



Envisioning the self: self-defining future projections in Alzheimer's disease

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ABSTRACT

Self-defining future projections (SDFPs) are vivid, emotionally salient projections of personally meaningful events that anchor identity and guide motivation. While past self-defining memories ground the self in remembered experiences, SDFPs extend this function into the future, offering a forward-looking perspective on identity and well-being. In Alzheimer's disease (AD), cognitive decline threatens autonomy, memory, and self-continuity, yet little is known about how SDFPs are affected. The present study examined SDFPs in 37 individuals with mild AD and 40 cognitively healthy older adults. Participants generated SDFPs, which were evaluated for specificity, integrative meaning, importance, and emotional valence. Compared to controls, patients with AD produced less specific, less integrated, and less important future events, while emotional intensity remained comparable across groups. In AD patients, better cognitive functioning predicted greater specificity, whereas higher depression and anxiety were associated with reduced specificity, integration, and importance, as well as higher negative emotions. These findings highlight that AD compromises the structural and identity-related features of future self-projections, but preserves emotional engagement, suggesting a potential pathway for interventions to support motivation, self-continuity, and well-being.

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Introduction

Despite cognitive decline, can patients with Alzheimer's disease (AD) imagine standing at an upcoming daughter's wedding, holding a grandchild for the first time, or celebrating a milestone birthday—moments believed to one day define who they are? These anticipated events are known as self-defining future projections (SDFPs): vivid, emotionally significant, and identity-related projections into the future.¹ Unlike ordinary future thoughts, SDFPs serve as anchors of identity and self-continuity, shaping motivation, decision-making, and well-being. In AD, where cognitive decline progressively threatens autonomy, memory, and the coherence of self,^{2,3} examining SDFPs offers a unique lens for understanding how patients may preserve a sense of who they are becoming. The aim of the current paper

is therefore to introduce the concept of SDFPs into the study of AD. To do so, the introduction will first present the theoretical foundations of SDFPs, and review existing findings in normal aging, before turning to research on future thinking in AD as a preliminary step toward investigating SDFPs in the disease.

A sense of self—the ability to see oneself as a unique individual with a personal history—is a cornerstone of the human experience.⁴ While this sense of self can be grounded in autobiographical memory,^{5–7} it is also shaped by our ability to imagine the future. Goals, expectations, hopes, and fears give structure and meaning to our lives, and extend identity beyond the past.^{8,9} These representations vary in scope: some are abstract (e.g., future traits or roles), while others are tied to specific imagined experiences.¹⁰ The latter category closely resembles what D'Argembeau, Lardi and Van der Linden¹ defined as SDFPs. SDFPs can be discussed in relation to self-defining memories (SDMs), which are vivid, emotionally intense recollections of personally significant events that convey central themes about

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identity and one's life story.¹¹ While SDMs ground identity in remembered experiences, SDFPs extend this function into the future, capturing anticipated events that individuals consider central to who they will be. In this way, SDFPs provide a forward-looking anchor for self-continuity and guide motivation and decision-making in ways that complement the role of SDMs.¹ Research has shown that most people can easily imagine SDFPs, which convey meaningful information about the person they wish or expect to become.^{12–17} SDFPs can correspond to future events that are expected to occur during key stages of personal development, such as entering a new career, starting a family, reflecting the timing of identity-relevant life transitions.^{18,19} Moreover, when individuals focus on a particular future self-conception, this can shape the way they mentally represent related future events, influencing which details are emphasized and how these events are integrated into their broader sense of self.²⁰ Research further indicates that reflecting on a SDFPs increases the salience of psychological traits relevant to that event and strengthens the sense of continuity between present and future self.^{13,21} Overall, SDFPs are not only central to self-conception but also actively shape how individuals understand and anticipate their own development. This perspective naturally leads to questions about the functioning of SDFPs in aging.

Research has assessed how SDFPs are expressed across different stages of adulthood. In young adults, SDFPs are often achievement-oriented and set at relatively long temporal distances, sometimes several years ahead.¹ These events tend to be specific and frequently include integrative meaning statements, reflecting their role in broader identity narratives. With age, however, Raffard, Bortolon, Iniasta, Macioce, Gely-Nargeot and Van der Linden²² found notable shifts in both scope and content. Older adults generated short narratives, few specific details, and less distant projections, while they rate their SDFPs as more emotionally positive. Thematic content also differed: whereas young adults' SDFPs centered on achievement, older adults more often described leisure, and their references to relationships and health threats remained relatively stable. Taken together, research highlights how SDFPs mirror life transitions and shifting sources of meaning across the lifespan.

