Are semantic and episodic autobiographical memories influenced by the life period remembered? Comparison of young and older adults

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Abstract

Autobiographical memory consists of a person's personal history and contributes to building a feeling of identity and continuity. Aging affects episodic autobiographical memory negatively, whereas semantic autobiographical memory is preserved or even enhanced in older adults. The study aim was to analyze whether these hypotheses continue to find support, or if there are differences when these memories are analyzed according to the components of life cycle retrieval. The sample was composed of 151 participants: 78 young and 73 older adults. Subjects were evaluated with the Autobiographical Memory Interview. A mixed ANOVA was performed for semantic memory with two groups and three life periods (childhood, youth–adulthood, and recent life). The main group effect was not significant, but the effects of the life period and the life period × group interaction were significant. When analyzing episodic memory, the main effects of the life period and group were significant, but their interaction was not. Young people have better episodic memory than older adults, and they show a similar episodic memory pattern during the three life periods evaluated. The semantic memory of the older adults is preserved, and the reminiscence bump and recent life scores are similar in both groups.

Keywords Autobiographical memory · Episodic memory · Healthy elderly · Semantic memory · Young adults

Introduction

Autobiographical memory (AM) is an interesting topic in the area of long-term memory. AM allows information to be conserved over a long period of time, but it also makes up one's personal history and builds a feeling of identity and

continuity (Piolino et al. 2002). Knowing the differences that exist in AM when comparing young people and older adults will offer information about the possible changes associated with age and, therefore, possible modifications in autobiographical memory could be expected in normal development. In addition, knowing which stages of development are best kept in memory could make it easier to know when there really are differences in recall according to the age group.

In this way, we will first present the main findings regarding episodic and semantic autobiographical memories and what changes are expected to be associated with age; secondly, we will introduce the results that the scientific literature shows about the structure of memory throughout the lifespan. Finally, and based on these findings, the hypotheses of this research will be presented.

Baddeley (2001) distinguished between semantic and episodic memories. Semantic memory was assumed to reflect our knowledge of the world and hold generic information that is probably acquired in many different contexts and can be used in many different situations. Episodic memory was assumed to refer to the capacity to recollect individual events, and the essence of this type of memory is

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its specificity and its capacity to represent a specific event and locate it in time and space. In addition, Martinelli et al. (2013) differentiated between autobiographical episodes and autobiographical personal semantic memories. Autobiographical episodes refer to the re-experience understood as specific personal information that is full of phenomenological details closely related to unique events located in a specific time and place. Personal semantic memories do not involve the re-experiencing of events, although they contain information that includes general knowledge about personal facts (e.g., “My name is X” or “how old am I?”) and memories of general events that encompass both extended and repeated memories.

A number of studies indicate that autobiographical memory is organized hierarchically. Conway and Rubin (1993) described three levels of autobiographical knowledge: lifetime periods, general events, and event-specific knowledge. The lifetime level corresponds to long periods of life measured in years or decades; the general level corresponds to general experiences, such as repeated events distributed in time and measured in days, weeks, or years; and the specific level refers to specific events, measured in minutes, hours, or 1 day. Conway (2001) proposed that higher-level self-knowledge structures spanning long time periods provide access to lower-level event-specific sensory–perceptual episodic information. When attempting to recall events from their past, people first access higher-level, more general descriptions, using them as intermediate steps to prompt lower-level, specific event representations (Reiser et al. 1985; Rubin 1996). Each hierarchical level provides cues or modes of access to other levels; thus, knowledge stored at the level of a life period provides cues that can be used to index a set of general events, whereas knowledge at the level of general events can index event-specific knowledge (Piolino et al. 2010). In general, lower-level cognitive representations are more vulnerable to disruption than higher-level cognitive representations (Cohen 2000). Thus, the maintenance of general knowledge is important to the specific memory because, given the existence of a hierarchical structure, this type of memory serves as an access point for episodic memory.

