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Psychometric Properties of the French Version of the Multifactorial Memory Questionnaire for Adults and the Elderly

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ABSTRACT

From its creation a year ago, the French version of the multifactorial memory questionnaire (MMQ) (Fort et al., 2011, 2012) has been used in several studies. In this study, the psychometric properties of this new questionnaire in healthy adults and cognitively impaired individuals are evaluated. The results are compared to the French version of the MMQ (Fort et al., 2011) and the French version of the MMQ-E (Fort et al., 2012). The results showed that the French version of the MMQ (Fort et al., 2011) is a reliable questionnaire for adults and cognitively impaired individuals. The French version of the MMQ-E (Fort et al., 2012) is a reliable questionnaire for cognitively impaired individuals. The French version of the MMQ (Fort et al., 2011) is a reliable questionnaire for cognitively impaired individuals. The French version of the MMQ-E (Fort et al., 2012) is a reliable questionnaire for cognitively impaired individuals. The French version of the MMQ (Fort et al., 2011) is a reliable questionnaire for cognitively impaired individuals. The French version of the MMQ-E (Fort et al., 2012) is a reliable questionnaire for cognitively impaired individuals. The French version of the MMQ (Fort et al., 2011) is a reliable questionnaire for cognitively impaired individuals. The French version of the MMQ-E (Fort et al., 2012) is a reliable questionnaire for cognitively impaired individuals.

KEYWORDS

The aim of this study was to evaluate the psychometric properties of the French version of the Multifactorial Memory Questionnaire (MMQ) (Fort et al., 2011). The MMQ was developed to measure memory, attention, executive functions, working memory, verbal fluency, and other cognitive functions. The questionnaire has 100 items and is scored on a 5-point scale (1-5). The results showed that the French version of the MMQ (Fort et al., 2011) is a reliable questionnaire for adults and cognitively impaired individuals. The French version of the MMQ-E (Fort et al., 2012) is a reliable questionnaire for cognitively impaired individuals. The French version of the MMQ (Fort et al., 2011) is a reliable questionnaire for cognitively impaired individuals. The French version of the MMQ-E (Fort et al., 2012) is a reliable questionnaire for cognitively impaired individuals. The French version of the MMQ (Fort et al., 2011) is a reliable questionnaire for cognitively impaired individuals. The French version of the MMQ-E (Fort et al., 2012) is a reliable questionnaire for cognitively impaired individuals.

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Metamemory is commonly defined as the knowledge one has of general memory functioning, along with the monitoring and control processes that allow subjects to regulate their memory activity and control (Bjorklund, 1985). This definition includes two domains that refer to knowledge of memory functioning and to monitoring and control processes that are used to perform memory tasks. According to Flaherty, Hartung, Dixon, and Liu (1998), the knowledge domain itself has two levels of content: (a) factual knowledge about memory processes and memory strategies and (b) the subject's beliefs about her/his own memory abilities. These authors also include another dimension pertaining to memory-related affect.

Metamemory has been studied mostly within two fields: educational psychology and the psychology of aging. In the latter field, it is considered to offer a possible explanation for the aging of memory abilities according to Hartung, Dixon, and Flaherty (1998): "Metamemory is not, by itself, a contributing factor to deficient strategy utilization by older persons in two ways: (a) older persons do not or do not identify the strategy behavior necessary to optimize test performance, and (b) inadequate ability to characterize the nature of memory" (p. 105). They add that older people may have accurate knowledge about memory functioning but negative beliefs about their own abilities (Hartung et al., 1998). Many studies about age differences in metamemory support this hypothesis, demonstrating that older people's perceptions of self-efficacy (ability) than younger subjects, report more memory problems and use external aids more often (Bye, 1981; Chaffin & Berman, 1981; Craighero & Pass, 1981; Ellis, Sanchez, & Balthaz, 1981; Lewis, Stone, & Cook, 1981; Mac, Stone, & Bagnall, 1981).

In the field of aging psychology today, we are witnessing an evolution in the place given to metamemory studies as the relationship between metamemory and concepts from social cognition are now being considered. Craighero (1988) and Craighero, Bellandi, and Hartung (1995) feel it is useful to integrate other concepts into models of these relationships—order to qualify the nature of monitoring and beliefs about memory. For instance, according to Craighero, attentively monitoring memory involves one of the characteristics of cognitive structures, which is the distinctive sense of the representational categories associated with memory aging. "Metamemory shows again, the ability to act in response to memory problems that those of young people continue lack in cognitive self-regulation among older subjects. The relationship between general beliefs about memory aging and beliefs about one's abilities has been empirically supported by Craighero and Hartung (1995), Stone,

and colleagues concerning memory aging, will influence the way subjects answer questions dealing with the utilization of abilities.