Building on the study by Raffard, Bortolon, Iniasta, Macioce, Gely-Nargeot and Van der Linden,²² Fritsch, Voltzenlogel and Cuervo-Lombard¹³ offered a comprehensive lifespan perspective by comparing young, middle-aged, and young-old adults. Participants were asked to generate three SDFPs, which were then analyzed along several, among other, dimensions: specificity (the extent to which the event was detailed in time and place), integration (the presence of meaning-making or links to the broader life story), perceived importance, and emotional valence. Results showed age-related changes in thematic content—achievement-related events decreased with age, whereas leisure and dependence events became more frequent. However, Fritsch, Voltzenlogel and Cuervo-Lombard¹³ found no significant differences across age groups in specificity or integration, suggesting that the structural qualities of SDFPs remain relatively stable across adulthood. Older adults did produce temporally closer and shorter narratives, echoing the study by Raffard, Bortolon, Iniasta, Macioce, Gely-Nargeot and Van der Linden,²² although the direct comparison across three age groups, as applied by Fritsch, Voltzenlogel and Cuervo-Lombard,¹³ allowed a more fine-grained characterization of how SDFPs evolve over the lifespan. Together, research highlights both continuities and age-related shifts in future-oriented self-representations. To the best of our knowledge, however, no study has examined SDFPs in AD. Instead, existing research on future-oriented cognition in AD has focused more broadly on episodic future thinking, providing an indirect yet valuable framework for understanding how SDFPs may be affected in AD.

Although studies of episodic future thinking have provided important insights into how individuals mentally simulate upcoming

experiences, SDFPs involve additional processes that extend beyond generating episodic details. Constructing personally significant future events relies not only on episodic simulation but also on autobiographical reasoning, that is, the ability to integrate imagined events into broader themes of identity and life narrative.²³ These processes involve a distributed neural network including the hippocampus, medial prefrontal cortex, posterior cingulate cortex, and other regions of the default mode network,²³ which support both episodic construction and self-referential processing. Because these neural structures are particularly vulnerable in AD, investigating SDFPs may provide a unique perspective on how neurodegeneration affects not only the ability to imagine the future, but also the capacity to maintain self-continuity and identity through personally meaningful future representations.

Patients with AD tend to demonstrate impairments in projecting themselves into the future. However, previous studies have primarily focused on episodic future thinking and phenomenological characteristics of imagined events, rather than on the identity-related and meaning-making dimensions that characterize SDFPs. For instance, when asked to imagine specific personal future events, they tend to produce over general rather than detailed representations situated in time and space.^{24–28} Such over generality has been linked to difficulties in mentally traveling forward in time, with patients reporting diminished subjective experience of envisioned events, including reduced visualization from a first-person “field perspective”.^{29,30} Beyond these structural impairments, research also shows some disconnection from the future in AD patients. These patients often express a pessimistic view of their future, characterized by preoccupation with death preparation and limited future horizons.³¹ This pattern was further documented through an evaluation of future-oriented repetitive thought in AD, defined as the tendency to recurrently think about and anticipate possible future outcomes.³² Results revealed an imbalance in how patients engaged with their future. Compared to controls, they displayed more pessimistic repetitive future thinking (e.g., anticipating loss), but less goal-directed repetitive thinking (e.g., making concrete plans) and less positive indulging (e.g., savoring imagined rewarding events). These findings suggest that, rather than constructing motivating visions of the future, patients are prone to ruminative and negative thought patterns, often shaped by hopelessness and depression. Converging evidence comes from studies of future self-conceptions: when asked to generate statements beginning with “I will be...”, patients with AD produced fewer overall responses, with diminished references to the physical, social, and psychological self, and increased references to self-cessation (i.e., mortality).³³ However, complementary findings nuance this picture. When asked to evaluate whether statements such as “I will be healthy” reflected an ideal or feared self, AD patients, like controls, tended to assign positive health traits to their ideal self, and this assignment correlated with lower depression and anxiety.³² These results suggest that, despite general difficulties in future-oriented self-projection, patients with AD retain the capacity to endorse positive, motivating aspects of their future self, particularly in the domain of health. Taken together, these results highlight depression as a key factor shaping future self-representations in AD. While depressive symptoms appear to fuel overgenerality, hopelessness, and pessimistic thought, the endorsement of positive and health-related ideals may serve as a protective mechanism, preserving some motivating and identity-relevant projections of the future.