Several authors have shown that normal aging affects the nature of AM, producing a transition from specific recovery to a more general one (Adams et al. 1997; Piolino et al. 2006). Levine et al. (2002) pointed out that cognitive aging research predicts that the quality of older adults’ autobiographical recollections would differ from those of younger adults, but the direction of these differences would depend on the task. Compared to younger adults, older adults have impairments in retrieving episodic contextual details, but age effects are reduced or nonexistent in the case of semantic autobiographical knowledge. Their study showed that younger adults produced more episodic details than older adults on autobiographical recall, whereas the production of

semantic details was unimpaired in older adults, supporting the generalization of previous laboratory findings to real life (Levine et al. 2002). Baron and Bluck (2009) analyzed age differences on levels of detail of AM and suggested that the amount of detail produced may be due to communication styles. Older adults’ communication style is more interpretive (i.e., focused on communicating meaning), whereas younger adults’ style is more literal. Although episodic AM declines with age and remoteness, the data suggest that a permanent memory store of a personal semantic nature persists (Piolino et al. 2002). The results indicate that, with increasing age, the semantic component of AM increases, whereas its episodic component decreases, in agreement with previous studies (Piolino et al. 2006). Although many autobiographical memories are retrieved as specific events, it is also common to retrieve more general autobiographical information (Piolino et al. 2009). This information can take the form of abstract knowledge about the self (i.e., lifetime period knowledge; Conway and Pleydell-Pearce 2000) or an extended memory of a set of repeated events or a period of time longer than 1 day (i.e., general event memory; Williams et al. 2007). These general autobiographical memories are derived from multiple specific events and recalled as semanticized personal knowledge.

AM has a structure that emerges in lifespan retrieval (Conway and Rubin 1993). When memories are plotted by age, three components can be distinguished: childhood amnesia (from birth to approximately 5 years of age), which is characterized by the fact that few memories come from the earliest years of subjects’ lives; the reminiscence bump, which refers to the disproportionate number of autobiographical memories from youth and early adulthood; and recency (from the present going back to the period of the reminiscence bump), which indicates a monotonic decrease in memories as a function of the amount of time elapsed since the events occurred (Conway and Pleydell-Pearce 2000). Rubin and Schulkind (1997) compared the distribution of memories over the lifespan in younger and older subjects. They showed that the retention component and childhood amnesia occurred in both younger and older individual subjects. The reminiscence bump is only observed in people over the age of about 35–40, and some recent findings suggest that it might only be present, or is much more prominent, in memories of positive experiences (Rubin and Berntsen 2003). Hyland and Ackerman (1988), with individuals ranging in age from 17 to 73, found that older subjects showed a clear reminiscence effect that peaked in their teens and early 20s, whereas subjects in their 40s had a nearly equal number of memories from their teens, 20s, and 30s, with 80% of their reports falling in the most recent decade of life. An important aspect to consider is the appearance of the reminiscence bump. Researchers

have generally employed two broad classes of cueing techniques in probing for the distribution of autobiographical memories over the lifespan, the word-cue method (recalling autobiographical memories associated with cue words) and the important memory method (participants are asked to recall particularly important memories). The word-cue method allows any association between the cue and the memory, whereas the request for an important memory requires an event with a specific role in the participant's life story and, therefore, tends to produce a narrative-based search (Koppel and Rubin 2016). Koppel and Berntsen (2015) found that the mean range of the bump in word-cued memories is from 9 to 23 years of age, whereas for important memories, the corresponding age range is from 15 to 28.

The main aim of this study is to compare the autobiographical memory of young and older adults based on a test that uses the important memory method. The research on AM described above is consistent with the hypothesis that aging negatively affects episodic autobiographical memory, whereas semantic autobiographical memory is preserved in older adults. The following hypotheses are proposed: (H1) There will be no differences between the groups in semantic autobiographical memory; (H2) older adults will present significantly lower scores on episodic autobiographical memory. In addition, we intend to study whether these hypotheses continue to be fulfilled, or if differences are found when these memories are analyzed in terms of the components of life cycle retrieval. Regarding the proposal related to the distribution of autobiographical memory in the life cycle, (H3) the first stage (childhood) to the distribution of autobiographical memory in the life cycle should be significantly worse than the other stages for both semantic and episodic memories; in addition, (H4) the group of young people will present significantly greater memory (episodic and semantic) for recent life than for the other life periods; and in the group of older adults, (H5) there will be significantly greater memory (episodic and semantic) on youth–adulthood and recent life periods than in childhood.

Method

Participants

The sample is composed of 151 subjects: 78 young adults (22 men and 56 women) and 73 older adults (22 men and 51 women). The young adults have ages ranging between 18 and 27 years (mean = 20.66; SD = 2.53), and the older adults have ages ranging between 60 and 90 years (mean = 69.90; SD = 8.37).