Another specificity of the concept of metamemory is that it is considered an aging stability, so that it encompasses the concept of stability's complexity. Memory complexity refers to an impression that one's memory abilities have been impacted with age (Bjorklund, 1985). While ability self-ratings tend to a small a dimension of metamemory, it does seem to include memory complexity (Metzger, Brunstein-Gibrom, 1981) and emotional (Phares, Libero, & Jelic, 1981; Sells, Loewig, & Metememory in Metememory, 1981; Johnson, Adolphsberg, & Jelic, 1981) variables have been found regarding the relationship between memory complexity and depression. Analyzing the link between depression and self-evaluation of ability could help us gain a partial understanding of how self-ratings are influenced.

Metamemory Subjects: Memory Functioning

A person's awareness and knowledge of her/his own memory functioning are usually measured by self-report forms constructed and only with collections of memory in various situations or with the frequency of forgetting in everyday life. Others deal with a more diverse range of topics, such as changes in a subject's difficulties during the day for the execution of memory tasks, or the influence of affective factors (Bjorklund, 1981; Gilmore, Bellandi, & Bellandi, 1981).

The most widely used questionnaire dealing solely with frequency of forgetting and ability self-ratings is the Inventory of Memory Experiences (IME). Developed by Craighero and Berman (1981), a short version of this questionnaire (the Short Inventory of Memory Experiences (SIMEX)) is described by Craighero (1981). Like the original version, it has two components. The first contains 16 items related to forgetting and covers the following areas: memories people cannot, geographical difficulties, conversations, things learned by one, absent-mindedness, and failure to remember something one knows. The second part contains two sections: recall of early childhood (first names) and recall of various specific events (first names). This version has been used in several studies pertaining to age differences in the relationships between metamemory and memory (Chaffin & Berman, 1981; Craighero & Pass, 1981; Ellis et al., 1981; Bye, 1981). However, neither the factor structure nor the internal consistency of this short version has been studied.

The most frequently used questionnaire dealing with diverse topics on the Memory Functioning Questionnaire and the Memory in Adulthood Questionnaire (Bye, 1981; Sanchez, 1981; Craighero & Pass, 1981; Gilmore, Bellandi, & Bellandi, 1981; Lee,

ness et al., 1997; McClelland-McClelland, Gould, & Lydy, 1997; Lee & Zelazo, 1997). The Memory Functioning Questionnaire was designed as a self-report measure of ability-memory functioning to reflect it was derived from Zelazo (1996) and Thompson's (1995) Memory Questionnaire and was shortened by factor analysis using the principal component technique (Lee et al., 1996). The authors obtained a final questionnaire consisting of 16 items. The factor analysis revealed four factors that accounted for 73.1 per cent of the variance. Factor 1 was interpreted as general memory ability (i.e., the total score indicated overall ability), Factor 2 was interpreted as a composite functioning factor, and Factor 3 included items about strategy use and was named memory use. This factor structure was chosen to be similar to that of the *alpha* coefficients of the different forms, varied from .83 to .89, indicating good internal consistency within each form. The MFMQ has been translated into French (Jouin & Walz, 1998), but the psychometric properties of this version have not been investigated.

The Memory in Adolescent (MIA) scale was developed by Elias and Hébert (1998). The authors aimed to derive a multidimensional questionnaire instrument to represent a multidimensional construct of memory in adolescent later on examination of questionnaire and interview about semantic memory, episodic memory, memory metamorphosis, and self-perception. Its initial goal is to be able to be generated a content analysis of this part but the authors to create 180 items, covering the following dimensions: strategy (memory strategy use) and knowledge about memory processes and taking capacity (knowledge about one's own abilities, change patterns of evolution of one's memory), ability (judging the functioning memory ability (ability) and ability strategy activation (importance of according to a task), and three forms of control in memory abilities: *alpha* coefficients indicated relatively high estimates of internal consistency (from .88 to .91), except in the case of the strategy dimension (.86). The results of a factor analysis showed that level of the eight dimensions were clearly distinct, but the capacity dimension was combined with the change dimension. Moreover, within the strategy dimension, one could distinguish between use of internal strategies and use of external strategies (Elias & Hébert, 1998). Although the reliability and validity of the MIA have been appropriately proven recently, its dimensional structure has not been demonstrated (Hébert, Hébert, & Goss, 1999). Moreover, the MIA has been validated in French (Jouin, 1999). Jouin, Goss, and Hébert (1999) conducted a principal component analysis of the MIA. With the exception of writing, all of the dimensions

were identified. The also found satisfactory estimates of the internal consistency of the dimensions ($\alpha > .85$ to .93) with the exception of motivation ($\alpha = .70$).