To summarize, examining SDFPs in patients with AD offers a unique window into how the disease affects the capacity to project oneself into personally meaningful future events. Understanding these processes is clinically relevant, as SDFPs not only reflect identity and self-continuity but also may influence motivation, goal-directed behavior, and emotional well-being in patients. The present study asks participants to produce two SDFPs that will be analyzed in terms of specificity, integration,

perceived importance, and emotional valence. We hypothesize that, compared to healthy older adults, AD participants will produce less specific and less integrated SDFPs. Nonetheless, we anticipate that the perceived importance of events will remain high, and that emotional valence may be positive, particularly among patients with AD with lower levels of depressive symptoms.

Method

Participants

The study included 37 individuals diagnosed with mild AD (20 women; M age = 67.76 years, SD = 5.08; M years of formal education = 10.97, SD = 2.54) and 40 cognitively healthy older adults (23 women; M age = 66.48 years, SD = 4.83; M years of formal education = 11.58, SD = 3.11). Patients with AD were recruited from the University Hospital of Nantes, France, and their diagnosis was established according to the NIA-AA criteria for probable Alzheimer's disease.³⁴ Control participants were recruited from the local community, were autonomous, and lived independently at home. Both groups were comparable in terms of gender [$\chi^2(1, N = 77) = .093, p = .76$], age [$t(75) = 1.13, p = .26$], and educational level [$t(75) = .92, p = .36$].

All participants met general inclusion criteria of preserved sensory capacities sufficient for testing and were screened for exclusion criteria including any history of major neurological or psychiatric illness, or substance abuse. Prior to recruitment, we conducted an a priori power analysis with G*Power to estimate the required sample size for group comparisons (Mann Whitney U tests). Assuming a large effect size ($W = .8$), an alpha level of .05, and 95% power, the recommended sample size was approximately 74 participants (37 per group). The assumption of a large effect size was chosen a priori to ensure feasibility while maintaining adequate statistical power for detecting group differences. To further strengthen statistical power and ensure robust analyses, we recruited three additional healthy older adults beyond the initially planned sample size. All participants provided written informed consent before taking part in the study. The research protocol was approved by the Committee for the Protection of Persons (approval number: 20,202-A02276–33) and conducted in accordance with the principles of the Declaration of Helsinki.

Procedures

Cognitive and psychiatric assessment

We assessed general cognitive functioning with the Mini-Mental State Examination,³⁵ a widely used screening tool for assessing global cognition, covering domains such as orientation, attention, memory, language, and visuospatial abilities. Scores range from 0 to 30, with lower scores reflecting greater cognitive impairment. The AD group demonstrated significantly lower global cognitive functioning compared to healthy older adults, with the patients' scores suggesting a mild stage of the disease (see Table 1). In addition, participants completed the Hospital Anxiety and Depression Scale,³⁶ a 14-item self-report questionnaire designed to assess symptoms of anxiety and depression in clinical and non-clinical populations. The scale consists of two subscales: seven items for anxiety and seven for depression, each rated on a 4-point Likert scale (0–3). Subscale scores range from 0 to 21, with higher scores indicating greater symptom severity. Conventionally, scores of 0–7 reflect the absence of a disorder, 8–10 suggest possible anxiety or depression, and scores of 11 or above indicate clinically significant symptoms.³⁷ As shown in Table 1, patients with AD reported higher levels of both depression and anxiety compared to controls.

