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**Personality traits affect older adults' memory differently depending on the  
environmental support provided at encoding**

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## 26        **1. Introduction**

27            The effects of aging on episodic memory are well documented (e.g., McDaniel et al.  
28 2008) and are characterized by important external and internal sources of variability. Older  
29 adult's performance varies with the context in which the memory task is taken, the type of  
30 memory task, and notably with environmental support provided at encoding or retrieval stages  
31 ( Craik, 1986). Age-related differences in memory performance are greater when  
32 environmental support is absent, because the tasks are demanding and cognitive resources are  
33 low in older adults (Rabinowitz et al., 1982). Moreover, according to the Cognitive Reserve  
34 Hypothesis (Stern, 2002), life experiences (emotional, social, and environmental) and  
35 intelligence can protect against age-related episodic memory declines (Angel et al., 2010;  
36 Gombart et al., 2018; Park & Reuter-Lorenz, 2009). More recently, research demonstrates a  
37 relationship between personality dimensions and cognition, whereby personality modulates  
38 the way people process and remember information (e.g., Karsazi et al., 2021; Simon et al.,  
39 2019; Soubelet et al., 2010). However, we do not fully understand how personality traits  
40 influence memory performance or which aspects of memory are affected by personality traits,  
41 particularly in older adults. Therefore, the current studies examined the effects of two  
42 personality traits hypothesized to modulate memory performance in older adults: neuroticism  
43 and openness to experience. We tested the hypothesis that these two traits may be differently  
44 associated with episodic memory performance, depending on the amount of encoding support  
45 provided.

46            Previous research suggests that personality may contribute to cognitive performance,  
47 especially as people age (e.g., Karsazi et al., 2021; Simon et al., 2019; Soubelet & Salthouse,  
48 2010). For example, cognitive performance might be associated with the five personality traits  
49 described by the Big Five model (Agreeableness, Conscientiousness, Extraversion, Neuroticism  
50 and Openness; Costa & McCrae, 1992). However, the most robust results show that two

51 personality traits are closely related to cognitive performance, and in particular memory:  
52 openness, the tendency to be intellectually curious, creative and imaginative, and neuroticism,  
53 the disposition to experience negative affect, including anger, anxiety, self-consciousness,  
54 irritability, emotional instability, and depression (e.g., Allen et al., 2019; Karsazi et al., 2021).  
55 Openness is positively associated with memory performance, whereas neuroticism is  
56 negatively associated with memory performance. A recent longitudinal study confirmed the  
57 important role of these two personality traits for memory, showing that high levels of  
58 openness and low levels of neuroticism were associated with reduced memory decline  
59 (Stephan et al. 2020). Studies conducted with older adults show that a high level of openness  
60 has a protective effect against cognitive decline (e.g., Franchow et al., 2013; Jackson et al.,  
61 2020; Karsazi et al., 2021; Luchetti et al., 2016; Simon et al., 2019).

62         There are several reasons why openness may be related to cognitive performance.  
63 Openness to experience is related to the tendency to be creative and unconventional, and  
64 seems to be beneficial for developing crystallized intelligence, i.e., knowledge accumulated  
65 throughout one's life (e.g., Jopp & Hertzog, 2007; Salthouse et al., 2002), as well as fluid  
66 intelligence, i.e., the ability to solve problems in new situations (e.g., Zimprich et al., 2009).  
67 These two cognitive components are critical for the development of knowledge in the long  
68 term (Soubelet & Salthouse, 2010) and episodic memory (Bouazzaoui et al., 2013, 2014).  
69 Moreover, openness is associated with participation in cognitively-stimulating activities,  
70 possibly leading to preservation of cognitive functions (Ihle et al., 2016; Soubelet &  
71 Salthouse, 2010). With regard to memory, a positive association between openness and  
72 memory has been found in numerous studies (e.g., Jackson et al., 2020; Martinez et al., 2021;  
73 Soubelet & Salthouse, 2010). In a recent study, Talpain and Soubelet (2020) showed that high  
74 levels of openness were associated with good memory performance because people with high  
75 levels of openness use efficient memory strategies. Research on memory strategies also

76 showed that the most efficient strategies require a substantial amount of controlled processes  
77 (e.g., Burger et al., 2017) unless they are driven by particular experimental context (type of  
78 stimuli, type of task, or particular instructions at the learning stage, Craik, 1986; Tacconat et  
79 al., 2004). Therefore, one would predict that a high score on openness would be particularly  
80 useful for the most difficult memory tasks—those that require a significant amount of  
81 controlled processes and require people to select and use the most efficient memory strategies  
82 (Talpain & Soubelet, 2020).

83         The other personality trait that is strongly linked to cognitive performance in general,  
84 and to memory in particular, is neuroticism (e.g., Klaming et al., 2017; Simon et al., 2020;  
85 Neupert et al., 2008). People who score high in neuroticism tend to experience negative  
86 emotions easily and frequently, are vulnerable to stress, and show performance decrements on  
87 cognitive tasks (Boyle et al., 2010; Chapman et al., 2012; Graham & Lachman, 2014; Munoz,  
88 et al., 2013; Wettstein, et al., 2017). They are also more unstable (Elliott, et al., 1994) and  
89 have weaker adaptive capacities (Kokkonen & Pulkkinen, 2001) which may cause people  
90 with high levels to this trait to behave less efficiently in certain situations, such as when  
91 performing cognitive tests. Furthermore, older adults with a high level of neuroticism report  
92 more intense negative affect (e.g., Bolger & Schilling, 1991; Bolger & Zuckerman, 1995;  
93 David & Suls, 1999; Gunthert et al., 1999) more memory failures (Neupert et al., 2008) and  
94 more memory complaints (Merema et al., 2013) than older adults with low neuroticism.

95         The deleterious effect of a high level of neuroticism on memory performance has been  
96 explained by the fact that people with high levels of neuroticism have more negative beliefs  
97 about their ability to control their memory (i.e., perceived control) and lower self-esteem,  
98 which can negatively influence their behavior in new or difficult situations (Judge, et al.,  
99 2002; Lachman et al., 2011; Pinard et al., 2021). Chronic stress can cause structural damage  
100 in the hippocampus, a structure both involved in the regulation of stress hormones through the

101 HPA axis and in memory, and therefore lead to impaired memory and accelerated memory  
102 decline (Kim & Diamond, 2002). Therefore, one can predict that a high level of neuroticism  
103 would be associated with poor memory performance, regardless of the nature of the task.

104 In the current studies, we examined how openness and neuroticism contribute to older  
105 adults' memory performance as a function of whether environmental support is provided or  
106 not at encoding. Providing environmental support may help older adults implement memory  
107 strategies that are particularly resource demanding, because one crucial factor for age-related  
108 memory decline is the lack of cognitive resources in older adults (Rabinowitz et al., 1982).  
109 Environmental support can be provided in different ways. Classically, environmental support  
110 refers to the use of orientation tasks that guide the implementation of effective cognitive  
111 processes for memory ( Craik, 1986; Tacconat & Isingrini, 2004). Thus, environmental  
112 support can correspond to any experimental situation that promotes memorization. For  
113 example, Sindi et al. (2013) showed that when older adults performed a memory task under  
114 conditions that were favorable to them (the experimenter was the same age as the participants,  
115 instructions did not mention a memory task to avoid stereotype threat, experimentation was  
116 conducted in a familiar place and in the morning, which is the preferred time of day of older  
117 adults), they were more successful than when they performed the task in more unfavorable  
118 conditions. To create conditions of environmental support, we provided older adults with  
119 prior task success (Experiment 1) and encouraged effective study strategies using generation  
120 versus reading (Experiment 2).

121 In Experiment 1, we examined the role of openness to experience and neuroticism on  
122 memory performance when it was either facilitated or not by success on a prior task. The prior  
123 task success effect refers to the finding that older adults perform better on a task after having  
124 succeeded on a prior unrelated cognitive task than after failing or not performing a prior task  
125 (Geraci & Miller, 2013; Geraci et al., 2016; Rossi-Arnaud et al., 2018). For example, Geraci

126 and Miller (2013) showed that older adults' memory performance was better when they had  
127 succeeded on an unrelated sentence scramble task prior to participating in a memory test  
128 compared to when they did not succeed on the prior task. This effect of prior task success on  
129 memory performance could be the consequence of decreased anxiety, and increased self-  
130 esteem (Geraci et al., 2016), both of which facilitate engagement in effective cognitive  
131 processing, such as efficient strategy selection (see Lemaire & Brun, 2018). Thus, prior task  
132 success can be considered as a form of environmental support.