Hayes and Bick (1990) examined the existing questionnaires to have assessed adequately that made their choice was difficult. The drawbacks were related to the nature of the items, the fact that some items are not relevant for all subjects, the length of the questionnaires, and the diversity of the instruments. Therefore, Hayes and Bick (1990) designed the Multidimensional Memory Questionnaire (MMQ). The MMQ consists of 10 items, seven of which are more hypothetical dimensions: structural memory judgments, memory construction, memory ability self-appraisal, and overgeneral memory (9). The authors recommended to create short items and to include only items dealing with situations where action is possible, along with some situations relevant to memory use (overriding the memory construction task with the task itself). Items have about their content: memory ability (rank, class, confidence, endorsement, inhibition) and with the self-evaluation abilities. It includes 10 items in 1-point Likert format, ranging from strongly agree to strongly disagree, with higher scores indicating higher satisfaction with one's memory. Memory ability addresses frequency of forgetting in different situations. It consists of items that ask the subject to rate the frequency of events that do the best experiment in the last 2 weeks as a 1-point Likert-type scale, ranging from never to always, with higher scores indicating more positive patterns. The strategy dimension deals with strategy use in everyday life. It includes 10 items. Participants answer on 1-point Likert-type scale, ranging from never to always, in accordance with how often they used the strategies in the last 2 weeks. Higher scores indicate greater propensity to use memorization strategies. The MMQ was used by Hayes (1991) in a study about the effects of an intervention program for older adults.

Hayes and Bick (1990) examined the internal consistency test-retest reliability and construct validity of scores on the MMQ scale among 10 middle-aged and elderly subjects (50% were female) aged from 40 to 60 years ($M = 54$, $SD = 8$). The mean level of education was 12.6 years (ranging from 8 to 16, $SD = 2.8$). Construct validity was tested for MMQ content, that is, MMQ ability and internal MMQ (i.e., eg. The most correlations after a month interval were strong ranging from .63 to .89 ($p < .05$). The convergent validity of the MMQ scales was demonstrated by their correlation with the Memory Functioning Questionnaire (MFI), the Memory in Adolescent Questionnaire (MIA), and objective memory tasks. Dimensional validity was demonstrated by the lack of correlation between the MMQ scale and

translation team. A principal component analysis with a varimax rotation identified three factors corresponding to the hypothesized questionnaire scales. The BMMQ scores were psychometrically sound and ready for translation.

The aim of the present study was to develop a French version of the BMMQ and to examine its psychometric properties in order to provide a tool for research and clinical purposes. In addition to our knowledge, the psychometric properties of a French version of a questionnaire questionnaire have been investigated only for the BMMQ. Therefore, this study will provide researchers and practitioners with the opportunity to select among our evaluation alternatives to assess vulnerability.

Method

Translating and Adapting the BMMQ

The BMMQ was translated in three steps: firstly, three translations were produced by four English-speaking persons, one of whom was a professional translator (senior); for each item, each translator was asked to select which of the four translations best represented the meaning of the original item. Finally, an experimental version generated from the consensus given by the translators (the shortened, original) and approved by a committee of psychologists working in the field of psychological measurement. The final version is presented in the Appendix.

Participants and Procedures

The study participants were 196 French adults (108 women and 88 men) their average age was 61.9 years (ranging from 41 to 84, $M = 61.9$, $SD = 11.6$) and lived in their own homes. All participants lived in retirement homes, and 10% percent had 10 or more years of education. They were contacted by the authors' relatives or through independent clubs and associations. Participants were informed of the voluntary and anonymous nature of the study.

Measures

The participants filled out the BMMQ individually in the format originally proposed by Inoué and Kirk (2001). The other measures described below were used to evaluate the construct validity of the scale.