Materials and procedure

All subjects participated voluntarily. The young adults were psychology and teacher education students from the University of Valencia, and the older adults were students from the Nau Gran (university extension for people over 55 years old) of the University of Valencia. None of the participants received an incentive to participate in the study. Before carrying out the assessment, all the participants in the study were informed about the study objectives and procedure and gave their consent to participate. The study was approved by the Ethics Committee of the University of Valencia.

The exclusion criteria for older adults were as follows: the presence of mild cognitive impairment (< 23) on the Spanish version of the Mini-Mental State Examination (MMSE; “Mini Examen Cognoscitivo”; Lobo et al. 2002) and, for both groups, significant depressive symptoms, as they had to have a score of less than 16 on the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff 1997). According to these scales, none of the participants included in the study presented cognitive impairment or depressive symptomatology.

The evaluation was carried out in individual sessions lasting approximately 45 min. First, the participants' sociodemographic data were collected, then compliance with the exclusion criteria was verified, and finally, the AM interview was conducted. The psychologists in charge of the evaluation were trained to administer all the tests using the same procedure. AM assessments were recorded by a voice recorder to be scored later by two independent evaluators, and then inter-judge reliability was checked. Pearson's correlations were > 0.89, which guarantees reliable correction. All the tests used for the evaluation are listed below.

- (a) *Mini-Mental State Examination* (MMSE; Folstein et al. 1975).

MMSE is a screening test that quantitatively estimates the existence and severity of cognitive impairment, without providing a diagnosis of any specific nosological entity. We used the Spanish version of the MMSE, the Mini Examen Cognoscitivo (MEC), adapted by Lobo et al. (2002). The maximum score is 30 points, obtained by adding together the scores on all the items. The cutoff score for cognitive impairment is usually set at 23 points. Scores from 23 to 21 indicate mild dementia, scores from 20 to 11 indicate moderate dementia, and a score of less than 10 points indicates severe dementia.

- (b) *Center for Epidemiologic Studies Depression Scale* (CES-D; Radloff 1997).

CES-D is a 20-item self-report scale developed to screen depressive symptoms in the general population. Each item is scored on a 4-point scale from 0 (little or no experience of the symptom over the past week) to 3 (almost constant experience of the symptom). Total scores range from 0 to 60, with higher scores indicating more depressive symptoms. We used the version translated into Spanish by Latorre and Montañés (1997). A cutoff score (≥ 16 points) is typically used to indicate clinically significant symptoms.

(c) *Autobiographical Memory Interview* (AMI; Kopelman et al. 1990).

AMI is a semi-structured interview, applicable to subjects from 18 years old, that evaluates the two components of AM: semantic and episodic. In addition, it evaluates the memories from the three life periods when the event took place (childhood, youth–adulthood, and recent life). Childhood is divided into three sections: preschool period, primary school (5–11 years old), and secondary school (11–18 years old). Youth and early adulthood has three sections: career or study or post-secondary education, marriage and children or nieces and nephews, and people they met in their 20s. Recent life has four sections: hospitalization or health institution where they currently receive care, previous hospitalization or health institution (in the past 5 years), last Christmas or Christmas Eve, and holidays or trips.

To evaluate the subjects' autobiographical responses, the standard established by the test in each of the three life periods and their sections was followed. In the Personal Semantics section, the subject is asked to recall specific information about his/her personal past from each period. Subjects were asked questions about their personal past, including names and locations of schools attended, home addresses, and names of friends. The scores ranged from 0 to 2. For example, when the subject is asked for his/her address when he/she started elementary school, 2 points are given for the complete address, 1 point for the street and town, and 0.5 for the street or the town. Subjects can obtain a maximum of 21 points in each of the three major periods, and 63 points on the whole test.

Moreover, for most of the questions in the Personal Semantics section, the AMI offers alternative questions to facilitate responses in people with different circumstances and contexts. For example, when asked about the address, the score is different if the context is rural or urban because in the rural context some streets may not have a proper name; therefore, a lack of response would seem to indicate a lack of memory, which may not be the case. In our study, because we used two groups with such different ages, in the youth and early adulthood and recent life sections, we had to use the alternative questions for the youngest group because most of them had not experienced these events yet and could

not answer the questions. For example, in the young and early adulthood section, on questions about their wedding, the young people were asked for the name of another person whose wedding they had attended in their 20s and the place where it was held. The rest of the questions in this section refer to this wedding mentioned by the subject. On the questions about the year and place of birth of children, the young people were asked for the year and place of birth of a brother, cousin, or close relative. In the recent life section, on questions referring to the hospital or present institution, the young people were asked about the health center they attend. On questions about hospitalizations, in the case of both young and old adults, if they had not been hospitalized, they were asked about a hospital they had recently visited for themselves or to visit someone else.