133 In Experiment 2, we examined the role of openness to experience and neuroticism on  
134 memory performance using a different paradigm in which the engagement of controlled  
135 processes varied: a generation effect protocol. The generation effect (Slamecka & Graf, 1978)  
136 refers to the finding that more words are remembered after generating (e.g. saddle-ho---) than  
137 after reading (e.g., roof-house). Young adults as well as older adults demonstrate the  
138 generation effect (Taconnat & Isingrini, 2004). This effect is due to the fact that in the reading  
139 condition, memory-efficient encoding processes are self-initiated, whereas in the generation  
140 condition, these processes are driven by the production task itself, and thus less costly to  
141 implement. Thus, remembering words that were simply read would require additional self-  
142 initiated processes, and more control-demanding processes, which make the task more  
143 difficult for older adults who have reduced cognitive resources (Taconnat & Isingrini, 2004).

144 Given the facilitating effects of prior task success and of generating words on  
145 subsequent performance, we predicted that openness to experience would contribute most to  
146 memory performance in the conditions in which self-initiated control processes are required  
147 by the memory tasks, such as in the control (no prior task success) condition of Experiment 1  
148 and the reading condition of Experiment 2. We predicted that neuroticism would contribute to  
149 memory performance in both more and less supportive conditions because high levels of this  
150 personality trait could affect memory regardless of whether controlled processes are required.

151

152 **2. Experiment 1: Effect of prior task success on memory performance in relation with**  
153 **Openness and Neuroticism**

154 In Experiment 1, we sought to examine the role of openness to experience and  
155 neuroticism on memory when performance was either facilitated or not by success on a prior  
156 task. To induce task success, participants in the task success group completed a vocabulary  
157 test prior to participating in the memory portion of the experiment. We used a vocabulary test  
158 to instantiate task success because vocabulary is one domain in which performance remains  
159 stable or increases with age (Park & Reuter-Lorenz, 2009) such that the test could be  
160 successfully completed by older participants. Moreover, a vocabulary test is the type of task  
161 (i.e., verbal task) that has been shown to be effective in achieving prior task success effects  
162 (e.g., Geraci et al., 2016). We therefore hypothesized that participants would recall more  
163 words when the memory task was completed after the vocabulary task (prior task success  
164 condition) than when it was completed following no prior task (standard condition), indicating  
165 a prior success effect. We predicted that openness would be positively associated with recall  
166 performance, and neuroticism would be negatively associated with recall performance overall.  
167 We hypothesized that the main predictor of memory performance in the standard condition,  
168 i.e., the condition with higher cognitive demands, would be openness to experience because  
169 high scores on openness favor controlled processes required by this task. Neuroticism should  
170 explain memory performance to a lesser extent because neuroticism is associated with  
171 anxiety, which can affect memory performance regardless of the situation. On the other hand,  
172 in the prior task success condition, neuroticism should be the main predictor of memory  
173 performance because this personality trait should affect memory performance in any situation,  
174 regardless of the condition in which memory test is taken. Openness, and the qualities  
175 associated to this personality trait, would not be useful in this “easier” condition.

## 1762.1. Methods

177 **2.1.1. Participants** Eighty-one older adult volunteers (45 women) ages 60-78 years ( $M =$   
 178 69.53 years,  $SD = 4.55$ ) participated in this study. Participants lived independently and had  
 179 no learning, neurological or psychiatric disorders. They were not taking any medication that  
 180 could affect the central nervous system. An informed consent to participate was signed by  
 181 all participants. To reduce the risk of including people with anxiety and/or depressive  
 182 symptoms at a pathological level, participants were assessed using the two HADS subscales  
 183 (Hospital Anxiety and Depression Scale; Zigmond & Snaith, 1983). All participants scored  
 184 below 11 to both subscales (pathological threshold). They scored an average of 5.29 ( $SD =$   
 185 2.57) and 6.21 ( $SD = 1.94$ ) on the Anxiety and Depression subscales, respectively. All  
 186 participants scored higher than 27/30 ( $M = 28.72$ ,  $SD = 0.74$ ) on the MMSE (Mini Mental  
 187 State Examination; Folstein et al., 1975), which reduces the risk of including participants  
 188 with major neurocognitive disease. Participants in this sample had an average of 12.27 years  
 189 of education ( $SD = 1.85$ ). Participants of each group's characteristics are presented in Table  
 190 1.

191

192 Table 1: Participants' mean characteristics and Standard Deviations (SD) in each condition in  
 193 Experiment 1.

	Standard condition (n=41)	Prior task success condition (n=40)	t(79); p
Age	69.00 (4.57)	70.07 (4.53)	-1.06, p=.29
Educational level*	12.48 (1.95)	12.05 (1.66)	1.09, p=.27
MMSE	28.75 (.80)	28.70 (.69)	.34, p=.73
Vocabulary	24.65 (.99)	24.32 (1.24)	1.33, p=.19

Anxiety	5.27 (2.58)	5.32 (2.59)	-.10, $p=.92$
Depression	6.36 (2.12)	6.05 (1.75)	.73, $p=.46$

194 Note: \* in years, MMSE: Mini Mental State Examination, Vocabulary: Vocabulary score  
 195 from the Mill-Hill vocabulary test; Anxiety and Depression scores from the Hospital  
 196 Anxiety/Depression Scale (HADS)

### 197 **2.1.2. Materials and procedure**

198 *Memory assessment.* Participants' memory was assessed under two conditions, the standard  
 199 (no support) condition and the prior task success (encoding support) condition. They were  
 200 randomly assigned either to the standard condition or to the prior task success condition. They  
 201 were first interviewed to collect demographic data, and they completed the MMSE and  
 202 HADS, and then given the personality questionnaire. Finally, they completed the task in  
 203 standard or prior task success condition. They had to learn a list of 20 common words of 4 to  
 204 9 letters and 2 to 3 syllables. In each condition, the 20 words were presented on a computer  
 205 screen at a rate of 3 seconds per item and 500 ms between each item. The experimenter asked  
 206 participants to memorize the word-list in order to recall as many words as possible during the  
 207 subsequent recall phase. At the end of the word presentation, participants performed a short  
 208 countdown task to avoid any recency effect. At the end of this task, participants were asked to  
 209 recall orally all the words they could remember (free recall) without any order or time  
 210 constraints. The dependent variable was the number of words correctly recalled under each  
 211 condition. Last, participants were debriefed on the objectives of the study.

212 *Prior task success manipulation.* Participants in both the standard and the task success  
 213 conditions completed a shortened version of the Mill-Mill vocabulary test (Raven et al.,  
 214 1989). In the task success (encoding support) condition, participants completed the  
 215 vocabulary test before participating in the memory portion of the experimental session. In the

216 standard (no encoding support) condition, they completed the vocabulary test afterwards. For  
217 the vocabulary test, participants were asked to choose the synonym of a word from a list of  
218 six other words. To create a feeling of success on this vocabulary test, we created a version of  
219 the test that consisted of 26 items instead of 34 by removing the most difficult items. To  
220 further instantiate a sense of task success, the experimenter informed participants that they  
221 had done well on this test (regardless of their condition). As shown in Table 1, the two groups  
222 performed equivalently on vocabulary (the score corresponds to the number of correct  
223 answers). One might wonder whether taking a vocabulary test after a more difficult memory  
224 test might result in poorer vocabulary test scores than when the test occurred before the  
225 memory experiment. However, we did not expect this effect since vocabulary is a cognitive  
226 ability that is generally not impaired with aging and for which older adults are expected to  
227 perform proficiently.

228 *Personality measures.* The NEO-PI-R French version (BFI-Fr) was used to assess personality.  
229 This self-questionnaire corresponds to the French version (Plaisant et al., 2010) of the NEO-  
230 PI-R developed by Costa & McCrae (1992). It is based on the Big Five model and allows the  
231 positioning of individuals on five scales corresponding to five personality traits: Extraversion,  
232 Agreeableness, Conscientiousness, Neuroticism and Openness. In this study, we collected  
233 only the scores from the dimensions "Openness to experience" and "Neuroticism".  
234 Participants in the standard condition and the participants in the prior task success had  
235 equivalent scores to Openness trait (respectively  $M = 29.34$ ,  $SD = 8.49$  and  $M = 31.62$ ,  $SD =$   
236  $9.62$ ;  $p = .26$ ) and to Neuroticism trait (respectively  $M = 24.40$ ,  $SD = 6.97$  and  $M = 23.75$ ,  $SD$   
237  $= 7.86$ ;  $p = .56$ ).

