

# Self-Defining Future Projections Throughout Adulthood

Imagination, Cognition and  
Personality: Consciousness in  
Theory, Research, and Clinical  
Practice  
1–20

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## Abstract

Self-defining future projections (SDFPs) have never been explored across lifespan. The present study aimed to characterize those self-relevant narratives in three age groups matched for sex and education level: young (mean age = 23.0 years), middle-aged (mean age = 41.7 years), and young-old (mean age = 68.2 years) adults. All participants first completed the Hospital Anxiety and Depression Scale followed by two tests assessing executive functions : a phonemic verbal fluency task and the Similarities sub-test of the WAIS-IV. Finally, participants were asked to collect three SDFPs. Results highlighted that thematic contents of SDFPs varied with advancing age: percentage of achievement events decreased whereas percentage of leisure or dependence events increased. No significant difference in specificity and meaning-making was observed between the three groups. Compared to the SDFPs of young and middle-aged adults, older participants' SDFPs were closer to the present time. Moreover, young-old adults provided fewer words to describe their narratives than young individuals.

## Keywords

self-defining future projections, mental time travel, identity, autobiographical memory, adulthood

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## **Introduction**

Personal identity is built from adolescence (e.g., McLean et al., 2010) and is modified across adulthood through one's self-defining life story called narrative identity (Singer, 2004). This developmental movement is closely linked to the process of autobiographical reasoning and, as recently established in a longitudinal study in emerging adults (McLean et al., 2021), might be stable or vary according to individuals and the types of experiences they meet.

Just as individuals often remember past events to ground and maintain their sense of self (e.g., Conway, 2005; McAdams, 2001), they also mentally travel in time and project themselves into the future to nourish their identity (D'Argembeau et al., 2012). The constructive episodic simulation hypothesis (Schacter & Addis, 2007) suggests that the simulation of future projections is closely linked to the episodic memory system. Recently, Addis (2020) more precisely conceptualized that imagining future events depends on the same global or detailed experiences than remembering memories, is governed by the same associative processes and is subserved by the same brain systems.

Regarding personal identity, Demblon and D'Argembeau (2017) established that memories and future events relevant for identity were organized in coherent self-defining event networks. In addition, other studies showed that future imagined events may better reflect current concerns and personal goals than past experiences (e.g., Cole & Berntsen, 2016), and consequently be more salient for the construction of the self (Berntsen & Bohn, 2010).

### ***Self-Defining Future Projections***

The construct of self-defining future projections (SDFPs) was introduced by D'Argembeau et al. (2012). These projections represent emotionally intense, vivid and repetitively recalled events that help us understand who we are as individuals (D'Argembeau et al., 2012). According to these authors, both SDFPs and self-defining memories (SDMs; Singer & Moffitt, 1992) are made up of event clusters characterized by the same motives and by the centrality of the self. This result provided evidence that SDFPs were the future counterparts of SDMs.

As SDMs, SDFPs can be explored through different dimensions and, most notably, specificity, integrative meaning and thematic content (Blagov & Singer, 2004). Whereas specificity refers to the structure of narratives (from a single event to a generalized one), we termed integrative meaning the result of a cognitive mechanism called autobiographical reasoning (Habermas, 2011). It is about the meaning people develop or a lesson they might learn from the future event about themselves, others or life in general as they would do it from their most essential memories (Singer & Blagov, 2000–2001).

Furthermore, for each narrative, references to tension (Thorne et al., 2004) and other variables directly rated by individuals (affective response, personal importance,

temporal distance) can be collected. Relationships among the dimensions of SDFPs have been rarely explored.

These future projections have mainly been studied in hypomania (Lardi Robyn et al., 2012), schizophrenia (Raffard et al., 2016), anxiety and depressive symptoms (Irvine, 2017), and bipolar disorders (Raucher-Chéné et al., 2021).

### *SDFPs Throughout Adulthood*

Only three studies have explored SDFPs in a non-pathological context and in particular in young (D'Argembeau et al., 2012), in middle-aged (Tuchina et al., 2021) and in older adults (Raffard et al., 2020).

D'Argembeau et al. (2012) explored SDFPs in two samples of young adults, aged in their 20s ( $n = 72$ ;  $M = 21$  years) and 30s ( $n = 78$ ;  $M = 32$  years) and who had completed between 10 and 19 years of education ( $M = 14.0$  and  $14.9$  years). These authors established that 37% and 19% of the SDFPs they produced referred to specific events, and a quarter to a third of them contained integrative meaning statements. They also showed that temporal distance was greater for the younger sample (6.7 vs. 4.7 years) and correlated negatively with participants' age. Regarding affective responses, this initial study found that higher levels of positive emotions than of negative emotions were associated with future events.