An adapted French version of the BMMQ scale (Inoué & Kirk, 2001) validated by Barbeau (2007) was administered. This is a 34-item questionnaire in 5-point Likert format assessing five dimensions of vulnerability: eating (1 items, $M = 2.6$), "I do not eat because when I am put on the spot to remember one thing"; change of time, activities (4 items, $M = 2.6$), "The clock gets the better of me to remember things"; activity (10 items, such as "I am good at remembering names") and strategy (14 items, such as "Do you ever appear

stupid on a schedule to help you remember them?"). Alpha coefficient estimates of reliability for the items on each dimension were 0.89, 0.89, 0.83, and 0.80, respectively.

A French version of the short version of the Cognitive Function Scale (CFS) (Folstein & Folstein, 1990; Folstein, Folstein, & Tangor, 1991) validated by Barbeau et al. (2007) was used to measure short duration. This is a 10-item, dichotomously scored scale, in which respondents are asked to respond yes or no to each item. A sample item from this scale is, "Is it easy to find your way around town at the time?" Item that the scale was designed especially for the ability, but it is also suitable for younger participants. Under Barbeau's estimate of reliability for scores on the CFS was 0.76. Previous research has demonstrated that mood affects not only cognitive functioning, but also self-evaluation, so hypothesized that scores on the BMMQ would be positively correlated with scores on the CFS (de, Malhotra, & Inoué, 2009; Malhotra, 2009).

Bar's (2001) Memory Aging Questionnaire (MAQ) was administered to assess how participants perceived of memory change with advancing age. The MAQ is a 14-item scale (1 = poor 14 item: "I don't remember names including strange details that aging is associated with declining memory performance). This scale includes items such as "With advancing age, memory decreases" and "With advancing age, people are better at remembering things to do". The reliability of the scores on this scale was satisfactory ($\alpha = 0.81$). We hypothesized that negative beliefs about age-related memory performance would be negatively associated with vulnerability judgments.

Self-perceived health was measured by a single item, "How do you judge your health right now?" Answers were given on a 5-point scale ranging from "excellent" to "worst", with higher scores indicating greater satisfaction with one's health (poor self-perceived health).

Results

Comparisons with the English-speaking sample

The BMMQ scores are presented in Table 1, along with scores from an English-speaking sample (Inoué & Kirk, 2001). To compare the two samples, t-tests were performed. The results showed that our sample had higher scores than the English-speaking sample on the commitment and ability dimensions of vulnerability (inconsistency on the strategy dimension). Note, though, that our sample was younger than the English-speaking sample (61.9 vs. 67.1 of our study and 61.7 in the original study, $p < 0.001$).

Table 1. Descriptive statistics for the dimensions of the IQM2

	Countdown		Ability		Strategy		Age	
	Female	Male	Female	Male	Female	Male	Female	Male
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Countdown	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)
Ability	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)
Strategy	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)
Age	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)	10.1 (1.0)

Factorial structure

A maximum likelihood confirmatory factor analysis was conducted to evaluate the three-dimensional model proposed by Torgue and Burt (2006). This model did not adequately fit the data ($\chi^2(128.5)$ $df(128)$, $p < 0.001$, $RMSEA = 0.10$) and principal component analysis, followed by variance rotation, was then performed. The solution for use of a factor analysis was evaluated by applying Bartlett's sphericity test and the Kaiser-Meyer-Olkin test. The χ^2 value on Bartlett's test was $\chi^2(127.5)$ $df(128)$, $p < 0.001$ and the value on the Kaiser-Meyer-Olkin test was 0.80, both indicating adequate homogeneity. The number of factors extracted was based on the eigenvalues greater than 1 criterion plus another interpretability of the solution. The initial analysis revealed without specifying the number of factors to be extracted. This procedure resulted in six factors with eigenvalues greater than 1. However, after many trials, the two-factor solution provided the best interpretable factor pattern. This solution accounted for 64% percent of the total variance in the questionnaire responses. Items with cross-loadings greater than 0.40 were found to be meaningful for the questionnaire.

Factor 1 (eigenvalue = 18.0) accounted for 28.3% percent of the variance variance and included all items on the ability dimension of the IQM2. Factor 2 (eigenvalue = 1.0) accounted for 1.6% percent of the total variance and included all four items of the countdown dimension. Factor 3 (eigenvalue = 0.8) accounted for 1.3% percent of the total variance and included nine items from the strategy dimension. It was labelled the overall strategy factor. Factor 4 (eigenvalue = 1.0) accounted for 1.6% percent of the variance variance and included nine other items from the IQM2/strategy dimension. This factor was named the overall strategy factor. Only two items (C7 and C10) did not have high loadings (>0.40) on either an

overall/strategy of items on the overall factor of the IQM2.