238

239 **2.1.3. Data processing**

240 First, to test our first hypothesis, the mean recall scores in each condition were  
241 compared with t tests. Then, correlational analyses were performed to examine the  
242 relationship between recall performance and the two personality traits in the two learning  
243 conditions. To control for the variables possibly associated to recall, the correlations (Bravais-  
244 Pearson r) between the recall score and the following variables: The HADS measures of  
245 anxiety and depression, age, education, and vocabulary were analyzed. Correlational analyses  
246 between personality traits and recall were therefore conducted under the control of measures  
247 correlated with recall (i.e., partial correlations). In addition, correlational analyses between  
248 openness and recall were performed controlling for neuroticism, and correlational analyses  
249 between neuroticism and recall were performed controlling for openness (i.e., partial  
250 correlations).

251 If a personality trait was not associated with recall in the same way in the prior task  
252 success condition and in the standard condition, a General Linear Model (GLM) analysis was  
253 conducted. The GLM analysis was used to analyze models with combinations of continuous  
254 (as individual openness and neuroticism scores) or categorical (as condition) predictors when  
255 applied to quantitative scales. This analysis allowed us to examine the interaction between the  
256 variable condition (categorical variable) on one hand and the openness score or the  
257 neuroticism score (as continuous variables) on the other hand. Last, regression analyses were  
258 conducted to assess the best predictors of recall in the standard condition and in the prior task  
259 success condition.

260

### 261 **3. Results**

#### 262 ***3.1. Effect of prior task success on memory performance***

263 In accord with our first hypothesis, participants who learned the word list in the prior task success  
264 condition recalled more words ( $M = 8.55$ ,  $SD = 1.97$ ) than participants who learned in the

265 standard condition ( $M = 6.97$ ,  $SD = 2.05$ ),  $t(79)=3.51$ ,  $p<.001$ , Cohen's  $d = .78$ , indicating a  
266 large effect size.

### 267 **3.2. Relationship between recall and the two personality traits**

268 First, we examined the correlations between the recall score and the following variables:  
269 The HADS measures of anxiety and depression, age, education, and vocabulary. In the  
270 Standard condition, only the anxiety score was correlated with the recall ( $r = -.46$ ,  $p = .002$ ).  
271 In the prior task success condition, anxiety was correlated with recall ( $r = -.45$ ,  $p = .003$ ),  
272 education ( $r = .34$ ,  $p = .03$ ), and vocabulary ( $r = .33$ ,  $p=.03$ ).

273 Partial correlations performed on recall in standard condition showed that openness  
274 was significantly and positively correlated with the number of words recalled ( $r = .53$ ,  $p <$   
275  $.001$ ), and neuroticism was significantly and negatively correlated with recall ( $r = -.32$ ,  $p$   
276  $=.048$ ). On the recall score under the prior task success condition, openness was not correlated  
277 with recall ( $r = .07$ ,  $p =.65$ ), whereas neuroticism was significantly and negatively correlated  
278 with recall score ( $r = -.35$ ,  $p = .04$ ).

279 Because openness was not equally associated with recall in the prior task success  
280 condition and in the control condition, we performed a GLM to test the interaction between  
281 the learning condition and openness to experience. The effect of condition was significant,  
282  $F(1,77) =9.71$ ,  $p=.002$ ,  $\eta_p^2 =.11$ , indicating that participants recalled more words in the  
283 previous task success condition than in the standard condition. The effect of openness to  
284 experience was significant,  $F(1,77) =25.61$ ,  $p<.0001$ ,  $\eta_p^2 =.25$ . The interaction between  
285 condition and openness was significant,  $F(1,77) =4.98$ ,  $p=.02$ ,  $\eta_p^2 =.06$ , indicating that the  
286 effect of openness was different according to the condition. According to the correlational  
287 analyses, this result indicates that the effect of openness is greater in the standard condition  
288 than in the prior task success condition. In the standard condition, the higher the score to

289 openness, the higher the recall performance. Moreover, the interaction suggests that  
 290 individuals with lower levels of openness benefit more from environmental support (prior task  
 291 success condition) than individuals with high levels of openness.

292

### 293 *3.3. Predictors of recall*

294 The main objective was to determine the best predictor(s) of recall performance under  
 295 each condition. Hierarchical linear regression analyses were performed for each experimental  
 296 situation. All measures correlated with recall in each group were entered into the model, in  
 297 addition to measures of openness and neuroticism. Thus, in the standard condition, the  
 298 Anxiety score was entered into the analysis, and in the prior task success condition, the  
 299 Anxiety score, Vocabulary score and Educational level were also entered into the analysis. All  
 300 variables are entered in the equation at the same time, and they appear in decreasing order of  
 301 reliability in the analysis. The results are presented in Table 2.

302

303 **Table 2: Results of the Regression Analysis on Recall (Standard and prior task success**  
 304 **Conditions)**

Steps	Standard Condition (N=41)	Prior Task Success Condition (N=40)
1	Openness $\beta = 0.54, p < .001$ $R^2 = 0.42$ ; $R^2C = 0.42, p < .0001$	Neuroticism $\beta = -0.48, p < .001$ $R^2 = 0.268$ ; $R^2C = 0.268, p < .001$
2	Neuroticism $\beta = 0.29, p = .04$ $R^2 = 0.48$ ; $R^2C = 0.06, p = .04$	Education level $\beta = 0.21, p = .15$ $R^2 = 0.31$ ; $R^2C = 0.04, p = .13$

305

306 Regression analyses showed that in the standard situation, openness was the first  
307 predictor of recall and accounted for 54% ( $p < .0001$ ) of the variance of recall; neuroticism  
308 added 29% ( $p = .04$ ). In the prior task success condition, neuroticism was the only predictor of  
309 recall with 37% ( $p < .001$ ) of variance explained, Educational level accounted for a non  
310 significant 4%.

#### 311 **4. Discussion**

312 Consistent with previous results (e.g., Geraci & Miller, 2013; Geraci et al., 2016),  
313 the effect of previous task success was confirmed in the present study. Previous results by  
314 Geraci and colleagues were thus extended, showing that participants who completed the  
315 vocabulary test prior to participating in the memory experiment recalled more words than  
316 those who completed the vocabulary test after the memory experiment. Note that participants  
317 of both groups were in fact successful on the vocabulary test (about 92% success on the  
318 vocabulary test on average whatever the experimental condition) suggesting that performance  
319 on this test was not impacted by the episodic memory test. Moreover, consistent with previous  
320 research and with our prediction, we found a positive association between openness and  
321 memory performance in the standard condition (e.g., Jackson et al., 2020; Martinez et al.,  
322 2021; Soubelet & Salthouse, 2010; Talpain & Soubelet, 2020) and a negative association  
323 between neuroticism and memory performance (e.g., Kim & Diamond, 2002; Stephan et al.,  
324 2020). Finally, our data showed that the two personality traits did not act in the same way in  
325 the two experimental conditions. In the standard condition, i.e., the most demanding condition  
326 with the least amount of support, openness was the main predictor of recall. This finding  
327 suggests that the characteristics of people with a high level of openness, i.e., those who enjoy  
328 new experiences, perhaps such as taking a memory test in a laboratory, perform better than  
329 those with lower levels of openness. This test situation could be less stressful for these people,  
330 and, being in better position to take a test, they could therefore allocate more resources to the

331 memory task, which would be more successful. However, the level of neuroticism appears as  
332 a second predictor. Thus, even when individuals are high on openness, a high level of the  
333 neuroticism can negatively influence memory scores. In the prior task success (support)  
334 condition, only neuroticism predicted memory performance. Overall, participants who  
335 participated in the memory experiment following a successful task experience performed  
336 better on the memory test than those who simply participated in the memory experiment.  
337 However, having a high level of neuroticism negatively influenced memory performance,  
338 even in the prior task success condition that we might consider to be easier, suggesting that  
339 even in the supported and potentially less stressful experimental condition, neuroticism was  
340 negatively associated to memory scores. The level of the openness trait did not predict  
341 memory performance in the prior task success condition. This could mean that when the  
342 memory task is easier, the qualities of people with a high level of openness are not needed to  
343 succeed on the memory task.

344

## 345 **5. Experiment 2: Effect of word generation on memory performance in relation with** 346 **Openness to experience and Neuroticism**

347 In Experiment 2, we sought to examine the role of these personality traits on memory  
348 performance when memory was supported through specific strategies at encoding. To do this,  
349 we used a word generation paradigm to enhance encoding (e.g. the “generation effect”;  
350 Slamecka & Graf, 1978; Tacconat & Isingrini, 2004). In this paradigm, participants learn a  
351 list of words according to two modalities, reading and generation. In the reading condition, a  
352 target word associated to a cue word must simply be read (e.g., roof-house), in the generation  
353 condition, the target word must be produced from the cue word (e.g., saddle-ho---) and a  
354 generation rule (here: produce a semantic associate).