Raffard et al. (2020) found that the SDFPs of older adults ( $n = 43$ ;  $M = 69.5$  years) contained fewer specific references than the narratives of young adults ( $n = 43$ ;  $M = 23.1$  years), but did not observe any significant difference in integration between the two age groups. Regarding thematic content, research has found that achievement is the main content in young adults' SDFPs, followed by relationships, leisure, and life-threatening events (D'Argembeau et al., 2012; Raffard et al., 2020). Raffard et al. (2020) found that older participants' SDFPs contained more frequent references to leisure than those of young adults (34.1% vs. 10.9%) and less frequent references to achievement (17.8% vs. 43.4%). Finally, the theme of relationships was equally common in older adults and young adults, and life-threatening events equally sparse. They also established that the projections of older participants concerned a less distant time ( $M = 2.7$  vs.  $5.7$  years), contained fewer words ( $M = 49.7$  vs.  $84.5$ ) and had a higher emotional value than those of young adults.

Some differences between the SDFPs in young and older adults may be explained at the light of retirement, a crucial step often associated with lifestyle changes and adjustment of the sources of meaning (Leclerc et al., 2003). Between these two essential periods, midlife can be considered as central in life story and is situated after the reminiscence bump, that is after 30 years (e.g., Munawar et al., 2018). Most of middle-aged adults have founded a family and succeeded in their career so that they reached an increasing autonomy (Wang & Conway, 2004). Finally, midlife is also characterized by major changes in the psychological and physical dimensions (Lachman, 2004). A recent study (Tuchina et al., 2021) explored SDFPs in the general Russian population with a

mean age of 36.9 years ( $SD = 10.4$ ) after a task priming individualism or collectivism. In this sample mostly composed of men (83.7%), the authors established that 17.9% of the SDFPs were specific and that the ability to integrative meaning (a mean of 42.1% of the projections were integrated) might be hindered by collectivism attitudes. They found that achievement (63.7%) was the most important content in the SDFPs before relationships (15.3%) and leisure events (11.6%). They also showed that the future projections were close in time (0,5–5 years) with a mean temporal distance of 1.8 years.

### *Interrelations among Dimensions of SDFPs and with Executive Functions*

Some of the possible interactions between SDFPs dimensions and cognitive variables have seldom been explored. However, in young adults, D'Argembeau et al. (2012) found that specificity correlated negatively with integrative meaning, and temporal distance was negatively associated with participants' age. In older adults, Raffard et al. (2020) recently showed that integrative meaning is positively correlated with semantic skills, and specificity with temporal distance.

### *Gender Differences*

Gender could have an influence on the construction of identity. The self-construal theory (Cross & Madson, 1997) argued that women tend to construct an interdependent self. On the contrary, men are more frequently supposed to construct an independent self to others (Asher et al., 2017). In addition, previous studies highlighted that women narrate more emotion than do men in their memories relevant for the self (El Haj & Allain, 2020).

### *The Current Study*

The aim of the present study was to examine identity development in adults through the exploration of SDFPs that is projections that are very salient for the self and closely linked to personal goals. To our knowledge, this cross-sectional study was the first to characterize SDFPs throughout adulthood. More precisely, we aimed to compare the main dimensions of these future projections in three life periods: in young, in middle-aged and in older adults, designed as young-old adults (e.g., Ruthig et al., 2019). Furthermore, neither of the previous studies measured references to tension or personal importance and another goal was to investigate these dimensions. Our second objective was to examine correlations among SDFPs' characteristics and with cognitive variables. Finally, we aimed to study the influence of gender on the main SDFPs' dimensions.

### *Hypothesis*

We expected several of the SDFPs' dimensions to vary throughout adulthood. We hypothesized the frequency of specific narratives to be low in all groups but to diminish

with age (Raffard et al., 2020). Contrastingly, we expected that integrative SDFPs were as frequent whatever the step of adulthood (D'Argembeau et al., 2012; Raffard et al., 2020). In addition, we expected that the tension sequences were more present in young-old adults' SDFPs than in two others due to the anticipation of health decline. Regarding thematic contents, we predicted that achievement events were less reported and leisure events more reported in young-old adults compared to young (Raffard et al., 2020) and to middle-aged adults. Finally, we hypothesized that temporal distance (D'Argembeau et al., 2012; Raffard et al., 2020) and length of narratives (Raffard et al., 2020) would diminish with age.