In the Autobiographical Incident section, which evaluates episodic memory, subjects should evoke three incidents per period. The score depends on the descriptive richness of the incident and its specificity in time and place. If the memory specifies the temporal moment and place where the remembered event took place, it obtains 3 points; if it is a personal event that is not very specific and does not include the time or place, it obtains 2 points; if it is a vague memory, it is awarded 1 point; and finally, if there is no answer or the answer is based on a semantic memory, 0 points are awarded, with a maximum of 27 points on the test.

Analysis

Two (2×3) mixed ANOVAs were performed with two groups (young and healthy older people, between-subjects) and three life periods (childhood, youth/adulthood, and recent life). The first ANOVA was for semantic memory and the second for episodic memory, with post hoc comparisons using the Bonferroni correction. All the analyses were performed with the SPSS 21 program.

Results

For semantic memory, a mixed ANOVA was performed with two groups (young and older adults, between-subjects) $\times$ three life periods (childhood, youth/adulthood, and recent life). The main effect of the group factor was not significant ($F(1,149) = 3.81$; $p = .053$; $\eta^2 = .025$), which indicates that young people and older adults have similar semantic memories (mean for young adults: 19.54, $SD = 1.22$; mean for older adults: 19.15, $SD = 1.64$), but the main effects of the life period factor ($F(2,148) = 27.05$; $p < .001$; $\eta^2 = .268$) and the life period $\times$ group interaction ($F(2,148) = 10.27$; $p < .001$; $\eta^2 = .120$) were significant. Post hoc Bonferroni comparisons of the three life period measures show that the childhood semantic

memory mean (18.61, $SD = 2.33$) is lower than the means for youth–adulthood ($p < .001$) and recent life ($p < .001$), and the youth–adulthood mean (19.50, $SD = 1.58$) is lower ($p = .011$) than the recent life mean (19.92, $SD = 1.07$).

For a posteriori analysis of the significant life period $\times$ group interaction, three simple effects tests were performed, comparing the groups on each life period (Table 1). Significant differences were observed for childhood ($F(1,149) = 13.52$; $p < .001$; $\eta^2 = .083$; mean for young adults: 19.28, $SD = 2.02$; mean for older adults: 17.94, $SD = 2.45$), but not for the youth–adulthood period ($F(1,149) = .43$; $p = .510$; $\eta^2 = .003$; mean for young adults: 19.41, $SD = 1.64$; mean for older adults: 19.58, $SD = 1.53$) or the recent life period ($F(1,149) = .004$; $p = .974$; $\eta^2 = .001$; mean for young adults: 19.92, $SD = 1.18$; mean for older adults: 19.91, $SD = .95$). Next, the life periods of each group were compared separately, with significant differences observed in the young adults ($F(2,148) = 4.65$; $p = .011$; $\eta^2 = .059$), who had significantly higher means on recent life than on childhood ($p = .031$) and youth–adulthood ($p = .033$). The group of older adults also showed significant differences ($F(2,148) = 31.63$; $p < .001$; $\eta^2 = .299$), with significantly lower means on childhood than on youth–adulthood and recent life ($p < .001$).

With regard to the analysis of episodic memory, a mixed ANOVA was performed with two groups (young adults and older adults, between-subjects) and three life periods (childhood, youth/adulthood, and recent life). Significant main effects were observed for both life period ($F(2,148) = 8.36$; $p < .001$; $\eta^2 = .102$) and group ($F(1,149) = 40.20$; $p < .001$; $\eta^2 = .213$), which indicates that young adults have better episodic memory than older adults (mean for young adults: 7.28, $SD = 1.51$; mean for older adults: 6.09, $SD = 1.73$), but there were no main effects of the life period $\times$ group interaction ($F(2,148) = .73$; $p < .480$; $\eta^2 = .010$), which indicates that young adults and older adults show a similar episodic memory pattern in the three life periods. Post hoc Bonferroni comparisons of episodic memory in the three life period measures show significantly lower scores for childhood (mean = 6.23, $SD = 1.84$) than for youth–adulthood ($p = .001$; mean = 6.91, $SD = 1.71$) and recent life ($p = .002$; mean = 6.85, $SD = 1.63$), but no differences between youth–adulthood and recent life.