355           Based on a previous research (Martinez et al., 2021), we predicted that openness  
356 would be more strongly associated with recall of read words than with recall of generated  
357 words because this personality trait seems to be especially associated to cognitive tasks that  
358 require highly cognitive control. By contrast, and in line with the literature and the results of  
359 Experiment 1, a negative association was expected between neuroticism and memory  
360 performance. Neuroticism would be negatively correlated to the recall score of both read  
361 words and generated words, but more highly in the former, reading being a condition more  
362 dependent of control processes than generation, and neuroticism being especially deleterious  
363 for these processes.

## 364 **5.1. Methods**

### 365 **5.1.1. Participants**

366           Forty-two older adults between the ages of 60 and 82 years ( $M = 71.22$ ,  $SD = 6.70$ )  
367 participated in the experiment (21 men and 21 women). To characterize the participants, we  
368 used the same measures that were used in Experiment 1. All participants had a score above 27  
369 to the Mini-Mental Status Examination (MMSE, Folstein et al., 1975). The mean scores to the  
370 anxiety and depression components of the HADS (Zigmond & Snaith, 1983) were 5.81 ( $SD =$   
371  $2.67$ ) and 5.52 ( $SD = 2.34$ ) respectively. The Mill-Hill vocabulary test (Raven et al., 1989)  
372 was used to evaluate and compare the level of vocabulary across participants in the two study  
373 conditions. Note that because our goal was simply to measure participants' vocabulary  
374 knowledge, and not to manipulate task success, we used a standard version of the vocabulary  
375 test with 34 items and we used a standard administration procedure that did not include  
376 feedback. The sample mean score was 24.07 ( $SD = 4.78$ ) and thus comparable to the  
377 participants' vocabulary level in Experiment 1. The overall level of education of participants  
378 in the sample was 11.24 years of school completed ( $SD = 2.68$ ). All the tests and  
379 questionnaires were given before the memory test.

### 380 **5.1.2. Materials and procedure**

381 **Episodic-memory task.** Participants studied a list of 24 semantically associated word pairs  
382 (Ferrand & Alario, 1998). This list consisted of two sub-lists of 12 word pairs,  
383 counterbalanced across the two conditions: reading (roof-house) and generation (saddle-hor--  
384 ). The pairs of items were presented randomly within a block, on a screen, for 5s each, with an  
385 inter-stimulus time of 1s. Participants were instructed to try to learn the words in preparation  
386 for a recall phase in which the first word (cue word) would be presented again and they would  
387 need to recall the second word of the pair (target word). In order to ensure the correct  
388 understanding of the instructions, participants were given practice trials with 4 word-pairs per  
389 condition (no used in the test). Then, participants were given the study list. At the end of the  
390 study phase, participants completed a one-minute distractor task (letter-pairs comparison XO  
391 task, Salthouse, 1990) to avoid any recency effect. Finally, participants were given the cued  
392 recall test and had unlimited time to recall the target words from the cue words. Note that in  
393 the generation condition, participants produced 100% of the words from the cues and the  
394 fragment of the target words. Thus, the number of words learned in the reading condition and  
395 the generation conditions were equivalent, i.e., 12 words. Recall performance is the total  
396 number of words read and produced that were correctly recalled.

### 397 **5.1.3. Personality measures.**

398 The same questionnaire used in Experiment 1 was used to assess openness and neuroticism in  
399 Experiment 2. The participants mean scores for these traits were 31.88 ( $SD = 7.17$ ) and 25.26  
400 ( $SD = 6.52$ ), respectively.

### 401 **5.1.4. Data processing**

402 To test our first hypothesis, the mean recall scores in each condition were compared with t  
403 tests. Then, correlational analyses were performed to examine the relationship between recall

404 performance and the two personality traits for the read words and the generated words. To  
405 control for the variables possibly associated to recall, the correlations (Bravais-Pearson  $r$ )  
406 between the recall score and the following variables: The HADS measures of anxiety and  
407 depression, age, education, and vocabulary were analyzed. Correlational analyses between  
408 personality traits and recall were therefore conducted under the control of measures correlated  
409 with recall (i.e., partial correlations). In addition, correlational analyses between openness and  
410 recall were performed controlling for neuroticism, and correlational analyses between  
411 neuroticism and recall were performed controlling for openness (i.e., partial correlations).  
412 General Linear Model (GLM) analysis was conducted under the same conditions as in  
413 Experiment 1

414

## 415 **6. Results**

### 416 **6.1. *Effect of generation on memory performance***

417 As expected, the  $t$ -test showed a significant generation effect  $t(82) = 3.80, p < .001$ , indicating  
418 that the recall was higher for words that had been generated at study ( $M = 5.38, SD = 2.19$ )  
419 than those that had been read ( $M = 3.67, SD = 1.92$ ), Cohen's  $d = .817$  indicating a large  
420 effect, in accord with the literature.

### 421 **6.2. *Correlational analyses***

422 First, we examined the correlations between the recall of read and generated words and the  
423 following variables: Anxiety, depression, age, education, and vocabulary. Only vocabulary  
424 was correlated with recall of generated words ( $r = .356, p = .021$ ). The number of read words  
425 recalled was correlated with education ( $r = .465, p = .002$ ) and vocabulary ( $r = .379, p =$   
426  $.013$ ). Analyses of the correlations between measures of personality traits and recall were  
427 therefore conducted by controlling for vocabulary, and while controlling for both vocabulary

428 and the educational (i.e., partial correlations). In addition, correlation analyses between  
429 openness and recall were performed controlling for neuroticism, and correlation analyses  
430 between neuroticism and recall were performed controlling for openness. Analyses performed  
431 on recall of read words showed that openness to experience was significantly and positively  
432 correlated with the number of words recalled ( $r = .606, p < .001$ ), whereas neuroticism was  
433 negatively correlated with recall ( $r = -.35, p = .03$ ). For recall of generated words, openness  
434 was not correlated with recall ( $r = .11, p = .45$ ), whereas neuroticism was significantly and  
435 negatively correlated with recall ( $r = -.38, p = .016$ ).

436 Because openness was not equally associated with recall for the generated words and for the  
437 read words, we performed a GLM to test the interaction between the learning condition and  
438 openness to experience. The generation effect was significant  $F(1,40) = 24.25, p < .0001, \eta_p^2 = .37$ ,  
439 indicating that the recall was higher for words that had been generated at than those that  
440 had been read. The effect of openness was significant,  $F(1,40) = 21.22, p < .0001, \eta_p^2 = .35$ .  
441 The interaction between the encoding condition and openness was significant,  $F(1,40) =$   
442  $14.53, p = < .001, \eta_p^2 = .26$ , indicating that the effect of openness was not the same according  
443 to the encoding condition. According to the correlational analyses, this result indicates that the  
444 effect of openness is greater for the recall of the read words than for the generated words. This  
445 suggests that individuals with lower levels of openness benefit more from environmental  
446 support (generation) than individuals with high levels of openness.

447

448

### 449 **6.3. Regression analyses**

450 The main objective was to determine the best predictor(s) of recall performance under  
451 each condition. Hierarchical linear regression analyses were performed for the read words and

452 for the generated words separately. All measures that were correlated with recall were entered  
 453 into the model, in addition to measures of openness and neuroticism. Thus, for the read words,  
 454 Educational level, Openness and Neuroticism were entered into the analysis, and for the recall  
 455 of generated words, Vocabulary Score and Neuroticism were entered into the analysis. All  
 456 variables were entered in the equation at the same time, and they appear in decreasing order of  
 457 reliability in the analysis. The results are presented in Table 3.