Concerning relations among main dimensions, we predicted that specificity was negatively correlated with temporal distance (Raffard et al., 2020) and tension negatively correlated with emotional value. Moreover, we hypothesized that personal importance and emotional value were positively correlated. We also expected a positive correlation between integrative meaning and executive functions (Raffard et al., 2020).

Finally, concerning gender differences, we predicted that SDFPs of men and women were almost similar except for relationship content. Nevertheless, consistently with previous studies exploring the self, we expected the following dimensions to be more frequent and higher in the projections of women than in those of men : relationship events (Asher et al., 2017) and emotional value (El Haj & Allain, 2020).

## Material and Methods

### *Participants*

The final sample was composed of 111 adults divided into three age groups: young ( $n = 37$ ; mean age = 23.0 years), middle-aged ( $n = 34$ ; mean age = 41.7 years), and young-old ( $n = 40$ ; mean age = 68.2 years) adults. All the older adults lived at home and were retired. We did not include adults older than 75 years, owing to their increased probability of physical or mental dependence and declining health. The three samples were matched for sex ratio and education level (Table 1). We did not include participants with psychiatric or neurological disorders or with a history of substance abuse (according to DSM-5 criteria). Young-old participants were also screened for potential cognitive impairment, using the Mini-Mental State Examination (MMSE, Folstein et al., 1975). Four participants were excluded because they scored below the pathological threshold (Hudon et al., 2009), and the final mean MMSE score was  $28.9 \pm 1.2$ .

### *Materials*

The Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983) is a 14-item questionnaire, with 7 items concerning depression and 7 concerning anxiety. For

**Table 1.** Mean age Differences (Standard Deviation) in SDFPs and in Sociodemographic, Clinical and Temporality Variables.

	G1 = Young 20-30 years (n = 37)	G2 = Middle 31-55 years (n = 34)	G3 = Old 60-75 years (n = 40)	F(2,108)	P	
Age (years)	23.0 (2.4)	41.7 (8.3)	68.2 (4.0)	690.33	<.001	G1<G2<G3
Sex (% female)	56.8	55.9	57.5	0.010	.991	
Education level (years)	13.1 (2.0)	13.3 (2.8)	13.1 (3.0)	0.039	.962	
Similarities	18.2 (4.1)	20.2 (5.4)	18.1 (5.6)	1.261	.288	
Verbal fluency	13.5 (4.4)	12.9 (4.1)	13.7 (4.8)	0.203	.817	
Anxiety score	7.9 (3.6)	7.7 (2.9)	6.4 (2.4)	2.732	.070	
Depression score	4.5 (2.9)	4.2 (2.7)	4.2 (2.6)	0.086	.918	
Specificity (%)	6.3 (20.5)	10.8 (24.2)	11.7 (19.3)	0.681	.508	
Integrative meaning (%)	29.7 (32.2)	30.3 (25.1)	29.2 (29.4)	0.016	.984	
Tension (%)	4.5 (14.0)	1.0 (5.7)	8.3 (16.5)	2.890	.060	
Life-threatening events(%)	0.9 (5.5)	3.9 (10.9)	3.3 (10.1)	1.119	.330	
Leisure events (%)	17.1 (24.4)	18.6 (20.4)	45.0 (26.7)	16.204	<.001	G1<G3, G2<G3
Relationship events (%)	21.6 (27.5)	23.5 (24.0)	19.2 (22.5)	0.291	.748	
Achievement events (%)	42.3 (33.0)	28.4 (20.3)	16.7 (22.6)	9.399	<.001	G1>G3
Dependence events (%)	0.9 (5.5)	7.0 (17.8)	13.3 (22.4)	5.242	<.007	G1<G3
Unclassifiable events (%)	18.0 (23.0)	24.5 (26.3)	15.0 (19.9)	1.605	.206	
Positive emotion (PE)	5.21 (0.83)	5.01 (1.18)	4.85 (0.91)	1.283	.282	
Negative emotion (NE)	0.71 (0.77)	0.85 (1.11)	1.09 (1.25)	1.254	.290	
Emotion. value (PE - NE)	4.50 (1.40)	4.16 (1.94)	3.77 (1.85)	1.688	.190	
Personal importance	5.90 (0.95)	5.61 (1.06)	5.52 (0.98)	1.530	.222	
Temporal distance (years)	5.04 (4.41)	5.87 (3.85)	2.82 (1.79)	7.522	.001	G1>G3, G2>G3
Number of words	62.3 (33.1)	57.8 (28.1)	37.9 (19.7)	8.378	<.001	G1>G3

Note. groups significantly different ( $p < .05$ ) with Bonferroni correction.

each item, participants were asked to answer a 4-point Likert scale (rated from 0 to 3). The maximum score for each dimension was 21. A score between 0–7 indicates an absence of suspected anxiety or depressive disorders, between 8–10 shows suspected anxiety or depressive disorders, and a score rather 11 indicates proven anxiety or depressive disorders.

