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Narrative identity differences in autism

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Autism is characterized by a modification of the sense of self, particularly self-continuity. While former studies focused on the recollection and narrative of single past events, the present study aimed to explore autistic individuals' narrative identity by assessing for the first time their life story, described as the most integrated form of personal narrative and the closest to the self. A comparison of the narrative coherence of autistic individuals' life stories (n = 22) with those of nonautistic participants (n = 22) revealed that global coherence, particularly causal-motivational coherence, was lower in the life narratives of autistic individuals. Additionally, typical narrative beginnings at birth and elaborated endings were less frequent in autistic individuals. In comparison with the nonautistic group, the autism group included personal events in their life narratives that were self-rated as more negative and associated with negative feelings at retrieval, along with having lower life impacts. The present study provides evidence for a different narrative identity in autism. We discussed how this effect could be related to variations in narrative coherence and temporal framework, possibly influenced by differences in others' perspective-taking.

Keywords Autism, Narrative identity, Life story, Narrative coherence, Others' perspective-taking

Autism is characterized by a modification of the sense of self, that is, of the feeling and knowledge of who we are as individuals across time and compared with others[1–5]. In particular, the temporally extended aspects of the self that sustain an individual's sense of self-continuity and are supported by the autobiographical memory system[6] are strongly changed in autism[1,4].

First, in autism, episodic memory variations are responsible for reduced mental time travel, possibly hindering the subjective experience of selfhood across time[7,8]. Second, the mental representation of one's self across time has also been shown to be different in autism. More precisely, self-knowledge is poorer[9] since autistic individuals use fewer self-statements to define themselves[10] and report a lower clarity of self-concept[11] than nonautistic participants. In addition, the personal narratives of autistic individuals are less organized from a structural standpoint. McCabe and colleagues[12] showed either poorer content or rambling and incoherent narratives, including too much information. Autistic individuals seemed to struggle to make sense of their emotional experiences and resolve the dilemmas experienced in their lives. High-functioning autistic children showed difficulties inferring causal relationships both within and across story episodes[13]. In relation to identity, particularly important personal events (i.e., self-defining memories[14]) are correctly identified by autistic individuals[15] but are less integrated into the self when narrated[1,15,16]. More precisely, autistic individuals present difficulties in understanding the impact of these important personal events on their identity. Berna and colleagues[17] used self-report scales to demonstrate that persons with high levels of autistic traits have a less clear and stable self-concept, in relation to a lower capacity to reason about past important personal events and make meaning of these events. Altogether, these findings showed that autobiographical reasoning processes are different in autistic individuals and might account for the lower sense of self-continuity in autism.

Previous studies investigating the sense of self-continuity in autism focused on the recollection and narrative of single past events. However, narrative theories of identity sustain that individuals understand and make sense of their personal experiences by creating coherent stories of their lives, which enable them to construct and maintain a sense of identity and self-continuity[18,19]. The life story has been conceptualized as the constantly evolving subjective representation of the life course as it is remembered, reflected upon, or narrated[20]. The life story is also considered by Conway[21] to be the highest level of autobiographical memory organization sustained by complex cognitive processes.

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The life story consists of a selection of relevant personal events associated with an overall organization of different life events and chapters. In addition, the narrator uses autobiographical reasoning and general statements, reflecting semanticized and abstracted levels of memory, to synthesize a large volume of information[22] and create narrative coherence. According to Habermas and colleagues[18], abilities to construct coherent life narratives are rooted in both the development of narrative and the development of the identity and require high social-cognitive functioning. Importantly, the life story corresponds to the product of a particular sociocontextual demand and satisfies normative and cultural expectations regarding facts and events that should be included in life narratives (referred to as the cultural concept of biography[18,23], or cultural life script[24]).