458

459 **Table 3: Results of the Regression Analysis on Recall (reading and generation**  
 460 **Conditions).**

	<b>Reading Condition</b> (N=42)	<b>Generation Condition</b> (N=42)
Steps	Variables	Variables
	Openness	Neuroticism
<b>1</b>	$\beta = 0.54, p < .001$ $R^2 = 0.53$ ; $R^2C = 0.53, p < .0001$	$\beta = -0.32, p = .027$ $R^2 = 0.23$ ; $R^2C = 0.10, p = .02$
	Neuroticism	Vocabulary
<b>2</b>	$\beta = -0.29, p = .03$ $R^2 = 0.59$ ; $R^2C = 0.06, p = .01$	$\beta = 0.14, p = .02$ $R^2 = 0.127$ ; $R^2C = 0.127, p = .02$
	Educational Level	/
<b>3</b>	$\beta = .18, p = .09$ $R^2 = .62$ ; $R^2C = 0.02, p = .13$	
	Vocabulary	/
<b>4</b>	$\beta = .15, p = .17$ $R^2 = .64$ , $R^2C = .018, p = .17$	

461

462

463 Regression analyses showed that for the read words, openness was the first predictor  
464 of recall performance and accounted for 53,4% ( $p < .0001$ ) of the variance of recall scores.  
465 Neuroticism added 6.5% ( $p = .028$ ). Education and vocabulary added respectively non  
466 significant 2% and 1% of the variance. For generated word recall, vocabulary accounted for  
467 12.6 % of the variance in recall ( $p = .02$ ) and neuroticism accounted for 10.4% ( $p = .027$ ) of  
468 the variance.

## 469 7. Discussion

470 Consistent with previous research, generated words were better recalled than read  
471 words (Isingrini & Taconnat, 2004; Marticnez et al., 2021). Because participants in  
472 Experiment 2 completed a vocabulary test prior to the memory test, whereas those in  
473 Experiment 1 only did so in one condition (the prior task success condition), one might  
474 predict that overall memory performance would be higher in Experiment 2 than in Experiment  
475 1. However, the vocabulary tests and procedures differed across the two experiments, so their  
476 potential effects on subsequent memory performance cannot be easily compared. The  
477 vocabulary test used in Experiment 1 was designed to instantiate a feeling of task success,  
478 whereas the vocabulary test used in Experiment 2 was used simply to measure vocabulary  
479 knowledge following the standard procedure. In Experiment 1, the vocabulary was shortened  
480 to help ensure that participants would successfully complete most of the items. They correctly  
481 identified 92% of the words. In Experiment 2, the full set of 34 items was used and  
482 participants correctly identified 72% of them. Also, in Experiment 1, participants received  
483 positive feedback on their performance, whereas they received no feedback in Experiment 2,  
484 following the standard procedure.

485 We also found that these two personality traits act differently according to the level of  
486 environmental provided at the learning stage. There was a positive association between recall

487 of read words and openness (e.g., Jackson et al., 2020; Martinez et al., 2021; Soubelet &  
488 Salthouse, 2010; Talpain & Soubelet, 2020). However, openness was not correlated to the  
489 recall of generated words, consistent with our hypothesis. This lack of correlation between  
490 openness and memory for generated words could be due to the fact that both encoding  
491 (generation) and retrieval stages (cued recall) provided support. Possibly, this relatively easy  
492 task does not require the cognitive competencies usually found to be associated with  
493 openness. We found a positive correlation between vocabulary and recall of generated words,  
494 in accord with Martinez and al.'s study (2021). Having a good vocabulary may facilitate rapid  
495 and fluent generation of words, allowing more time to learn the words, and thus better recall  
496 of them. Negative associations between neuroticism and recall of read words (e.g., Kim &  
497 Diamond, 2002; Stephan et al., 2020) and generated words were found. The recall of read  
498 words was predicted first by the score to the openness trait, consistent with Experiment 1  
499 results. In Experiment 2, recall of read words was the most difficult condition, in which  
500 individuals need to use most cognitive resources. These cognitive resources might be higher  
501 and/or more available in people with a high level on openness. Neuroticism accounted for a  
502 significant part of the variance of recall of read words. This result confirms the negative  
503 influence of neuroticism on memory, especially when the task requires significant cognitive  
504 resources.

505         Neuroticism was the first predictor of memory for generated words, confirming the  
506 prediction that this personality trait negatively contributes to episodic memory, even when the  
507 task is relatively easy. Thus, a high level of neuroticism may have a negative influence on  
508 memory, regardless of the difficulty level of the task. Vocabulary was the second significant  
509 predictor of memory performance in this condition, in accord with results from Martinez et al.  
510 (2021), though they did not examine the role of neuroticism in memory for generated words.

511 That suggests that having a strong vocabulary may facilitate encoding and thus recall of  
512 words.

513

## 514 **8. General Discussion**

515 In two experiments, we examined how neuroticism and openness to experience were  
516 associated with memory performance depending on whether the tasks provided environmental  
517 support or not. In Experiment 1, participants successfully completed a vocabulary task, either  
518 prior having the memory task (prior task success, high environmental support condition), or  
519 after (standard, low support condition). In Experiment 2, participants learned a list of word-  
520 pairs either by generating them (high environmental support condition) or by reading them  
521 (low environmental support condition). In both experiments, results showed that memory  
522 performance was higher when greater environmental support was provided. These results are  
523 consistent with previous findings showing a prior task success effect (Geraci et al., 2013;  
524 2016) and a generation effect in older adults (e.g., Martinez et al., 2021; Taconnat et al.,  
525 2004).

526

### 527 ***8.1. Effect of neuroticism on memory***

528 In both experiments, neuroticism was a significant predictor of memory performance  
529 regardless of whether experimental conditions provided environmental support or not. High  
530 levels of neuroticism were associated with lower performance, in accord with previous  
531 research (e.g., Kim & Diamond, 2002; Stephan et al., 2020). Although neuroticism was not  
532 the main factor accounting for memory performance in all conditions, it always contributed to  
533 performance even in the facilitating conditions. That finding suggests that individuals higher

534 in neuroticism do not get a boost in performance from environmental support. These results  
535 are consistent with the view that individuals with a high level of neuroticism have a general  
536 decline in memory capacity, due to chronic stress that causes damage in the hippocampus, and  
537 thus to encoding processes and storage of information (Kim & Diamond, 2002).

538         Beyond the structural effects of neuroticism on memory, individuals with a high level  
539 of this trait may also have lower self-esteem, control, and memory self-efficacy than those  
540 with a low level of neuroticism (Judge et al., 2002), which may affect memory (see Pinard et  
541 al., 2021 and Bouazzaoui et al., 2020 for discussions on these points). Regarding personality  
542 traits, Metternich and colleagues (2009) suggested a “vicious circle”, whereby individuals  
543 who are conscious of their memory failures experience stress, which in turn may provoke  
544 memory lapses. In general, older adults report more memory complaints than younger adults,  
545 even when they are performing normally, suggesting that these complaints could be  
546 considered as a type of stress-related psychosomatic disorder (Commissaris et al., 1998). This  
547 phenomenon can become important in individuals with a high level of neuroticism. In accord  
548 with this idea, Munoz and colleagues (2013) showed that intrusive thoughts, perhaps  
549 stemming from negative beliefs about memory for people with high a level of neuroticism,  
550 mediate the association between neuroticism and cognitive performance. This finding may  
551 explain why this personality trait is so important in accounting for memory performance: it  
552 would be so in two ways, 1) a direct effect on memory, by the action of stress on  
553 hippocampus, and/or 2) a metacognitive effect, via the relationships between memory beliefs  
554 and memory performance.

555

556 ***8.2. Effect of openness on memory***

557           In both of the present studies, people who had higher scores on openness to experience  
558 had greater performance in memory than those with lower scores. The effect of openness to  
559 experience was greater in the control conditions, which provide less environmental support, as  
560 indicated by the significant interaction between condition and openness in the two  
561 experiments. This finding suggests that the encoding support helps individuals who are low  
562 on openness perform better - perhaps as well as individuals who are high on openness.  
563 According to Craik (1986), a task that does not provide environmental support, or that  
564 provides limited environmental support, requires substantial engagement of self-initiated,  
565 cognitive resources, and older adults, for whom these resources are diminished, have impaired  
566 performance to this type of task. In fact, openness was the first predictor of memory scores in  
567 the standard condition of Experiment 1 and the first predictor of memory scores for the recall  
568 of read words in Experiment 2. These were the conditions that offered the lower support to  
569 help implementation of memory processes. Openness seems to be particularly important for  
570 memory in these conditions. Openness is associated with both crystallized and fluid  
571 intelligence (DeYoung et al., 2005), two cognitive resources important for memory, especially  
572 in aging (Bouazzaoui et al., 2013; 2014) and may have a particularly prominent relationship  
573 with the development and the maintenance of the cognitive reserve which contributes to  
574 cognitive functions in old age (Franchow et al., 2013). A high level of openness reflects also  
575 greater intellectual curiosity and comfort with novel experiences. Therefore, the most open  
576 individuals may not only have a higher cognitive reserve making them better to memory tasks  
577 (Stern, 2009), but they may be less reluctant to undergo a laboratory memory experiment.  
578 This point is important because such experience in laboratory may be stressful, which could  
579 have a deleterious effect on memory performance. Interest for this new experience  
580 (participating to an experiment in laboratory) could counteract the harmful effect of  
581 apprehension for this type of experience. Moreover, being less anxious about a memory task

582 could free cognitive resources to complete the task. Thus, these qualities, present in  
583 individuals with a high-level in openness, could be particularly beneficial in experimental  
584 conditions where memory tasks are the most difficult, i.e., those that offer the low  
585 environmental support.