Assessment of executive functions. *Phonemic verbal fluency task* (Cardebat et al., 1990): participants were given 1 min to say as many common words as possible

beginning with the letter *M*, then again with the letter *P*; a means score was then calculated. *Similarities subtest* of the Wechsler Adult Intelligence Scale, fourth edition (WAIS-IV; Wechsler, 2008). The participant is presented with two words and asked how they are alike. The phonemic fluency task assessed mental flexibility and the *Similarities subtest* conceptualization skills (Godefroy, 2001).

SDFPs questionnaire. Participants were asked to imagine and write down three SDFPs, in accordance with D'Argembeau et al. (2012).

## Procedure

All participants were individually interviewed in a quiet environment. They were fully informed of the purpose and content of the experiment before providing their consent. The tasks were administered in the following order: MMSE (for young-old participants only), HAD scale, phonemic verbal fluency, *Similarities subtest* of the WAIS-IV and finally the SDFPs questionnaire. Participants were given an oral description of the task and SDFPs characteristics were explained. To be classified as an SDFP, an event had to (1) be likely to occur in at least 12 months, (2) be important and help the participant and significant others to understand who he/she was as a person, (3) be vividly represented, (4) reflect important concerns or goals in the participant's life and be related to other events sharing the same theme, (5) be either positive or negative and generate strong feelings, and (6) be an event that the participant had thought about many times. Once participants had understood the instructions, they were asked, for each SDFP, to give a title that summarized it and write a description containing enough details to help others visualize the scene and feel as if the future projection had happened. In particular, the following questions were suggested: "where you will be, who you will be with, what will happen, how you will react, and how others will react." After describing each SDFP, participants were invited to rate their affective response while imagining it. More precisely, they rated a scale for positive emotions and another for negative emotions, each on 7-point Likert ranging from 0 (*Not at all*) to 6 (*Extremely intense*).

Participants also indicated the personal importance they attached to that future event and rated it on a 7-point Likert scale ranging from 1 (*Not important*) to 7 (*Extremely important*). They also estimated the interval between the present time and the event so that we could calculate, for each projection, the distance (in years) between the present time and the time where the event was supposed to happen.

Total administration time was 30 to 40 min. No compensation was provided for participation in this study. The current study was conducted in accordance with the Declaration of Helsinki and approved by the local ethics committee (CERNI no. 2019-143).

## Data Coding

The data were coded by the authors for specificity, integrative meaning, tension and thematic content.

**Specificity.** Each future projection was coded as either specific (1 point), if it described a unique event that might happen at a particular time and place and last less than 24 h, or nonspecific (0 point), if it referred to a summary of events, a repeated event or an extended event lasting more than 1 day (Singer & Blagov, 2000–2001).

**Integrative Meaning.** Each projection was also coded as either integrated (1 point), if the participant assigned a meaning to it, concerning him- or herself, someone else, or life in general, or non-integrative (0 point) if the event contained no meaning (Singer & Blagov, 2000–2001).

**Tension.** Consistent with Thorne et al. (2004), we coded each SDFP for the presence (1 point) or absence (0 point) of references to tension (i.e., any discomfort or unease during the narrative).

**Thematic Content.** In line with Thorne and McLean (2001), SDFPs were divided into seven mutually exclusive categories according to their content: life-threatening events, recreation or exploration, relationships, achievement/mastery, guilt/shame, tobacco/drug/alcohol abuse, and unclassifiable events (projections that did not fit any of the other categories). As in pathological studies of SDMs (e.g. Castellon et al., 2020; Raucher-Chéné et al., 2021; Voltzenlogel et al., 2016), we decided to add a specific category for the older population. Thus, we coded content referring to the physical or mental decline of either the participants or others as dependence.

**Reliability.** All the SDFPs were scored by the first author and about a quarter of them by at least two raters (AF and CCL and/or VV). The second rater is blind to the age and other personal information from the participants. The interrater agreement was good for references to tension (Cohen's  $\kappa = 0.79$ ), very good for thematic content (Cohen's  $\kappa = 0.91$ ) and integrative meaning (Cohen's  $\kappa = 0.92$ ), and excellent for specificity (Cohen's  $\kappa = 1.00$ ).