The internal consistencies of the scores on the three questionnaire subs (IQM2) dimensions were examined using Cronbach's α coefficients. For the countdown dimension, $\alpha = 0.728$ (α in the original version) for ability scores, 0.88 (α in the original version) and for strategy scores 0.77 (original $\alpha = 0.80$).

We also conducted an item analysis in order to provide evidence of internal consistency and identify items that failed to contribute optimally to the respective total dimension scores. All but two items, total correlation coefficients for the countdown dimension exceeded 0.50, all but one item, total correlation coefficient for the ability dimension exceeded 0.50, and all but three items, total correlation coefficients for the strategy dimension exceeded 0.50. One dropping these items did not improve α coefficient estimates.

Construct validity

Like Torgue and Burt (2006), we studied convergent validity between the IQM2 and the IQM by comparing correlation coefficients. Table 1 summarizes the results. The countdown dimension of the IQM2 was significantly correlated with both strategy and age ($r = 0.33$, $p < 0.001$, $r = 0.25$, $p < 0.001$), which is similar to the results reported by Torgue and Burt (2006) ($r = 0.30$, $p < 0.001$, and $r = 0.20$, $p < 0.001$). These results indicate that a high degree of strategy utilization was associated with a low level of accuracy and a finding of ability concern. In our's children, being, significant correlations ($r = 0.33$, $p < 0.001$) were found between the IQM2 ability dimension and the IQM ability dimension, as reported by Torgue and Burt (2006) ($r = 0.30$, $p < 0.001$). The correlation indicates that an optimal rating of one's abilities was associated with low reports of difficulty. The strategy dimension of the IQM2 was strongly and significantly correlated with the strategy dimension of the IQM ($r = 0.70$, $p < 0.001$).

Table 6. Multivariate ordered structural models for the 2000 (N = 1,938)

Model year ^a	Structure coefficients ^b				R-squared
	Forma 1	Forma 2	Forma 3	Forma 4	
0.1	0.000	0.000	0.000	0.000	0.000
0.2	0.000	0.000	0.000	0.000	0.000
0.3	0.000	0.000	0.000	0.000	0.000
0.4	0.000	0.000	0.000	0.000	0.000
0.5	0.000*	0.000	0.000*	0.000	0.000
0.6	0.000	0.000	0.000	0.000	0.000
0.7*	0.000	0.000*	0.000	0.000	0.000
0.8	0.000	0.000	0.000	0.000	0.000
0.9	0.000	0.000	0.000	0.000	0.000
0.00	0.000	0.000	0.000	0.000	0.000
0.01	0.000	0.000	0.000	0.000	0.000
0.02	0.000	0.000	0.000	0.000	0.000
0.03	0.000	0.000	0.000	0.000	0.000
0.04	0.000	0.000	0.000	0.000	0.000
0.05	0.000	0.000	0.000	0.000	0.000
0.06	0.000	0.000	0.000	0.000	0.000
0.07	0.000	0.000*	0.000	0.000	0.000
0.08	0.000	0.000	0.000	0.000	0.000
0.1	0.000	0.000	0.000	0.000	0.000
0.2	0.000	0.000	0.000	0.000	0.000
0.3	0.000	0.000	0.000	0.000	0.000
0.4	0.000	0.000*	0.000	0.000	0.000
0.5	0.000	0.000	0.000	0.000	0.000
0.6	0.000	0.000	0.000	0.000	0.000
0.7	0.000	0.000	0.000	0.000	0.000
0.8	0.000	0.000	0.000	0.000	0.000
0.9	0.000	0.000	0.000	0.000	0.000
0.00	0.000	0.000	0.000	0.000	0.000
0.01	0.000	0.000	0.000	0.000	0.000
0.02	0.000	0.000	0.000	0.000	0.000
0.03	0.000	0.000	0.000	0.000	0.000
0.04	0.000	0.000	0.000	0.000	0.000
0.05	0.000	0.000	0.000	0.000	0.000
0.06	0.000	0.000	0.000	0.000	0.000
0.07	0.000	0.000	0.000	0.000	0.000
0.08	0.000	0.000	0.000	0.000	0.000
0.09	0.000	0.000	0.000	0.000	0.000
0.10	0.000	0.000	0.000	0.000	0.000
0.11	0.000	0.000	0.000	0.000	0.000
0.12	0.000	0.000	0.000	0.000	0.000
0.13	0.000	0.000	0.000	0.000	0.000
0.14	0.000	0.000	0.000	0.000	0.000

a. 0.01 increments, 0.1 ending 0.17 (0.17 = 0.000)

b. Structure coefficients for subsamples with a form

Table 1 (continued)