## 586 **9. Conclusion, limits and perspectives**

587 The current studies demonstrate that personality, in particular openness and neuroticism  
588 (Karsazi et al., 2021), is associated with memory performance for older adults, and that this  
589 association depends on the amount of environmental support. However, we do not know  
590 exactly how these personality characteristics influence memory performance, particularly  
591 when there is little environmental support. Future studies should assess the specific  
592 mechanisms by which these traits may influence performance with and without environmental  
593 support. In addition, future studies should examine the relationship between personality and  
594 other forms of environmental support to determine under which situations personality will  
595 have the greatest influence on performance, particularly in applied settings using cognitive  
596 and neurological assessments.

597       Neuroticism was negatively associated with memory regardless of the experimental  
598 condition in which memory is tested. This negative relationship is possibly due to  
599 metacognitive factors such as beliefs about ability to control memory (see Bouazzaoui et al.,  
600 2019; Lachman et al., 2011; Pinard et al., 2021), or about memory self-efficacy, as people  
601 high in neuroticism present high level in memory complaint in general (Merema et al., 2013)  
602 or in everyday life situations (Neupert et al., 2008). Thus, neuroticism can act negatively on  
603 memory independently of the nature of the memory task. This finding suggests that  
604 individuals higher in neuroticism do not get a boost in performance from the environmental  
605 support, which has implications for interventions. Future research would thus focus to

606 conditions that would help these people to be more successful in memory tasks, but also in  
607 general cognitive tasks.

608         Openness is also crucial for memory in particular for tasks carried out in conditions  
609 considered to be the most difficult. A high level to this personality trait could act as a  
610 cognitive reserve factor (Franchow et al., 2013; Martinez et al., 2021), and is especially  
611 positively associated to memory task providing low environmental support and where  
612 memory strategies have to be self-initiated. The present results are in accord with this view,  
613 and with previous results showing that older adults with a high level in openness use more  
614 efficient memory strategies that may promote memory performance (Pinard et al., submitted;  
615 Talpain & Soubelet, 2020). It is possible that people with a high level of openness, who are  
616 more creative, are more willing to seek out, find and execute the most effective strategies  
617 when there is no support to guide these strategies.

618         In sum, the present study extends previous research on the relationships between two  
619 personality traits, neuroticism and openness, and memory, and shows that these relationships  
620 may differ according to the nature of memory task. In particular, the present results showed  
621 that neuroticism is an important predictor of memory performance, but that openness is  
622 crucial in the most difficult memory tasks. Because our hypotheses were specific to  
623 Neuroticism and Openness, we collected data only for these two traits. However, it is possible  
624 that the other three personality traits, Agreeableness, Extraversion and Conscientiousness,  
625 may influence cognitive functions, particularly Conscientiousness (e.g., Chapman et al., 2017;  
626 Klaming et al., 2017). Thus, it would be interesting to assess these personality traits in a  
627 future research to better understand their influence on memory according to the current  
628 experimental test conditions.”

629            Including personality traits analyses in experimental studies about memory and aging  
630            may contribute to a better understanding of memory functioning, which would have important  
631            implications in experimental research as well as in clinical examinations insofar as people's  
632            individual characteristics must be taken into account for a better interpretation of their  
633            performance.

634

**References**

635

Allen, M. S., Laborde, S., & Walter, E. E. (2019). Health-related behavior mediates the

636

association between personality and memory performance in older adults. *Journal of*

637

*Applied Gerontology*, 38(2), 232-252. <https://doi.org/10.1177/0733464817698816>

638

Angel, L., Fay, S., Bouazzaoui, B., Baudouin, A., & Isingrini, M. (2010). Protective role of

639

educational level on episodic memory aging: An event-related potential study. *Brain*

640

*and cognition*, 74(3), 312-323. <https://doi.org/10.1016/j.bandc.2010.08.012>

641

Bolger, N., & Schilling, E. A. (1991). Personality and the problems of everyday life: The role

642

of neuroticism in exposure and reactivity to daily stressors. *Journal of*

643

*personality*, 59(3), 355-386. <https://doi.org/10.1111/j.1467-6494.1991.tb00253.x>

644

Bolger, N., & Zuckerman, A. (1995). A framework for studying personality in the stress

645

process. *Journal of personality and social psychology*, 69(5), 890-

646

902. <https://doi.org/10.1037/0022-3514.69.5.890>

647

Bouazzaoui, B., Fay, S., Taconnat, L., Angel, L., Vanneste, S., & Isingrini, M. (2013).

648

Differential involvement of knowledge representation and executive control in

649

episodic memory performance in young and older adults. *Canadian Journal of*

650

*Experimental Psychology/Revue canadienne de psychologie expérimentale*, 67(2),

651

100-107. <https://doi.org/10.1037/a0028517>

652

Bouazzaoui, B., Angel, L., Fay, S., Taconnat, L., Charlotte, F., & Isingrini, M. (2014). Does

653

the greater involvement of executive control in memory with age act as a

654

compensatory mechanism? *Canadian Journal of Experimental Psychology/Revue*

655

*canadienne de psychologie expérimentale*, 68(1), 59-

656

66. <https://doi.org/10.1037/cep0000005>

- 657 Bouazzaoui, B., Follenfant, A., Ric, F., Fay, S., Croizet, J. C., Atzeni, T., & Taconnat, L.  
658 (2016). Ageing-related stereotypes in memory: When the beliefs come  
659 true. *Memory*, 24(5), 659-668. DOI: 10.1080/09658211.2015.1040802
- 660 Bouazzaoui, B., Fay, S., Guerrero-Sastoque, L., Semaine, M., Isingrini, M., & Taconnat, L.  
661 (2020). Memory age-based stereotype threat: Role of locus of control and  
662 anxiety. *Experimental aging research*, 46(1), 39-51.  
663 <https://doi.org/10.1080/0361073x.2019.1693009>
- 664 Boyle, L. L., Lyness, J. M., Duberstein, P. R., Karuza, J., King, D. A., Messing, S., & Tu, X.  
665 (2010). Trait neuroticism, depression, and cognitive function in older primary care  
666 patients. *The American journal of geriatric psychiatry*, 18(4), 305-312.  
667 <https://doi.org/10.1097/JGP.0b013e3181c2941b>
- 668 Burger, L., Uittenhove, K., Lemaire, P., & Taconnat, L. (2017). Strategy difficulty effects in  
669 young and older adults' episodic memory are modulated by inter-stimulus intervals  
670 and executive control processes. *Acta Psychologica*, 175, 50-59.  
671 <https://doi.org/10.1016/j.actpsy.2017.02.003>
- 672 Chapman, B., Duberstein, P., Tindle, H. A., Sink, K. M., Robbins, J., Tancredi, D. J., ... &  
673 Ginkgo Evaluation of Memory Study Investigators. (2012). Personality predicts  
674 cognitive function over 7 years in older persons. *The American Journal of Geriatric*  
675 *Psychiatry*, 20(7), 612-621. <https://dx.doi.org/10.1097%2FJGP.0b013e31822cc9cb>
- 676 Chapman, B. P., Benedict, R. H., Lin, F., Roy, S., Federoff, H. J., & Mapstone, M. (2017).  
677 Personality and performance in specific neurocognitive domains among older  
678 persons. *The American Journal of Geriatric Psychiatry*, 25(8), 900-908.  
679 <https://doi.org/10.1016/j.jagp.2017.03.006>