Habermas and colleagues developed a theoretical framework to explain the process of life story construction[18,20]. This framework provides insight into how individuals create coherent, structured narratives of their lives, integrating personal experiences and social contexts to form a unified identity over time. They posited that in addition to the cultural concept of biography, three types of coherence sustain the life story's overall coherence: (1) temporal coherence, referring to the listener's understanding of when and in what order events happened in the narrator's life; (2) causal-motivational coherence, referring to the listener's understanding of how actions and changes in personality are caused and motivated by biographical experiences; and (3) thematic coherence, referring to the listener's understanding of the dominant thematic narrative arcs. Building on this theoretical framework, Habermas and colleagues developed a rigorous method to assess the degree to which the three types of coherence—temporal, causal-motivational, and thematic—support and sustain life story narration[18,25,26]. This method enables a precise quantification of how effectively individuals integrate these coherence dimensions within their life narratives. The three types of coherence are evaluated across two levels. First, at the local level—between sentences or within individual event—semantic indicators of each type of coherence are quantified within the narratives. Second, at the global level, where the entire life narrative is considered, each type of coherence is rated on a 7-point scale following a comprehensive reading of the life story[20]. The degree of elaboration in the beginning and ending of narratives also contributes to the overall coherence of the life story and is systematically assessed[25].

The present study aimed to explore autistic individuals' narrative identity using the life story approach to assess the most integrated form of personal narrative and the closest to the self. Life narratives were collected from autistic and nonautistic individuals, and the coherence was assessed using Habermas and colleagues' coding system[26]. The subjective sense of coherence—a global orientation toward life and personal experiences—was also assessed in each participant, using the Orientation to Life Questionnaire[27]. Based on former studies, we hypothesized that autistic individuals' life narratives would be less coherent than those of nonautistic participants. In particular, we hypothesized that causal-motivational coherence would be lower in autism, possibly at local and global levels. In line with the lower self-clarity, the sense of coherence was also hypothesized to be lower in autistic individuals than in nonautistic participants.

Results

Clinical and cognitive measures

Descriptive measures and statistics are reported in Table 1. Autistic individuals showed higher scores on the autism spectrum quotient, more depressive symptoms, and higher trait anxiety than nonautistic participants, *Prs* (A > NA) > 0.987. Conversely, autistic individuals had lower empathy, self-esteem and sense of coherence scores than nonautistic participants, *Prs* (A > NA) < 0.022.

Regarding cognitive functioning, autistic individuals performed better on the Trail Making Test, representing better mental flexibility abilities, $Pr(A > NA) = 0.998$. The groups did not differ in IQ or verbal fluency.

In addition, no meaningful difference between groups was observed in the frequency of biographical practices, $Pr(A > NA) = 0.122$.

Narrative identity measures

Personal events composing life stories (see Table 2)

The characteristics of the seven most important events selected and included in life narratives differed between autistic individuals and nonautistic participants regarding the emotional valence of both the initial event and the memory, being more negative in autistic individuals. In comparison with nonautistic individuals, autistic individuals also self-rated their memories as less associated with life consequences (as observed in two different questions: "Memory-consequences" and "CES—Item 5"). Regarding the centrality of the events composing the life narratives, except for Item 5 of the CES, the other items and the total score did not differ between the groups.

Life story measures

The life narrative duration and number of propositions, reflecting the length of the narratives, did not differ between the groups (see Table 3).

Beginnings and endings (see Fig. 1)

We observed that autistic individuals started their life stories at birth less frequently, $Pr(A > NA) = 0.014$, more frequently initiating them after birth, such as during childhood or adolescence, $Pr(A > NA) = 0.998$. We also observed a difference in how participants finished their life narratives. Autistic individuals ended their life stories less frequently in the present with retrospective and prospective thoughts, $Pr(A > NA) = 0.011$. The other categories of endings were similarly observed in both groups. Overall, autistic individuals more frequently exhibited narratives with both a late beginning and an less elaborated ending ($Pr(A > NA) = 0.971$).