**Other Characteristics.** We calculated the numeral difference between the two emotion scales (positive - negative), which we labeled as emotional *value*. For each SDFP, we obtained a score ranging from -6 (extremely negative emotion) to +6 (extremely positive emotion).

Finally, we determined the length of narratives by counting the number of words in each SDFP.

### Statistical Analysis

Analyses were performed using SPSS<sup>®</sup>. Comparisons between the three groups on SDFP dimensions and other variables (sociodemographic, clinical, executive functions) were



conducted using analyses of variance (Analysis of Variance, Fisher tests). Post hoc paired comparisons were carried out using Student-Newman-Keuls' or Games-Howell's tests, with Bonferroni correction ( $p < .05$ ). Moreover, we used Student tests to compare male and female dimensions of SDFPs and the Mann-Whitney tests when the normality assumption was not met. Finally, we calculated Spearman correlations between the main dimensions of the future projections and with other variables for every group age. Correlations were considered to be significant at  $\alpha = .05$  and the Bonferroni correction was applied for multiple interdependent testing.

## Results

The descriptive characteristics of the 111 participants are reported in Table 1. Mean scores on the HADS indicated that none of our groups have anxiety or depressive symptoms. Internal consistency (Cronbach's alpha) was satisfactory for depressive symptoms (0.61) and anxiety (0.69). We did not find a main effect of age for either executive functions or clinical (anxiety, depressive symptoms) variables. We do not report the values for two of the types of thematic content (guilt/shame and tobacco/drug/alcohol abuse), as only one of the 333 SDFPs contained a reference to guilt or shame, and none contained a reference to substance abuse.

### *Comparisons Between Young, Middle-Aged and Young-Old Adults*

Some of the SDFP dimensions varied throughout adulthood, even if we did not find any differences between the groups on specificity and integrative meaning. We highlighted that the frequencies of tension sequences tended to vary with age group but failed to reach significant difference ( $p = .06$ ). Specifically, young-old adults provided more SDFPs containing tension sequences ( $M = 8.3\%$ ) than middle-aged adults ( $M = 1.0\%$ ) did ( $t(49.7) = -2.65, p = .011$ ).

Regarding thematic content, we interestingly found that the frequency of leisure events increased with age, whereas achievement events decreased. More precisely, post-hoc analysis showed that references to leisure were significantly more frequent in the young-old group than in the middle-aged ( $p < .001$ ) or young ( $p < .001$ ) ones, whereas there was no difference between the middle-aged and young groups ( $p = 1.00$ ). By contrast, references to achievement were more frequent in the young sample than in the young-old group ( $p < .001$ ) whereas the middle-aged adults did not differ from the younger adults ( $p = .08$ ) and the young-old adults ( $p = .16$ ). Finally, young-old adults referred more frequently to dependence than young adults did ( $p = .005$ ), but the middle-aged group did not differ significantly from young-old adults ( $p = .55$ ) and young adults ( $p = .64$ ).

There was no significant main effect of age with the positive emotion, negative emotion, emotional value and personal importance (all  $p_s > .05$ ). In addition, temporal distance was shorter for young-old participants than for young ( $p = .015$ ) or middle-

aged ( $p < 0.001$ ) adults, but the two youngest groups did not differ significantly ( $p = .68$ ). Finally, the length of the narratives also decreased with age, as young-old adults used significantly fewer words to describe their SDFPs than young adults ( $p = .001$ ). In addition, young-old group did not differ from the middle-aged sample ( $p = .03$ ) and the young group did not differ from the middle-aged group ( $p = .86$ ).

### *Correlations among SDFP Dimensions and with Executive Functions*

Correlations among the SDFP dimensions are set out in Table 2.

Integrative statements were associated with narrative length whatever the participants' age. Integrative meaning also correlated positively with personal importance in the younger group ( $\rho = .44, p = .005$ ). Regarding thematic content, integration was positively correlated with achievement in the young-old group ( $\rho = .45, p = .003$ ).

Tension was negatively linked to emotional value ( $\rho = -.50, p = .001$ ) only in young-old adults. Emotional value was positively linked to personal importance only in young adults ( $\rho = .51, p = .001$ ). Finally, for young-old adults, temporal distance was correlated positively with references to dependence ( $\rho = .47, p = .003$ ).