- 680 Commissaris, C. J. A. M., Ponds, R. W. H. M., & Jolles, J. (1998). Subjective forgetfulness in  
681 a normal Dutch population: possibilities for health education and other  
682 interventions. *Patient education and counseling*, *34*(1), 25-32.  
683 [https://doi.org/10.1016/S0738-3991\(98\)00040-8](https://doi.org/10.1016/S0738-3991(98)00040-8)
- 684 Costa Jr, P. T., & McCrae, R. R. (1992). Normal personality assessment in clinical practice:  
685 The NEO Personality Inventory. *Psychological Assessment*, *4*(1), 5–  
686 13. <https://doi.org/10.1037/1040-3590.4.1.5>
- 687 Craik, F. I. M. (1986). A functional account of age differences in memory. *Human memory*  
688 *and cognitive capabilities: Mechanisms and performances*, Elsevier, pp. 409-422.
- 689 David, J. P., & Suls, J. (1999). Coping efforts in daily life: role of big five traits and problem  
690 appraisals. *Journal of personality*, *67*(2), 265–294. [https://doi.org/10.1111/1467-](https://doi.org/10.1111/1467-6494.00056)  
691 [6494.00056](https://doi.org/10.1111/1467-6494.00056)
- 692 DeYoung, C. G., Peterson, J. B., & Higgins, D. M. (2005). Sources of openness/intellect:  
693 Cognitive and neuropsychological correlates of the fifth factor of personality. *Journal*  
694 *of personality*, *73*(4), 825-858. <https://doi.org/10.1111/j.1467-6494.2005.00330.x>
- 695 Elliott, T. R., Herrick, S. M., MacNair, R. R., & Harkins, S. W. (1994). Personality correlates  
696 of self-appraised problem solving ability: Problem orientation and trait  
697 affectivity. *Journal of Personality Assessment*, *63*(3), 489-505.  
698 [https://doi.org/10.1207/s15327752jpa6303\\_7](https://doi.org/10.1207/s15327752jpa6303_7)
- 699 Ferrand, L., & Alario, F. X. (1998). Normes d'associations verbales pour 366 noms d'objets  
700 concrets. *L'Année psychologique*, *98*(4), 659-709.

- 701 Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). "Mini-mental state": a practical  
702 method for grading the cognitive state of patients for the clinician. *Journal of*  
703 *psychiatric research*, 12(3), 189-198. [https://doi.org/10.1016/0022-3956\(75\)90026-6](https://doi.org/10.1016/0022-3956(75)90026-6)
- 704 Franchow, E. I., Suchy, Y., Thorgusen, S. R., & Williams, P. (2013). More than education:  
705 openness to experience contributes to cognitive reserve in older adulthood. *Journal of*  
706 *Aging Science*, 1(109), 10-4172. <https://doi.org/10.4172/2329-8847.1000109>
- 707 Geraci, L., & Miller, T. M. (2013). Improving older adults' memory performance using prior  
708 task success. *Psychology and aging*, 28(2), 340-345. <https://doi.org/10.1037/a0030332>
- 709 Geraci, L., Hughes, M. L., Miller, T. M., & De Forrest, R. L. (2016). The effect of prior task  
710 success on older adults' memory performance: Examining the influence of different  
711 types of task success. *Experimental aging research*, 42(4), 365-381.  
712 <https://doi.org/10.1080/0361073x.2016.1191860>
- 713 Gombart, S., Fay, S., & Isingrini, M. (2018). Connaissances et contrôle exécutif: deux  
714 facteurs de protection du vieillissement cognitif ? [Knowledge and executive control:  
715 Two protective factors against age related cognitive decline?]. *L'Année Psychologique*  
716 */ Topics in Cognitive Psychology*, 118(1), 59-92.  
717 <https://doi.org/10.3917/anpsy1.181.0059>
- 718 Graham, E. K., & Lachman, M. E. (2014). Personality traits, facets and cognitive  
719 performance: Age differences in their relations. *Personality and Individual*  
720 *Differences*, 59, 89-95. <https://doi.org/10.1016/j.paid.2013.11.011>
- 721 Guerrero-Sastoque, L. G., Bouazzaoui, B., Burger, L., Froger, C., Isingrini, M., & Tacconnat,  
722 L. (2019). Optimizing memory strategy use in young and older adults: The role of

- 723           metamemory and internal strategy use. *Acta Psychologica*, 192, 73-86.  
724           <http://dx.doi.org/10.1016/j.actpsy.2018.11.002>
- 725   Gunthert, K. C., Cohen, L. H., & Armeli, S. (1999). The role of neuroticism in daily stress  
726           and coping. *Journal of Personality and Social Psychology*, 77(5), 1087-1100.  
727           <https://doi.org/10.1037/0022-3514.77.5.1087>
- 728   Ihle, A., Oris, M., Fagot, D., Maggiori, C., & Kliegel, M. (2016). The association of  
729           educational attainment, cognitive level of job, and leisure activities during the course  
730           of adulthood with cognitive performance in old age: the role of openness to  
731           experience. *International Psychogeriatrics*, 28(5), 733-740.  
732           <https://doi.org/10.1017/S1041610215001933>
- 733   Isingrini, M., Angel, L., Fay, S., Tacconnat, L., Lemaire, P., & Bouazzaoui, B. (2015). Age-  
734           related differences in the reliance on executive control in working memory: Role of  
735           task demand. *PloS one*, 10(12), e0145361.  
736           <http://dx.doi.org/10.3389/conf.fnhum.2015.217.00125>
- 737   Jackson, J. J., Hill, P. L., Payne, B. R., Parisi, J. M., & Stine-Morrow, E. A. (2020). Linking  
738           openness to cognitive ability in older adulthood: The role of activity diversity. *Aging  
739           & Mental Health*, 24(7), 1079-1087. <https://doi.org/10.1080/13607863.2019.1655705>
- 740   Jopp, D., & Hertzog, C. (2007). Activities, self-referent memory beliefs, and cognitive  
741           performance: evidence for direct and mediated relations. *Psychology and Aging*, 22(4),  
742           811. <https://doi.org/10.1037/0882-7974.22.4.811>
- 743   Judge, T. A., Erez, A., Bono, J. E., & Thoresen, C. J. (2002). Are measures of self-esteem,  
744           neuroticism, locus of control, and generalized self-efficacy indicators of a common

- 745 core construct? *Journal of Personality and Social Psychology*, 83(3), 693.  
746 <https://doi.org/10.1037/0022-3514.83.3.693>
- 747 Karsazi, H., Rezapour, T., Kormi-Nouri, R., Mottaghi, A., Abdekhodaie, E., & Hatami, J.  
748 (2021). The moderating effect of neuroticism and openness in the relationship between  
749 age and memory: Implications for cognitive reserve. *Personality and Individual*  
750 *Differences*, 176, 110773. <https://doi.org/10.1016/j.paid.2021.110773>
- 751 Kim, J. J., & Diamond, D. M. (2002). The stressed hippocampus, synaptic plasticity and lost  
752 memories. *Nature Reviews Neuroscience*, 3(6), 453-462.  
753 <https://doi.org/10.1038/nrn849>
- 754 Klaming, R., Veltman, D. J., & Comijs, H. C. (2017). The impact of personality on memory  
755 function in older adults—results from the Longitudinal Aging Study  
756 Amsterdam. *International Journal of Geriatric Psychiatry*, 32(7), 798-804.  
757 <https://doi.org/10.1002/gps.4527>
- 758 Kokkonen, M., & Pulkkinen, L. E. A. (2001). Extraversion and neuroticism as antecedents of  
759 emotion regulation and dysregulation in adulthood. *European Journal of*  
760 *Personality*, 15(6), 407-424. <https://doi.org/10.1002/per.425>
- 761 Lachman, M. E., Neupert, S. D., & Agrigoroaei, S. (2011). The relevance of control beliefs  
762 for health and aging. In *Handbook of the psychology of aging* (pp. 175-190).  
763 Academic Press. <https://doi.org/10.1016/B978-0-12-380882-0.00011-5>
- 764 Lemaire, P., & Brun, F. (2018). Effects of Prior-Task Success on Young and Older Adults'  
765 Cognitive Performance an Evaluation of the Strategy Hypothesis. *Journal of*  
766 *Cognition*, 1(1). 1-14. DOI: <https://doi.org/10.5334/joc.17>