Variables	Autistic participants (n = 22)		Non-autistic participants (n = 22)		Statistics	
	Mean	(SD)	Mean	(SD)	*d*	*Pr*(ASD > C)
Demographic information						
Gender	20 men and 2 women		21 men and 1 woman			0.257
Age	29	(10.08)	28.10	(10.46)	0.09	0.655
Years of education	13	(2.83)	13.41	(2.44)	− 0.16	0.325
Clinical measures						
AQ	33.28	(8.08)	13.94	(7.34)	9.67	**> .999**
EQ	21.22	(13.00)	45.28	(13.08)	− 1.84	**< .001**
BDI	14.94	(11.67)	4.68	(3.83)	1.32	**0.998**
STAI						
State	46.89	(11.64)	39.77	(11.61)	0.61	**0.987**
Trait	54.94	(14.73)	38.86	(7.75)	1.43	**> .999**
SES	26,39	(7.14)	30.82	(4.40)	− 0.77	**0.022**
SoC	102.33	(35.08)	145.23	(18.91)	− 1.59	**< .001**
Cognitive measures						
fNART	108.17	(5.68)	108.11	(6.24)	0.01	0.832
Verbal fluency						
Lexical	0.13	(0.78)	0.39	(0.70)	0.35	0.139
Semantic	0.28	(0.77)	0.28	(0.85)	0.00	0.502
Trail making test (B-A time)	0.69	(1.24)	-0.24	(0.84)	0.89	**0.998**

Table 1. Autistic and non-autistic individuals demographic information, clinical and cognitive measures. AQ, Autism spectrum quotient; EQ, Empathy quotient; BDI, Beck depression inventory; STAI, State trait anxiety inventory; SES, Self-esteem scale; SoC, Sense of coherence; fNART, French version of the national adult reading test. Significant values are in bold.

Self-rated characteristics	Autistic participants (n = 22)		Non-autistic participants (n = 22)		Statistics	
	Mean	(SD)	Mean	(SD)	*d*	*Pr*(ASD > C)
Event age	18.18	(6.34)	20.00	(6.77)	− 0.28	0.110
Memory details	5.34	(0.91)	5.32	(0.98)	0.02	0.675
Event—Feelings valence	3.89	(1.56)	5.06	(1.08)	− 0.89	**0.003**
Event—Feelings intensity	5.79	(0.83)	5.90	(0.90)	− 0.13	0.462
Memory—Feelings valence	4.30	(1.30)	5.43	(0.97)	− 0.99	**< .001**
Memory—Feelings intensity	4.96	(1.05)	4.90	(1.23)	0.05	0.596
Agentivity	5.87	(1.06)	5.84	(0.94)	0.03	0.639
Event—Consequences	4.75	(1.11)	5.16	(1.30)	− 0.34	0.180
Memory—Consequences	4.96	(1.24)	5.60	(0.71)	− 0.66	**0.013**
CES—Total score	23.59	(5.31)	25.28	(3.74)	− 0.37	0.148

Table 2. Autistic and non-autistic individuals' self-ratings of personal events composing life stories. Significant values are in bold.

Local indicators of coherence

The percentage of local indicators was analyzed using a multilevel Beta regression with the type of coherence (temporal *versus* causal *versus* thematic) as a within-subjects variable and group (autistic *versus* nonautistic individuals) as a between-subjects variable. We observed no group, type of coherence or interaction effects (*Prs*(A > NA) between 0.50 and 0.66).

Global coherence

Regarding local indicators of coherence, the scores of global coherence were analyzed using a multilevel Beta regression with the type of global coherence (temporal *versus* causal *versus* thematic) as a within-subjects variable and group (autistic *versus* nonautistic individuals) as a between-subjects variable. We observed a group effect, *Pr*(A > NA) = 0.005, showing that global coherence was lower in the life narratives of autistic individuals relative to those of nonautistic participants. More precisely, when considering the different types of coherence,

