing. Self-evaluations and changes in lifestyles might give early warning of cognitive decline [45].

Key points

- Activity and frequent contact with friends and family increase the chance that memory capacity is rated as good.
- People with higher subjective memory capacity scores are younger, have better health and a stronger internal locus of control.
- Those who consider themselves socially and physically active also consider their memory capacity to be good and are less anxious about their memory than less socially and physically active persons.
- People with poorer health, less education and less control of their environment consider themselves to have more memory problems.

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