SDFPs assessment

After the cognitive and clinical assessment, participants were invited to generate two SDFPs. We replicated the procedures by

Fritsch, Voltzenlogel and Cuervo-Lombard.¹³ The task was first explained orally, and the defining characteristics of an SDFP were carefully introduced to participants. To qualify as an SDFP, an imagined event had to meet the following criteria: (1) it should be plausible and likely to occur in at least 12 months, (2) it should be personally important and contribute to understanding the participant's identity or that of significant others, (3) it should be vividly represented, (4) it should reflect meaningful concerns or goals in the participant's life and be linked to other thematically related events, (5) it should be emotionally salient, either positive or negative, and generate strong feelings, and (6) it should be an event the participant had already thought about on multiple occasions. Participants were encouraged to ask questions, and the experimenter ensured that the criteria for SDFPs were fully understood before proceeding. For each SDFP, participants were asked to provide a short title and a detailed narrative description, sufficient for another person to visualize the scene as if it had truly occurred. To guide their elaboration, participants were prompted with questions such as: "Where will you be? Who will you be with? What will happen? How will you react? How will others react?". After describing each event, participants rated the personal importance of each event on a 7-point Likert scale ranging from 1 (not important) to 7 (extremely important). They also rated the intensity of positive emotions and negative emotions separately on two 7-point Likert scales (0 = not at all; 6 = extremely intense).

Note that, while three events have been produced in the study by Fritsch, Voltzenlogel and Cuervo-Lombard,¹³ participants in our study were asked to generate only two events, in order to reduce cognitive load for patients with AD. This adaptation ensured that participants could complete the task without undue fatigue or frustration, while still allowing a reliable and meaningful assessment of SDFPs across groups. To reinforce comprehension, the key instructions were carefully repeated before the description of each of the two SDFPs. SDFPs were recorded, with the participants' consent, for analysis.

SDFPs analysis

Each SDFM was evaluated along four main dimensions:

- **Specificity:** events were coded as specific when they described a unique episode situated at a particular time and place, lasting <24 h. By contrast, they were coded as nonspecific when they referred to repeated or extended narratives or to summaries of experiences that unfolded over more than a single day.^{11,38}
- **Integrative meaning:** each event was also coded for the presence of meaning-making. Projections were scored as integrative when the participant explicitly linked the event to a broader understanding of the self, others, or life in general; otherwise, they were scored as non-integrative.^{11,38}
- **Importance:** the subjective importance of each event was directly assessed through participants' ratings on the 7-point Likert scale, ranging from 1 (not important) to 7 (extremely important).
- **Emotion:** An overall emotion score was computed for each SDFP by subtracting negative emotion ratings from positive emotion ratings (positive – negative), resulting in a continuous valence index ranging from –6 (highly negative) to +6 (highly positive), with higher scores indicating more positive emotional experience.

Specificity and integrative meaning were independently scored by two blind raters. Interrater reliability was high, with Cohen's kappa values of 0.84 for specificity and 0.82 for integration, both within the range typically considered almost perfect (0.81–1.00). Cases of disagreement were resolved through discussion until consensus was achieved.

To illustrate the scoring procedure, consider the following examples. A control participant generated the projection "My granddaughter's wedding," describing how he imagined celebrating the occasion with his family at a specific location and emphasizing that the event

Table 1

Cognitive and clinical scores, and characteristics of Self Defining Future Memories (SDFPs) in the two populations.

	Alzheimer group	Control group	Statistical tests
Mini Mental Stat Examination	22.22 (2.03)	28.80 (1.11)	$t(75) = 19.72, p < .001$
Depression	8.05 (2.94)	4.10 (2.51)	$t(75) = 6.36, p < .001$
Anxiety	8.05 (2.67)	5.93 (2.64)	$t(75) = 3.52, p = .001$
SDFPs			$U = 510.00, Z = 2.51, p = .012$
Specificity	.45 (.60)	.85 (.72)	$U = 520.50, Z = 2.41, p = .016$
Integration	.36 (.56)	.68 (.69)	$U = 243.00, Z = 4.65, p < .001$
Importance	3.93 (1.26)	5.43 (1.22)	$U = 687.00, Z = .55, p = .584$
Emotion	4.47 (1.68)	4.67 (1.59)	

Note. SD in parentheses, the maximum score on Mini Mental Stat Examination was 30 points; the maximum score on depression/anxiety scale was 21 points; specific/integration= number of specific/integrated events (two generated events max); importance ranged from 1 (not important) to 7 (extremely important); emotion ranged from -6 (extremely negative) to +6 (extremely positive).