Variables	Autistic participants (n = 22)		Non-autistic participants (n = 22)		Statistics	
	Mean	(SD)	Mean	(SD)	d	*Pr*(ASD > C)
Narration duration (minutes)	15.00	(2.35)	13.64	(2.69)	5.30	0.966
Number of propositions	244.77	(85.39)	286.86	(89.39)	− 0.48	0.030
Local coherence (propositions percentages)						
Indicators of temporal coherence	9.19	(5.37)	7.38	(3.00)	0.43	0.837
Relative temporal indicators	3.76	(4.09)	2.46	(1.80)	0.44	0.846
Absolute temporal indicators	5.43	(2.68)	4.47	(3.23)	0.32	0.573
Indicators of causal coherence	0.70	(0.63)	0.94	(0.99)	− 0.30	0.279
Biographical arguments	0.61	(0.59)	0.78	(0.83)	− 0.24	0.293
Self-event connections	0.09	(0.25)	0.16	(0.28)	− 0.26	0.610
Indicators of thematic coherence (= self-event connections)	0.60	(0.68)	0.30	(0.39)	0.56	0.880
Autobiographical Reasoning (= causal + thematic coherences)	1.30	(1.04)	1.24	(1.14)	0.05	0.736
Global coherence (scores from 1 to 7)						
Temporal	5.50	(1.10)	6.04	(1.21)	− 0.47	0.056
Causal	3.36	(1.33)	4.82	(1.71)	**− 0.96**	**< 0.001**
Thematic	3.77	(1.77)	4.23	(1.51)	− 0.28	0.124

Table 3. Autistic and non-autistic individuals' life narratives measures. Significant values are in bold.

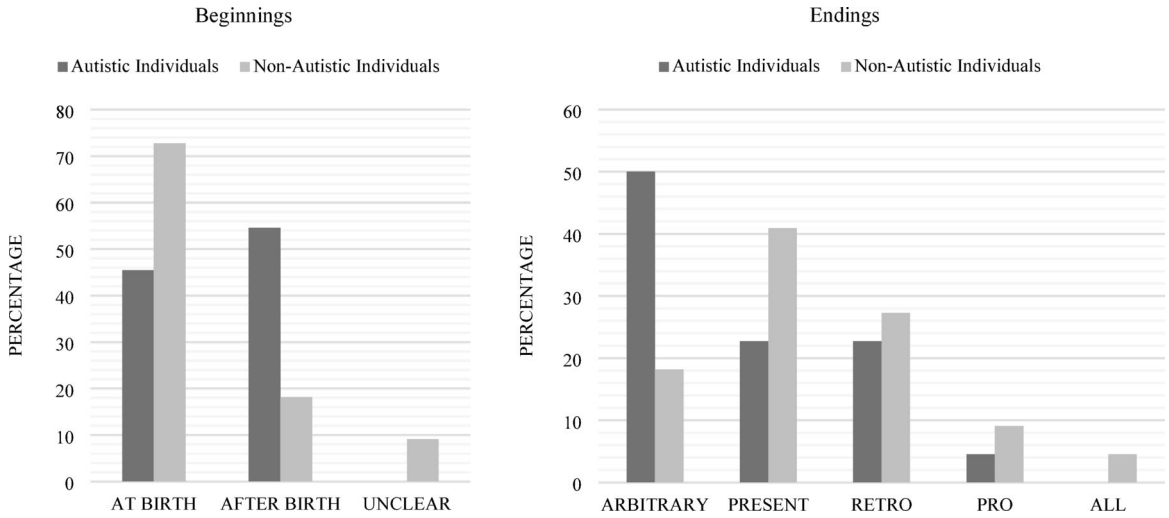

Fig. 1. Percentages of life narratives starting "at birth", "after birth" or "unclear" and percentages of life narratives ending "arbitrarily", "at present time", "at present time with a retrospective", "at present time with future projections", or "at present time with both retrospective and prospective thoughts", in both groups of participants.

we observed that the causal global coherence was lower in autistic individuals than in nonautistic participants ($Pr(A > NA) < 0.001$). In contrast, only a trend was observed for temporal coherence ($Pr(A > NA) < 0.056$). There were neither coherence type nor interaction effects $Prs(A > NA)$ between 0.45 and 0.55.