WMM item ^a	Structure coefficient ^b				Communities
	Factor 1	Factor 2	Factor 3	Factor 4	
133	0.520	0.175	0.152	0.001	0.001
134	0.500	0.007	0.001	0.001	0.001
137	0.475	0.101	0.001	0.001	0.001
138	0.500	0.014	0.014	0.140	0.001
139	0.500	0.144	0.001	0.107	0.001
140	0.481	0.079	0.001	0.107	0.001
151	0.001	0.001	0.001	0.400	0.001
152	0.001	0.001	0.100	0.400	0.001
153	0.001	0.001	0.001	0.001	0.100
154	0.001	0.100	0.475	0.001	0.400
155	0.001	0.001	0.100	0.400	0.001
156	0.100	0.075	0.400	0.001	0.001
157	0.001	0.007	0.001	0.400	0.007
158	0.100	0.101	0.400	0.007	0.001
159	0.001	0.100	0.001	0.400	0.001
170	0.101	0.001	0.111	0.400	0.011
171	0.001	0.001	0.400	0.001	0.001
172	0.001	0.101	0.001	0.400	0.001
173	0.100	0.001	0.400	0.001	0.001
174	0.100	0.101	0.400	0.001	0.001
175	0.001	0.100	0.001	0.400	0.001
176	0.001	0.001	0.400	0.001	0.001
177	0.001	0.101	0.400	0.075	0.001
178	0.001	0.001	0.001	0.400	0.075
179	0.001	0.001	0.475	0.001	0.001

a. W = WMM; M = memory; H = strategy.

b. Entries indicate coefficients for each item within factor.

This correlation is higher than the reportedly (Soper and Hartmann, 2014; $p < 0.001$) and implies that frequency use of strategies assessed by the WMM was associated with frequent use of the strategies assessed by the HMA.

As expected, a significant correlation was found between depressed mood and memory judgments. Table 1 shows that the three dimensions of the WMM were significantly correlated with the CDS, except clearly if depressed mood was negatively correlated with confidence with one's memory abilities ($r = 0.16$, $p < 0.05$) and frequency of forgetting ($r =$

0.21 , $p < 0.01$) and positively correlated with the use of mnemonic strategies, especially internal cues ($r = 0.41$, $p < 0.001$).

Also as expected, a significant correlation was found between memory judgments and beliefs about aging-related memory performance. Table 1 shows that the three WMM dimensions were significantly correlated with stereotypes about aging memory. These results mean that beliefs in negative stereotypes about memory aging were associated with a low degree of confidence with one's abilities ($r = 0.21$, $p < 0.01$), enhanced reporting of memory problems

Table 2. Correlations between the MMQ dimensions, the MMQ dimensions, dependent level strategies about memory aging and demographic variables

	MMQ- Substratum	MMQ-Ability	MMQ-Strategy	MMQ-Strat1 Strategies	MMQ-Strat2 Strategies
MMQ-Strategy		0.27**			
MMQ-Change	0.20**				
MMQ-Strategy	0.28**				
MMQ-Strategy			0.75+	0.87**	0.75+
Dependent level	0.28**	0.28**	0.32**	0.32**	0.31
Demographic about Aging	0.07+	0.03+	-0.03+	-0.03	-0.03+
Age	-0.11	-0.12*	0.03	0.03	0.12*
Education	-0.03	-0.03	0.13+	0.03	0.03+
Subjective health	0.30**	0.28**	0.17*	0.03	0.17**

**Significance at $p < 0.01$; *Significance at $p < 0.05$.

($r = 0.18$, $p < 0.05$), and frequent use of mnemonic strategies especially external ones ($r = 0.20$, $p < 0.005$).