represented family continuity and the transmission of family values to younger generations. This projection was classified as specific because it referred to a unique event occurring at a particular time and place, and as integrative because the participant explicitly linked the event to broader life themes. The participant rated the event as highly important (7/7) and reported strong positive emotion (6/6) with no or minimal negative emotion (0/6), resulting in a positive emotional valence score of +6. By contrast, a participant with AD generated the projection "Being with my family," describing a general hope that relatives would remain close and happy without specifying a particular spatiotemporal context or relating it to broader personal meaning. This projection was classified as nonspecific and nonintegrative. The participant rated the event as moderately important (4/7) and reported strong positive emotion (6/6) and no negative emotion (0/6), yielding a composite emotional valence score of +6 (positive minus negative).

Statistical analysis

To test our hypotheses regarding differences between the AD and control groups, we used Mann–Whitney U tests for specificity, integrative meaning, importance and emotion. This non-parametric test was chosen due to violations of normality. For instance,

Kolmogorov–Smirnov test ($D = .165, df = 37, p < .012$), indicated that the importance scores in the AD group significantly deviated from normal distribution. We did not apply Chi-square tests, as our variables of interest were continuous or ordinal rather than categorical, making Mann–Whitney U more appropriate for detecting group differences. Finally, we performed Spearman's rank-order correlations to examine the relationships between cognitive functioning, depression/anxiety, and SDFP characteristics.

Results

Low specificity & integrative meaning in AD

As indicated in Table 1, AD patients produced less specific, less integrated, and less important SDFPs than the control group. These results suggest that AD participants generated memories that were less detailed, less integrated in meaning, and perceived as less important compared to controls. In contrast, no significant group differences were observed for emotion ratings. This indicates that both groups experienced similar emotional intensity in their generated events.

Correlation analysis

As shown in Table 2, MMSE scores of AD patients showed a significant positive correlation with specificity, indicating that better

Table 2

Correlation Matrix by group.

Alzheimer group							
	MMSE	depression	anxiety	specificity	integration	importance	emotion
MMSE	-						
depression	-.602 $p < .001$	-					
anxiety	-.606 $p < .001$	.596 $p < .001$	-				
specificity	.612 $p < .001$	-.595 $p < .001$	-.393 $p = .016$	-			
integration	.633 $p < .001$	-.603 $p < .001$	-.451 $p = .005$	.678 $p < .001$	-		
importance	-.091 $p = .594$	-.117 $p = .492$	-.477 $p = .003$	.401 $p = .014$	.570 $p < .001$	-	
emotion	.051 $p = .763$	-.485 $p = .002$	-.532 $p = .001$	.386 $p = .018$	.583 $p < .001$	.578 $p < .001$	-
Control group							
	MMSE	depression	anxiety	specificity	integration	importance	emotion
MMSE	-						
depression	-.045 $p = .78$	-					
anxiety	-.065 $p = .690$	.36 $p = .022$	-				
specificity	.107 $p = .512$	-.269 $p = .094$	-.29 $p = .069$	-			
integration	.145 $p = .373$	-.307 $p = .054$	-.205 $p = .204$	.463 $p = .003$	-		
importance	.101 $p = .559$	-.339 $p = .032$	-.054 $p = .74$	.499 $p = .034$	.512 $p < .001$	-	
emotion	.138 $p = .395$	-.307 $p = .054$	-.399 $p = .011$	.491 $p = .001$	-.532 $p < .001$	.40 $p = .091$	-

cognitive functioning was linked to the retrieval of more detailed memories. This association did not emerge in the control group, most likely due to a ceiling effect on the MMSE. In the AD group, depression was negatively correlated with specificity, integration, and importance, but positively correlated with emotion. Thus, higher depressive symptoms were associated with less detailed, less integrated, and less important memories, accompanied by stronger negative emotional experiences. A similar pattern was observed for anxiety: higher anxiety scores were linked to poorer specificity, integration, and importance, but to greater negative emotion. In the control group, correlations between depression and specificity/integration/emotion were in the expected direction but did not reach significance. However, depression was significantly and negatively correlated with importance. Regarding anxiety, it had negative correlations with emotion, while its correlations with specificity, integration and importance were nonsignificant.