Correlation analyses

We conducted correlation analyses separately for both groups between the life story and the clinical and cognitive measures. In the autism group, the presence of depressive symptoms, anxiety and lower self-esteem were correlated with the negative valence of the events selected and included into the life story ($rs > -0.45$, $Pr(r > 0) < 0.015$). A higher proportion of temporal indicators correlated with lower depressive symptoms ($r = -0.40$, CI 95% = [− 0.72 to 0.003], $Pr(r > 0) = 0.026$), higher self-esteem ($r = 0.42$, CI 95% = [0.01 to 0.73], $Pr(r > 0) = 0.98$), lower anxiety ($r = -0.48$, CI 95% = [− 0.77 to − 0.09], $Pr(r > 0) = 0.01$), and lower autistic traits ($r = -0.45$, CI 95% = [− 0.74 to − 0.05], $Pr(r > 0) = 0.015$). A higher proportion of biographical arguments was related to higher depressive symptoms ($r = 0.44$, CI 95% = [0.03 to 0.74], $Pr(r > 0) = 0.98$), lower self-esteem ($r = -0.44$, CI 95% = [− 0.73 to − 0.03], $Pr(r > 0) = 0.018$), and higher anxiety ($r = 0.49$, CI 95% = [0.11 to 0.78], $Pr(r > 0) = 0.99$).

In the comparison group, the higher proportion of temporal indicators only correlated with higher self-esteem ($r = 0.54$, CI 95% = [0.21–0.78], $Pr(r > 0) = 0.99$). Cognitive measures did not correlate with life story measures in any group. In both groups, the sense of coherence was positively correlated with the proportion of indicators of temporal coherence ($rs > 0.51$, $Prs(r > 0) > 0.99$).

Discussion

The present study aimed to investigate for the first time the narrative identity of autistic individuals using the life story approach[18,25,26]. We showed that the life stories of autistic individuals differed from those of nonautistic individuals in global narrative coherence and in the extent to which beginnings and endings were elaborated. Throughout their narratives, autistic individuals used as many local indicators of coherence as nonautistic persons, regardless of the type of coherence. However, global coherence, particularly causal-motivational coherence, was lower in the life narratives of autistic individuals than in those of nonautistic individuals. In addition, autistic individuals more frequently had atypical narratives, starting less frequently at birth and having less elaborated endings. Personal events included in life narratives of the autism group were self-rated as being more negative and associated with negative feelings at retrieval and having lower life impacts than those included by individuals in the nonautistic group. Finally, the subjective sense of coherence was lower in autistic individuals than in nonautistic participants.

We first observed an overall lower global coherence of autistic individuals' life narratives than that of the life narratives of nonautistic participants, particularly for causal-motivational coherence. This lower coherence was observed despite the similar number of local indicators of coherences observed in both groups. Although the presence of local indicators of coherence relates to the global coherence of the narratives, they correspond to an indirect measure of the life narrative coherence[25] and do not account for all of the variability in the narrative coherence[26]. The presence of local indicators of coherence is associated with the narration of the specific events included in the life narratives, whereas global coherence also considers how these specific events are organized relative to each other and relates more to general statements, reflections about one's life, and personal semantic information. This pattern of findings might align with the weak central coherence characterizing autism[28], referring to a cognitive style that overfocuses on details and local information rather than the global form or meaning.

Life narratives are expected to explain the narrator's identity development and how the narrator became the person he or she is today[26]. Hence, the lower causal-motivational coherence observed in the autism group reflects individuals' difficulties in explaining their identity development through the narrative of their life trajectories. The turning points and motives sustaining personality, behavior or value construction, progress, and change might be less evident in autistic individuals' life stories. These results align with former findings showing that autistic individuals have difficulties giving meaning to self-defining memories, connecting these life events to their identity and drawing lessons from these events for the future[1,4,15,16]. Autism were also associated with lower self-concept clarity[11]. This association was mediated by difficulties to give sense to self-defining memories in individuals with high autistic traits. The present study extends the difficulty in making sense of single personal life events to the narrative and understanding of one's whole life trajectory in autism.