Other correlations among dimensions of SDFPs did not reach significance after Bonferroni's correction.

Regarding executive functions, we found that scores on the Similarities subtest and phonemic verbal fluency were both positively correlated with length of narratives in the 111 participants ( $\rho = .29, p = .004$  and  $\rho = .37, p < .001$  respectively). Furthermore, the score on fluency correlated positively with integrative meaning ( $\rho = .25, p = .016$ ). Moreover, the similarities task's score was negatively correlated to dependence' SDFPs in young-old adults ( $\rho = -0.49, p = .001$ ).

### *Gender Differences*

We did not find any sex differences concerning SDFPs, except for few dimensions. Two of them were more frequently referred to by women than by men: relationship content for middle-aged adults (31.6% of women's SDFPs contained references to this dimension, compared with 13.3% of men's SDFPs;  $U = 82.0, p = .022$ ), and personal importance for young adults (6.21 vs. 5.50;  $t(35) = -2.39, p = .022$ ). Contrastingly, women reported less non-classified sequences than men in the middle-aged group (14.0% vs 37.8%,  $t(32) = 3.88, p = .007$ ). Finally, in the whole sample, the emotional value was higher in women' SDFPs compared to men' SDFPs (4.44 vs. 3.72;  $U = 1136.0, p = .025$ ) and also the frequency of projections with relationship events (25.4% vs 16.0%,  $U = 1171.5, p = .025$ ) whereas the SDFPs containing non-classified events were lower (13.8% vs 25.7%,  $U = 1155.5, p = .017$ ).

**Table 2.** Spearman Correlations ( $\rho$ ) between Main Dimensions of SDFPs (Specificity, Integrative Meaning, Tension and Personal Importance) in Young, Middle-Aged and Young-Old Adults.

	Specificity			Integrative making			Tension			Personal importance		
	Y	M	YO	Y	M	YO	Y	M	YO	Y	M	O
Integrative meaning	.04	-.04	.18									
Tension	-.12	.39	.05	-.13	.04	.19						
Personal importance	.01	-.22	-.06	.44*	-.08	-.27	.18	-.37	-.26			
Number of words	.19	.31	.21	.53*	.55*	.44*	.24	.13	-.35	.37	-.30	-.01

\* $p < .005$  with Bonferroni correction ( $\alpha = .05$ ).

Y = young adults (20-30 years); M = middle-aged adults (31-60 years); YO = young-old adults (61-75 years);

\* $p < .005$  with Bonferroni correction ( $\alpha = .05$ ).

Y = young adults (20-30 years); M = middle-aged adults (31-60 years); O = young-old adults (61-75 years);

## Discussion

To explore and understand the development of personal identity through the simulation of salient future projections, the present study was designed to investigate SDFPs in young, middle-aged and young-old adults. To our knowledge, this was the first time that the dimensions of these self-relevant projections had been explored throughout adulthood. We did not find a main effect of age on clinical and cognitive variables.

### Self-Defining Future Projections Throughout Adulthood

*Specificity.* Contrary to our expectations, and in contrast to the only comparison between young and older adults' SDFPs (Raffard et al., 2020), we did not find that the specificity of simulated future events decreased with ageing. Nevertheless, our results are in line with D'Argembeau et al. (2012) who highlighted a high level of non-specific SDFPs. Our findings are also consistent with previous studies concerning other future projections. For example, De Beni et al. (2013) found that simulated future events were just as specific in young-old adults as they were in young adults. Most all of our participants used an overgeneral narrative style. Indeed, recent studies have established that self-projection requires considerable cognitive and executive resources (Jumentier et al., 2018), and evoking episodic future events remains difficult whatever one's age (Abram et al., 2014). Details of future events are influenced by imagination processes, but the temporal location of projections is seldom directly accessed, such that references to lifetime periods are commonly used to determine it (Ben Malek et al., 2017). Finally, identity mostly includes abstract representations, as semantic autobiographical memory appears to provide sufficient knowledge about

one's future (e.g., Irish & Piguet, 2013) and sense of continuity (D'Argembeau et al., 2012). Individuals sometimes desire certain future events to happen, in which case they elaborate more concrete plans and more specific SDFPs (D'Argembeau et al., 2012).

Compared with D'Argembeau et al. (2012)'s study, the young adults in our sample provided very few specific events. We suggest that this difference could be explained by the participants' age and education level (in the earlier study, they were younger and had a higher education level) and also eventually by cultural factors. Indeed, the cultural context plays a key role in the development of the self (Conway & Jobson, 2012) and some differences were even observed between Western individuals in their narratives highly relevant for the self (e.g., Lardi et al., 2010). In particular, we can suggest that, compared to other cultural context, the young French participants in the current study might have had a more global and less detailed perception of their future goals.