Discussion

We assessed SDFPs in patients with AD and healthy controls with respect to specificity, integration, importance, and emotional valence. Patients with AD produced future projections that were less specific, less integrated, and less important in comparison to controls, while emotional intensity was comparable across groups. Within the AD group, better cognitive functioning was associated with greater specificity, and higher depression and anxiety scores were linked to reduced specificity, integration, and importance, as well as to higher negative emotions.

Alterations in cognitive and identity-related features of SDFPs in AD

Our results provide the first evidence that SDFPs are compromised in AD. Compared to healthy controls, patients with AD generated future projections that were less specific, less integrated, and rated as less important. These findings extend earlier work on episodic future thinking in AD,^{24–28} by showing that deficits extend beyond episodic detail to encompass the structural and identity-related qualities of SDFPs. Reduced specificity suggests that patients struggle to situate future events in precise temporal and spatial contexts, echoing the overgeneralization observed in both past and future autobiographical recall in AD.^{25,26,39–42} These deficits in specificity and integration closely mirror findings on SDMs in mild AD, where patients similarly show reduced specificity and integration.^{43–45} Such parallels suggest that impairments in cognitive scaffolding supporting past self-defining memories may extend to SDFPs.

Reduced integration indicates difficulties in linking imagined events to broader life themes or personal meaning, reflecting a weakened ability to embed scenarios into coherent identity narratives⁴⁶; patients produced fewer self-descriptive statements,⁴⁷ showed reduced self-recognition especially in advanced stages.⁴⁸ Patients also demonstrate difficulties updating self-knowledge, often relying on premorbid traits.^{49,50} Lower ratings of importance further indicate that even when patients can imagine meaningful events, these events are often perceived as less central to the self. Clinically, this suggests that meaningful future moments—such as attending a daughter's wedding, holding a grandchild for the first time, or celebrating a milestone birthday—may feel less connected to the self as AD progresses. The reduced integration of SDFPs emphasizes the importance of interventions that help patients anchor future projections to enduring personal values, life themes, or emotionally significant goals, thereby supporting self-continuity, motivation, and well-being despite cognitive decline. Such approaches may include structured goal-setting or future thinking exercises, life review or reminiscence-based interventions, and person-centered care planning that explicitly links anticipated events to personally meaningful values, roles,

and life themes. Together, these patterns suggest that AD disrupts the cognitive scaffolding necessary to construct future projections that are detailed, identity-relevant, and motivationally salient.

Crucially, emotional intensity was preserved across groups. Patients with AD reported levels of affective engagement with future events comparable to those of controls. This preservation resonates with prior evidence indicating that emotional processing remains relatively intact in AD, particularly during early stages.^{27,51} Patients can still endorse positive future ideals in domains such as health.³² This pattern also coincides with findings on self-defining memories, where emotional engagement often remains despite deficits in specificity and integration.^{43–45} Clinically, this finding is encouraging: although structural and identity-related qualities of SDFPs are diminished, their emotional resonance remains. The ability to emotionally connect with imagined future scenarios may serve as a pathway for interventions aimed at sustaining motivation, self-continuity, and well-being in AD.

Overall, our findings indicate that AD disrupts the cognitive and structural aspects of SDFPs—specificity, integration, and importance—while sparing their emotional intensity. Importantly, the quality of SDFPs was associated with both general cognitive functioning and mood: higher cognitive abilities were linked to greater specificity, whereas elevated depression and anxiety were associated with reduced specificity, integration, importance, and stronger negative emotions. These results suggest that patients in the early stages of AD, particularly those with lower cognitive and affective symptoms, may retain the ability to emotionally engage with meaningful future scenarios. Clinically, this is encouraging, as it highlights the potential for interventions targeting cognition and mood to support self-continuity, motivation, and well-being in AD.

From a geriatric nursing perspective, these findings highlight the importance of preserving, as far as possible, future-oriented aspects of identity in people living with AD. Nurses are uniquely positioned to support self-continuity by encouraging discussions about anticipated family events, personally meaningful goals, valued social roles, and emotionally significant aspirations. Future-oriented conversations may be incorporated into routine care, reminiscence activities, or individualized care planning to help patients maintain some levels of motivation and emotional engagement. Because depressive and anxiety symptoms were associated with poorer characteristics of SDFPs, needless to say that addressing emotional distress and promoting psychological well-being may further facilitate patients' capacity to construct meaningful future scenarios. Supporting patients in maintaining connections between past experiences, present values, and future aspirations may ultimately contribute to person-centered care and enhance quality of life in AD.