Finally, correlations between memory judgments, on the one hand, and age, education, and self-perceived health, on the other, were computed. As shown in Table 3, only ability and external strategy-related ones, but statistically significant ones, ($r = 0.14$, $p < 0.01$) and ($r = 0.15$, $p < 0.01$, MMQ-external) were found to relate more memory problems and more external mnemonic strategies more frequently than the frequent and high ability did not appear any significant correlation between age and the MMQ dimensions in their high-ability sample. Level of education was significantly correlated with the MMQ-Strategy dimension only more positively for external strategies, ($r = 0.13$, $p < 0.05$). Self-perceived health was positively correlated with memory judgments ($r = 0.13$, $p < 0.05$), and negatively correlated with strategy ($r = -0.16$, $p < 0.05$). Positive self-perceived health was related to a lower propensity to use more memory strategies, fewer externalizing problems, and greater satisfaction with one's abilities.

Discussion

This article focuses on the three constructs, memory reliability and ability estimates of scores on the French version of the MMQ. The results allow us to conclude that the French version of this index is psychometrically sound (highly trustworthy on the French MMQ) proved highly reliable and correlated to the expected dimensions with other constructs. Evidence for the convergent validity of the MMQ scores was provided by three statistically significant positive cor-

relations with the MMQ. Correlations between the MMQ abilities and the MMQ subscores were strong, ranging from 0.76 to 0.79, and similar to those obtained by Lopez and Holt (2011) in their original study. Validity was established by examining the relationships between subscores across self-reported variables. We found that memory judgments were associated to the expected direction with dependent level use in previous studies (see Plieger et al., 1995; Balle et al., 1991; Johnson et al., 1995) and to negative beliefs about aging-related memory performance (as hypothesized by Fleming and, 1995). Instead we noted that beliefs in negative stereotypes about memory aging were associated with the frequent use of external mnemonic strategies, which could be considered as a way of compensating for one's need or imaginary memory impairment. Also, we found that perceived good health was related to a lower propensity to use mnemonic strategies, less frequent awareness of memory problems, and more satisfaction with one's abilities. Our results revealed that, with advancing age, subjects tend not only to report more problems concerning but also to use greater memory strategies more often. These results are in line with those obtained by other authors who have examined the relationship between memory and age (Lopez, 1991; Charlton & Harrison, 1991; Conroy & Pass, 1999; Balle et al., 1991; Lavenex et al., 1995). Finally, we found that the higher the subjects' level of education, the more they relied on mnemonic strategies. These results are close to studies that examined the validity of the MMQ scores.

Regarding the factor structure, the results of the exploratory factor analysis did not support the a priori three-factor model of the MMQ: no explanatory factor

analysis revealed that a few fewer children collected the most recognizable pattern of factor scores, accounting for 16.4 per cent of the variance variance in the data set. Three of the dimensions proposed by Thorpe and East (2000) were replicated: basic ability and content-matter. Note that according to Thorpe and East (2000), content is reflecting memory ability like those in the content-matter and used to frequency of applying basic skills like those in the problem solving) are determined by memory ability, defined as "a set of factors about each capability to use memory effectively in various situations" (Thorpe et al., 1999, p. 78). Also, the content-matter and ability dimension of the (MIA) can be seen as different measures of memory ability. The three factor strategy was divided into two factors: internal strategies and external strategies. Internal strategies are strategies that rely on subjects' using mental elaboration to solve problems that usually (e.g., by creating a mental image regarding information to learn, or rehearsing what they've come secondary while external strategies involve modifications of the subject's surroundings and demands for external cues to optimize performance (e.g., writing down things to do, or writing in class books). This distinction was established in an earlier study that validated the MIA (Dixon & Webb, 1997). Moreover, this measure allows us to gain further information about a possible preference of subjects for one type of strategy and to give specific feedback to see that it suits the subject's preferences.

Although the results provide support for the psychometric properties of the French version of the (MIA), additional research is needed to further examine predictive validity among diverse samples, using different languages. Correlations between scores obtained by self-report measures about some shared method variance (conformity factor analysis) may be an issue sample for instance among subjects or cognitively impaired subjects are needed to address factor structure for measures of the (MIA). The usefulness of (MIA) by construct validation to test self-knowledge and self-determination for the identification factor loadings generated by (MIA) can be regarded as "validity evidence" (Bollen, 1999). Furthermore, a factor loading score as an index of how good the item is at indicating the underlying construct it is intended to measure.

Notes

1. We used the software R (R-project.org) to generate

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