Discussion

The current study was designed to investigate the effects of age on semantic and episodic AM across the life periods. As the hypotheses proposed, semantic autobiographical memory did not show an effect of group, whereas for episodic AM, greater specificity of this kind of memory in young people was confirmed. In addition, the results showed that there is an effect depending on the period of life, where fewer memories come from the childhood stage, both semantic and episodic AM, in both groups. Finally, the semantic AM interaction was significant, showing that in young people there are more memories from recent life than from the other stages, whereas in older adults, there are fewer memories from the childhood stage, with no differences between youth and early adulthood and recent life.

Cognitive aging research indicates age-related deficits in episodic AM, whereas semantic AM is unimpaired in older adults. Similar results have been observed in this study: Younger adults produced more episodic retrieval than older adults on autobiographical recall, whereas semantic information was unimpaired. Piolino et al. (2002) demonstrated a decline in episodic AM with age and remoteness, and the persistence of a permanent memory store of a personal semantic nature (i.e., information, generic events), that is, compared to episodic memories, unrelated to either the participant's age or the time interval. Memories in older people, compared to younger people, are more frequently concerned with generic events, either repeated and extended events with no specific spatiotemporal situation or events lasting less than a day but retrieved without specific details (Levine et al. 2002). According to Piolino et al. (2006), these findings suggest that, in aging, the components that make up episodic AM, namely specificity and details, are affected regardless of remoteness, but they are compensated for by an increase in semanticized memories (i.e., generic events memory). Taking into account the hierarchical organization of autobiographical memory, the difficulty in accessing the lower level of cognitive representations (event-specific knowledge) would mean that access to the memory would be maintained at a level of general experience and, therefore, generate a larger number of semantic memories.

Similar results have been observed, suggesting that older adults excel at applying broader, time-independent knowledge structures acquired through a lifetime of experience

Table 1 Means and standard deviation of the groups according to the type of memory and life period

	Semantic memory			Episodic memory		
	Childhood	Youth–adulthood	Recent life	Childhood	Youth–adulthood	Recent life
Young adults	19.28(2.02)	19.41(1.64)	19.92(1.18)	6.93(1.70)	7.39(1.47)	7.50(1.37)
Older adults	17.94(2.4)	19.58(1.53)	19.91(0.95)	5.63(1.75)	6.43(1.81)	6.21(1.63)

(Levine et al. 2002). These findings have been interpreted as reflecting psychological growth, a positive change in the exercise of narrative intelligence, and a shift in attention to social or psychological needs that accompany aging (Labouvie-Vief and Blanchard-Fields 1982).

When analyzing the temporal distribution of AM, several aspects stand out. In episodic memory, childhood shows significantly lower scores and so there are no differences in the interaction between the group and the period in life. For semantic memory, childhood shows significantly lower scores, and when comparing the two groups, differences were observed in childhood, whereas similar scores were found for both groups on youth and early adulthood and recent life scores. For semantic memory in older adults, AM followed the normal distribution described, showing that they hardly recall any personal events from early childhood; however, they tended to recall many events from the youth and early adulthood and recent years (Rubin and Wenzel 1996). In the young group, differences between childhood and recent life were observed. As several authors (Kawasaki et al. 2011) pointed out, the youth and early adulthood is obscured by recent memories in the distribution of participants younger than 40 years old. Kawasaki et al. (2011) pointed out that the distribution of autobiographical memory peaks was in the third decade of people's lives (20–30 years) when participants were asked to name the most important events from their lives, while the distribution peaks in the second decade (10–20 years) when participants were given cue words. The methodology used in this research was based on asking the participants for the most important information they remembered, which could produce an overlap with the recency effect. Possibly in young subjects it would be more interesting to use the cue word technique to avoid this overlapping autobiographical memory.