- 767 Luchetti, M., Terracciano, A., Stephan, Y., & Sutin, A. R. (2016). Personality and cognitive  
768 decline in older adults: Data from a longitudinal sample and meta-analysis. *Journals of*  
769 *Gerontology Series B: Psychological Sciences and Social Sciences*, 71(4), 591-601.  
770 <https://doi.org/10.1093/geronb/gbu184>
- 771 Martinez, L., Fay, S., Onsekiz, T., Bouazzaoui, B., & Taconnat, L. (2021). Episodic memory  
772 and aging: The role of cognitive reserve and cognitive resources according to task  
773 difficulty. *Geriatric et Psychologie Neuropsychiatrie du Vieillissement*, 19 (2) 219-  
774 228. <https://www.jle.com/10.1684/pnv.2021.0937>
- 775 McDaniel, M. A., Einstein, G. O., & Jacoby, L. L. (2008). New considerations in aging and  
776 memory: The glass may be half full. In F. I. M. Craik & T. A. Salthouse (Eds.), *The*  
777 *handbook of aging and cognition* (pp. 251–310). Psychology Press.
- 778 Merema, M. R., Speelman, C. P., Foster, J. K., & Kaczmarek, E. A. (2013). Neuroticism (not  
779 depressive symptoms) predicts memory complaints in some community-dwelling  
780 older adults. *The American Journal of Geriatric Psychiatry*, 21(8), 729-736.  
781 <https://doi.org/10.1016/j.jagp.2013.01.059>
- 782 Metternich, B., Schmidtke, K., & Hüll, M. (2009). How are memory complaints in functional  
783 memory disorder related to measures of affect, metamemory and cognition? *Journal of*  
784 *psychosomatic research*, 66(5), 435-444.  
785 <https://doi.org/10.1016/j.jpsychores.2008.07.005>
- 786 Munoz, E., Sliwinski, M. J., Smyth, J. M., Almeida, D. M., & King, H. A. (2013). Intrusive  
787 thoughts mediate the association between neuroticism and cognitive  
788 function. *Personality and Individual Differences*, 55(8), 898-903.  
789 <https://doi.org/10.1016/j.paid.2013.07.019>

- 790 Neupert, S. D., Mroczek, D. K., & Spiro III, A. (2008). Neuroticism moderates the daily  
791 relation between stressors and memory failures. *Psychology and Aging, 23*(2), 287 –  
792 296. <https://doi.org/10.1037/0882-7974.23.2.287>
- 793 Park, D. C., & Reuter-Lorenz, P. (2009). The adaptive brain: aging and neurocognitive  
794 scaffolding. *Annual review of psychology, 60*, 173-196.  
795 <https://doi.org/10.1146/annurev.psych.59.103006.093656>
- 796 Pinard, F., Vanneste, S., & Taconnat, L. (2021). Self-esteem effect on recall and recognition  
797 in episodic memory, in young and older adults. *Experimental Aging Research, 47*(4),  
798 386-400. <https://doi.org/10.1080/0361073X.2021.1885926>
- 799 Pinard, F., Vanneste, S., Bouazzaoui, B., Fay, S., Isingrini, M., Angel, L., Borella, E., &  
800 Taconnat, L. (submitted). Personality and organizational strategies in episodic  
801 memory : The role of Openness to experience on recall and subjective organization in  
802 young and older adults. *L'Année Psychologique/Topics in Cognitive Psychology*.  
803 Submitted article.
- 804 Plaisant, O., Courtois, R., Réveillère, C., Mendelsohn, G. A., & John, O. P. (2010, March).  
805 Validation par analyse factorielle du Big Five Inventory français (BFI-Fr). Analyse  
806 convergente avec le NEO-PI-R. In *Annales Médico-psychologiques, revue*  
807 *psychiatrique* (Vol. 168, No. 2, pp. 97-106). Elsevier Masson.  
808 <https://doi.org/10.1016/j.amp.2009.09.003>
- 809 Rabinowitz, J. C., Craik, F. I., & Ackerman, B. P. (1982). A processing resource account of  
810 age differences in recall. *Canadian Journal of Psychology/Revue canadienne de*  
811 *psychologie, 36*(2), 325. <https://doi.org/10.1037/h0080643>

- 812 Raven, J. C., Raven, J. E. & Court, JH (1989). Mill Hill vocabulary scale. *Psychological*  
813 *Corporation*.
- 814 Rossi-Arnaud, C., Spataro, P., & Geraci, L. (2018). Effects of stereotype threat and prior task  
815 success on older adults' eyewitness memory. *Journal of Applied Research in Memory*  
816 *and Cognition*, 7(3), 422-431. <https://doi.org/10.1016/j.jarmac.2018.02.001>
- 817 Salthouse, T. A. (1990). Working memory as a processing resource in cognitive  
818 aging. *Developmental review*, 10(1), 101-124. [https://doi.org/10.1016/0273-](https://doi.org/10.1016/0273-2297(90)90006-P)  
819 [2297\(90\)90006-P](https://doi.org/10.1016/0273-2297(90)90006-P)
- 820 Salthouse, T. A., Berish, D. E., & Miles, J. D. (2002). The role of cognitive stimulation on the  
821 relations between age and cognitive functioning. *Psychology and Aging*, 17(4), 548.  
822 <https://doi.org/10.1037/0882-7974.17.4.548>
- 823 Simon, S. S., Lee, S., & Stern, Y. (2020). Personality-cognition associations across the adult  
824 lifespan and potential moderators: Results from two cohorts. *Journal of*  
825 *personality*, 88(5), 1025-1039. <https://dx.doi.org/10.1111%2Fjopy.12548>
- 826 Sindi, S., Fiocco, A. J., Juster, R. P., Pruessner, J., & Lupien, S. J. (2013). When we test, do  
827 we stress? Impact of the testing environment on cortisol secretion and memory  
828 performance in older adults. *Psychoneuroendocrinology*, 38(8), 1388-1396.  
829 <https://doi.org/10.1016/j.psyneuen.2012.12.004>
- 830
- 831 Slamecka, N. J., & Graf, P. (1978). The generation effect: Delineation of a  
832 phenomenon. *Journal of experimental Psychology: Human learning and*  
833 *Memory*, 4(6), 592-604. <https://doi.org/10.1037/0278-7393.4.6.592>

- 834 Soubelet, A., & Salthouse, T. A. (2010). The role of activity engagement in the relations  
835 between Openness/Intellect and cognition. *Personality and Individual*  
836 *Differences, 49*(8), 896-901. <https://doi.org/10.1016/j.paid.2010.07.026>
- 837 Stephan, Y., Sutin, A. R., Luchetti, M., & Terracciano, A. (2020). Personality and memory  
838 performance over twenty years: Findings from three prospective studies. *Journal of*  
839 *psychosomatic research, 128*, 109885.  
840 <https://doi.org/10.1016/j.jpsychores.2019.109885>
- 841 Stern, Y. (2002). What is cognitive reserve? Theory and research application of the reserve  
842 concept. *Journal of the international neuropsychological society, 8*(3), 448-  
843 460. <https://doi.org/10.1017/S1355617702813248>
- 844 Stern, Y. (2009). Cognitive reserve. *Neuropsychologia, 47*(10), 2015-2028.  
845 <https://dx.doi.org/10.1016%2Fj.neuropsychologia.2009.03.004>
- 846 Tacconat, L., & Isingrini, M. (2004). Cognitive operations in the generation effect on a recall  
847 test: Role of aging and divided attention. *Journal of Experimental Psychology:*  
848 *Learning, Memory, and Cognition, 30*(4), 827. [https://doi.org/10.1037/0278-](https://doi.org/10.1037/0278-7393.30.4.827)  
849 [7393.30.4.827](https://doi.org/10.1037/0278-7393.30.4.827)
- 850 Tacconat, L., Morel, S., Guerrero–Sastoque, L., Frasca, M., & Vibert, N. (2020). What eye  
851 movements reveal about strategy encoding of words in younger and older  
852 adults. *Memory, 28*(4), 537-552. <https://doi.org/10.1080/09658211.2020.1745848>
- 853 Talpain, E., & Soubelet, A. (2020). Strategy Use Mediates the Relation between Openness to  
854 Experience and Episodic Memory in Younger and Older Adults. *Psychological*  
855 *Reports, 0033294120981938*. <https://doi.org/10.1177/0033294120981938>

- 856 Wettstein, M., Tauber, B., Kuźma, E., & Wahl, H. W. (2017). The interplay between  
857 personality and cognitive ability across 12 years in middle and late adulthood:  
858 Evidence for reciprocal associations. *Psychology and Aging, 32*(3), 259.  
859 <https://doi.org/10.1037/pag0000166>
- 860 Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta*  
861 *psychiatrica scandinavica, 67*(6), 361-370. [https://doi.org/10.1111/j.1600-](https://doi.org/10.1111/j.1600-0447.1983.tb09716.x)  
862 [0447.1983.tb09716.x](https://doi.org/10.1111/j.1600-0447.1983.tb09716.x)
- 863 Zimprich, D., Allemand, M., & Dellenbach, M. (2009). Openness to experience, fluid  
864 intelligence, and crystallized intelligence in middle-aged and old adults. *Journal of*  
865 *research in personality, 43*(3), 444-454. <https://doi.org/10.1016/j.jrp.2009.01.018>
- 866
- 867