In addition, in our study, specificity did not vary with temporal distance, in contrast to precedent findings (Raffard et al., 2020).

*Integrative Meaning.* Consistent with the study comparing young and older adults' SDFPs (Raffard et al., 2020), we found that participants extracted integrative meaning equally frequently whatever their age, with integrative statements featuring in around a third of SDFPs. This high level of integration is in accordance with previous studies (D'Argembeau et al., 2012; Tuchina et al., 2021). It suggests that in order to achieve their personal goals and find a sense of unity (McAdams, 2001), young, middle-aged and older adults all try to associate past and future self-relevant events in their life stories (Habermas & Köber, 2015) in the same way. Moreover, some authors consider that creating future representations entails making sense of these projections, and consequently shaping thoughts and guiding actions (Raffard et al., 2016).

The quest for autobiographical reasoning in SDFPs was confirmed by the positive correlation between the frequency of integrative statements and the length of the narratives. Because of this need to find meaning for personal salient events, young, middle-aged and young-old adults used far more words to describe their integrated projections than their nonintegrated SDFPs. Thus, the length of the narratives was explained by the quest to find an explanation or a lesson to be learned from future events, rather than to describe the events with more contextual details. In young adults in particular, who were only just establishing their identity (e.g., McLean, 2008), this need was very high, as evidenced by the positive link between integrative meaning and the personal importance attached to their projections.

In contrast to the initial study by D'Argembeau et al. (2012), we did not find that integrative meaning was linked to specificity in SDFPs. Nevertheless, young-old participants tended to make meaning in their future experiences, through the anticipation of achievement events. This can be explained by the fact that only the simulation of specific content can induce autobiographical reasoning in older participants, possibly because these adults are keen to maintain as consistent an identity as possible (e.g.,

Brown et al., 2005) and anticipate any disruption of it, except when imagining specific achievement SDFPs.

*Tension.* In the current study, we highlighted a tendency for an age-related increase in the frequency of references to tension between young-old adults and middle-aged ones. We argue that there are several possible explanations for this result. First, compared with middle-aged individuals, young-old adults have fewer expectations about the future, as they have already achieved important personal goals. Second, they probably imagine that in the future, they will be more likely to face physical or mental dependence as the frequency of dependent projections demonstrate it. This suggestion is confirmed by statistics showing that the declaration of a chronic disease or a long-term health problem increase with ageing (e.g., Demaison et al., 2020).

*Thematic Content.* During the lifespan, identity themes vary according to personal concerns and life scripts (Berntsen & Rubin, 2004). As expected, some of the thematic content of self-relevant future projections varied according to participants' age. More specifically, the frequency of achievement events decreased between young or middle-aged adults and young-old ones, while that of leisure events increased. This finding is in line with previous research comparing SDFPs in young and older adults (Raffard et al., 2020). Young adults initially define themselves in terms of achievement, reflecting their current life goals (D'Argembeau et al., 2012), whereas older ones mostly focus on and engage in leisure events, specifically after retirement or widowhood (Nimrod & Kleiber, 2007). In ageing, leisure activities may help to transcend negative life events and generate optimism about the future (Kleiber et al., 2002). Interestingly, we found that middle-aged adults had a comparable profile to that of young individuals. We can argue that these adults are generally in employment, and therefore are less prone visualizing themselves engaged in leisure activities.

Compared to previous studies (D'Argembeau et al., 2012; Tuchina et al., 2021), the projections of our young participants were less oriented towards achievement in life but similar to Raffard and coworkers' findings. A possible explanation for the difference between our adults and the Russian one's is that every participant collected just one SDFP in their study. This could mostly correspond to a major goal and an achievement event to be expected in the near future, as the mean temporal distance was lower in Tuchina and colleagues' study (2021) than in the present one.

With the exception of leisure and achievement projections, we found that thematic content did not differ throughout adulthood, consistent with Raffard et al. (2020) study comparing young and older individuals. Regardless of age, relationship events were the second most frequent characteristic of adults' future self-representations. This finding is also congruent with the fact interpersonal relations appear to be one of the most important themes in personal identity and in SDMs for young (Blagov & Singer, 2004; Lardi et al., 2010; Singer et al., 2007), middle-aged (Cuervo-Lombard et al., 2020) and older adults (Singer et al., 2007).