A possible limitation of the study could be the stages in which the test used evaluates AM because the childhood stage goes beyond the preschool period and this would hinder the possible assessment of childhood amnesia. However, when comparing the memory in the life periods, the results confirmed the existence of a smaller number of autobiographical memories (episodic and semantic) from the first stages of development, compared to later stages. Regarding the results of the groups throughout the life periods, there was an increase in memories from the youth and early adulthood in older adults, and from recent life for both groups. It should be pointed out that, in the group of young people, the differentiation of these two stages can be difficult due to their time overlap, which could explain why no increase was observed for the youth and early adulthood stages, whereas the recency stage would have a greater effect. Moreover, the type of test used, based on the important memories method, tends to delay the beginning of the reminiscence bump (Kawasaki et al. 2011). By contrast, in the group of

older adults, the reminiscence bump and recent life showed significant differences from the childhood stage.

This memory increase is coherent with what was proposed by the life script account. The life script account represents an alternative to most existing accounts, which emphasize factors of encoding and retention (Koppel and Berntsen 2015). The identity formation account postulates that events that are relevant to the goals of the current working self are preferentially encoded and maintain their availability through increased rehearsal; the cognitive account postulates that the existence of many novel events involves a greater effort in encoding, and it increases the memory from the reminiscence bump. The central argument of the life script account is that the bump is produced, instead, by the preponderance of culture-based general knowledge about the most important events in a typical life and important events in the bump period. This cultural life script is then held up to serve as a cognitive schema that guides the retrieval of important autobiographical memories (Koppel and Berntsen 2016). According to this account, the life script influences retrieval of important autobiographical events by providing search descriptions for events that are included in the script. Crucially, the life script account posits that the cultural significance assigned to life script events is what makes them especially accessible in recall, rather than factors specific to the individual. The life script account differs from the other theories in that it stresses processes at retrieval rather than encoding, cultural semantic knowledge common to a group rather than episodic information from an individual life, and autobiographical memories that are personally important rather than autobiographical memories in general (Koppel and Rubin 2016). As it has been verified the semantic information of the youth–adulthood period did not show differences between the groups and therefore the significant cultural events were equally accessible for young and older adults. In addition, the significance of these events in an individual's life should allow them to be especially well coded and rehearsed, adding to the effectiveness of later searches. In addition, the life script account was explicitly restricted to the retrieval of important memories. Based on this proposal, it would be coherent for the older adults' scores on the reminiscence bump and recent life stages to show no significant differences because there may be significant cultural events at different moments in development. These types of memories could be just as significant as others related to their own events from the reminiscence bump. It is possible that cultural scripts are changing showing an increase in the preponderance of significant events to later stages, offering a future line of research.

This study presents certain limitations. The division of the AMI by stages impedes the assessment of childhood amnesia. Although the test presents a subsection dedicated to the preschool period, the maximum scores

of this subsection would be different and not comparable with the other subsections on personal semantic information. Specifically, this subsection has a maximum score of five, while the other subsections of this period and later ones have a maximum of eight points, making it difficult to compare the scores between the subsections. Furthermore, as pointed out above, when recent life is assessed in young people, there can be overlapping of the youth and early adulthood stage. It should be pointed out that the test adapts the questions to this group, and that the type of information sought is different because the assessment of memory for youth and early adulthood is oriented toward aspects related to typical life events during development that coincide with the reminiscence bump stage. Another limitation of this study is the class of cueing techniques used to test the distribution of autobiographical memories over the lifespan. Researchers have generally employed two broad classes, the word-cue method and the important memory method (used in this study). The distribution of autobiographical memories is not identical with these two methods. The bump is smaller in the word-cue method, and the temporal location of the bump is earlier in the important memory method (Koppel and Berntsen 2016), which suggests that modifications may occur in the retrieval strategy employed by participants. Therefore, it would be necessary to compare the groups using the word-cue method. One aspect to consider is the existence of the memory overgeneralization effect. Ricarte et al. (2011) confirmed the overly general effect on memory retrieval, resulting in retrieval of less specific memories. Finding out whether there have been depressive episodes at some moment in the life cycle would offer information that should be taken into account when analyzing the data; this could be an interesting future direction for research.

As the study has shown, younger and older adults present similar semantic autobiographical memory, allowing us to conclude that, faced with the episodic impairment associated with age, semantic memory is maintained. This result leads us to propose, as a future line of research, studying older adults with cognitive impairment to find out whether there is a significant reduction in the amount of semantic memory, an aspect that could be used as a cognitive marker for impairment. In addition, if reminiscence intervention is proposed as an effective treatment for older adults without impairment, it would be interesting to find out whether its effects are also valid for subjects with impairment, and whether it affects cognitive aspects or only emotional ones.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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