SDFPs in healthy older adults

In healthy older adults, our findings indicate higher scores on specificity, integration, importance, and emotional intensity of SDFPs compared to patients with AD. These results align with previous research on self-defining memories, which shows that older adults generally maintain specificity and integrative meaning, although subtle age-related changes in integration may occur. For instance, Cuervo-Lombard, Raucher-Chene, Barriere, Van der Linden and Kaladjian⁵² reported that cognitively healthy older adults recalled similar numbers of specific memories as middle-aged adults, but integrative meaning was somewhat reduced with age. Research further indicated that specificity and identity-related qualities of self-defining memories remain detectable in older adults, particularly when cognitive function is intact.^{13,21} More importantly, this relative preserved structural and identity-related features, as observed in our study, can be accompanied by maintained or even enhanced emotional engagement, consistent with the positivity effect often

observed in aging. According to the socioemotional selectivity theory,⁵³ as perceived time horizons shorten, healthy older adults prioritize emotionally meaningful experiences and positive affect, which is consistent with the sustained emotional resonance of their SDFPs observed in the present study. Together, our findings suggest that even in later life, emotional engagement may continue to be associated with motivation, self-continuity, and well-being, providing a clear contrast with the cognitive and structural deficits observed in AD.

According to the socioemotional selectivity theory 53, as perceived time horizons shorten, healthy older adults prioritize emotionally meaningful experiences and positive affect, which may explain the sustained emotional resonance of their SDFPs

Regarding correlational analyses in healthy older participants, we observed few significant associations between SDFPs measures and Mini Mental Stat Examination scores, likely due to ceiling effects in this cognitively high-functioning sample. Correlations with depression and anxiety were generally weak and occasionally only trends, reflecting the low prevalence of affective symptoms in normal aging. These patterns reinforce the notion that, unlike in AD, mood and general cognitive function have limited influence on SDFPs in non-clinical older adults.

Limitations

Although we largely replicated the procedures of Fritsch, Voltzenlogel and Cuervo-Lombard,²¹ we did not include all variables, such as temporal distance, where participants estimate the interval between the present and the projected event. Including this measure would have allowed us to calculate, for each future projection, the distance (in years) between the present time and the intended event. However, this calculation would have posed substantial difficulties for patients with AD, and we deliberately reduced the cognitive load of our assessment to avoid overwhelming participants. Similarly, we opted for a single testing session, which necessitated limiting the number of SDFPs to two per participant and precluded the inclusion of past self-defining memories. While these methodological choices ensured feasibility and participant comfort, they also constrain the generalizability of our findings. Future research can expand our design by including additional SDFPs, integrating past self-defining memories, and measuring temporal distance for each projection, particularly in healthy older adults or in patients with mild cognitive impairment who can tolerate slightly more complex tasks. Such studies would provide a more comprehensive understanding of the interplay between temporal cognition, identity, and emotional engagement in both normative and pathological aging.

Conclusion

Our findings highlight that patients with AD show marked reductions in specificity, integration, and importance of future self-defining memories, despite preserved emotional engagement. Clinically, these results underscore the potential of interventions that leverage preserved emotional engagement—for example, through goal-setting, reminiscence, or future-oriented exercises—to support motivation, self-continuity, and well-being in AD. More importantly, targeting cognition and mood may further enhance patients' ability to construct meaningful future scenarios, offering a practical pathway to improve quality of life even in the early stages of cognitive decline.

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CRediT authorship contribution statement

Christine Cuervo-Lombard: Validation, Supervision, Methodology, Investigation. **Mohamad El Haj:** Writing – original draft, Methodology, Investigation, Conceptualization. **Souheil Hallit:** Writing – review & editing, Visualization, Validation. **Guillaume Chapelet:** Validation, Investigation. **Samuel Bulteau:** Resources, Investigation. **Virginie Voltzenlogel:** Validation, Supervision, Methodology, Investigation.

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