SDFPs seldom feature life-threatening events at any age. Nevertheless, individuals in late adulthood made more references to dependence in their SDFPs than younger adults, probably because they were faced with a shrinking positive future. However, we observed that these projections concerned the most distant future. Thus, young-old adults wished their health problems or those of their loved ones to occur as late as possible and tended to delay health decline that might emerge.

*Emotion.* We found that affective responses to SDFPs were very positive regardless of age, consistent with previous studies (D'Argembeau et al., 2012; Raffard et al., 2020). These findings suggest that, through their future projections, individuals try to maintain a positive identity whatever their age, as well in adolescence (e.g., Ramsgaard & Bohn, 2021) as in ageing (e.g. Sedikides & Gregg, 2008). Future projections allow a positive self to be enhanced (Grysmen et al., 2013).

*Temporal Distance.* As we hypothesized, the SDFPs of young-old participants were closer to the present than those of young and middle-aged ones, in line with previous studies reporting a negative correlation between temporal distance and age of participants (D'Argembeau et al., 2012; Raffard et al., 2020). Older adults are aware that their future is more limited (Lang & Carstensen, 2002) and that they have less time to accomplish their important goals. As has been observed elsewhere (Raffard et al., 2020), the length of the narratives decreased with advancing age, especially the more distant SDFPs concerning experiences that were necessarily less precise and more difficult to simulate.

### *SDFPs and Executive Functions*

As suggested by the positive association between similarities or verbal fluency scores and the length of SDFPs, we can argue that people with higher cognitive and executive functioning are more able to project their selves in the future with longer narratives. Furthermore, we showed that integrative meaning was positively correlated with mental flexibility. This finding is in accordance with Raffard et al.'s (2020) study showing a link between semantic verbal fluency and integrative meaning in older adults. It also confirms the salience of executive functions in creating integrative projections. Nevertheless, these correlations were only significant for the whole sample, probably because each of our three age groups was relatively small.

Moreover, as the negative relationship between dependence and conceptualization skills suggests, we can assume that young-old adults consider they are protected from mental decline because of a high cognitive reserve (e.g., Stern, 2009).

## *Influence of Gender on SDFPs*

Finally, concerning sex differences, we interestingly found that young women lent greater importance to their SDFPs than young men did to theirs. One possible explanation is that their future projections are closer linked to their personal goals (success in higher education, having children, etc.); they also may be directly located in time and judged to be personally more important than those of their male counterparts. The case of middle-aged individuals' SDFPs is also interesting, as women mentioned relationship events significantly more frequently than men did: this sex difference may partly be explained by self-construal theory (Cross & Madson, 1997), according to which women mostly construct an interdependent identity, whereas men tend to construct a self that is independent of others (Asher et al., 2017).

Regardless of age, women reported higher emotional value than men after providing SDFPs. Considering that future projections are closely linked to memories, in particular when both are self-relevant (Demblon & D'Argembeau, 2017), this finding is consistent with recent studies establishing that women attribute greater emotional value to autobiographical memories than men (El Haj & Allain, 2020).

## *Limitations*

Some limitations of the current study should be addressed. Firstly, our samples were relatively small. Secondly, no psychiatric or neurologic disorders were reported by our participants but we did not use a standardized clinical interview to assess potential psychiatric disorders. Thirdly, participants rated the emotions linked to SDFP after the description of each ones but we did not assess their affect at the beginning of the experiment even if their current affective state may have influenced the emotional value of their SDFPs.

## **Conclusions**

To our knowledge, this is the first study to explore personal identity and targeting SDFPs throughout adulthood. Results revealed that these self-relevant simulated events in the future change, particularly in terms of their thematic content and the times at which they are expected to happen. More specifically, we found that the SDFPs of young and middle-aged adults were quite similar, compared with those of young-old adults, probably because of the impact of retirement and the shrinking future of older individuals. Clinical interventions based on SDFPs might be interesting. Indeed, psychotherapy using SDMs are already developed (Singer, 2006; Singer & Blagov, 2004; Spor & Lefèvre, 2021) and improve patients' well-being. Indeed, using SDFPs, psychotherapists can help their patients to project themselves in the future in a more positive way (Singer, 2006). As D'Argembeau et al. (2012) highlighted that an individual's particular style of constructing self-defining information is manifested in a similar way for past and future events in young adults, future research

should also focus on an examination of SDMs in addition to SDFPs throughout adulthood in order to determine their respective evolution and contribution to the personal identity.

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