Importantly, the seven personal events selected and included in the life narratives were similarly self-rated in terms of vividness, agency and centrality to the identity in both groups. Hence, in the present study, autistic individuals could identify highly important events that were relevant and central to their identity. However, their ratings of personal events were more negative than those of nonautistic participants[29]. In the present study, the higher negativity of the personal events in the autism group was related to the higher scores of depressive symptoms and lower scores of self-esteem reported by autistic individuals, as previously observed[16]. Autistic individuals often exhibit higher levels of depressive symptoms and lower self-esteem compared to non-autistic individuals[30]. Consequently, their tendency to focus on more negative events in their life stories may stem from depressive symptoms, low self-esteem, or inherent characteristics associated with autism itself. However, the present study does not enable us to disentangle these distinct contributing factors. Additionally, this tendency might reflect the more negative social self-image often reported by autistic individuals[29]. Additionally, although central to their identity, the seven life events selected were considered less impactful and less associated with changes in autistic individuals' lives. This result is fully in line with their difficulty in explaining—at the life story level—the evolution of and changes in their identity using causality links between life events and between life events and their identity. Thus, the most important personal events tend to exert a rather negative emotional impact on autistic individuals' self without stimulating self-reflection and narrative processes to make sense of those negative events.

The lower self-impact of the selected personal events associated with the lower causal coherence suggests that autistic individuals have difficulties understanding and making sense of the impact of biographical experiences on their personality. These results might reflect a lack of flexibility in autism[31], possibly making identity immutable in time and lacking the integration of natural changes and evolution. Consequently, when autistic individuals experience major life disruptions or breakdowns, the rigidity of their thinking might serve as a buffer to maintain self-continuity in time; however, it might also prevent them from integrating important changes likely to update their sense of self[32].

Yet, in the present study, the lower coherence observed in the life narratives of autistic individuals is unlikely to be explained by cognitive dysfunctions in the autism group. Autistic individuals showed similar or even higher cognitive abilities than nonautistic participants, and no correlations were observed between cognitive and narrative measures. In contrast, the lack of a temporal framework (i.e., beginnings and endings elaboration) observed in the autism group and correlated to autistic trait severity might account for the lower global coherence of the narratives[26].

Despite the specific instructions asking participants to narrate the story of their life beginning from their birth, autistic individuals started their life narratives later on, more frequently mentioning their first memories dating from childhood or even adolescence. Although one's own birth, together with the first years of life, are not remembered, they also compose one's life trajectory and participate in anchoring one's life into a social, historical, and family context that remains important for the rest of their life[20]. According to the cultural concept of biography[23], there are some culturally and socially defined normative—but implicit—expectations as to what constitutes an appropriate life narrative and what does not. As part of this cultural concept of biography, beginnings of life narratives are intended to help create coherence by beginning before the first actual memories and comprising scenes that foreshadow themes to come later in life and in the narrative[20]. This self-contextualization requires integrating abstract historical knowledge and knowledge of family stories into one's autobiography. Implicit social cognition differences are a hallmark of autism[33,34], and autistic individuals might not pay attention to the importance of beginning elaboration and contextualization for listeners. More precisely, autism is associated with higher egocentrism and lower allocentrism[35], possibly leading autistic individuals to narrate their life stories from their own perspectives without considering the listeners' point of view and implicit expectations. In line with this assumption, autistic adults report using autobiographical memories less frequently to feed their social relationships than nonautistic individuals[11,17].

In addition, autistic individuals less frequently ended their life narrative at the present time with both retrospective and prospective reflections than nonautistic individuals. However, Habermas and de Silveira[20] highlighted the importance of wrapping up life narratives, as simply ending the narrative at present would leave it unfinished. In addition, global biographical evaluations, which adults often place at the end of their life narratives, serve to create a unitary perspective of their life[36]. They reflect the narrator's capacity to step back from his or her life and share a distanced perspective of it with the listener[20]. In addition, because autobiographical remembering often serves a directive function reflecting learning from past mistakes[37], the life narratives of younger people often include spontaneous future projections with a focus on expectations and plans. The reduction in spontaneous future projections in autistic individuals' life narratives might also be partly explained by episodic future thinking difficulties described in autism[38,39].

Importantly, here and above, the reduced narrative coherence was observed from the listener or reader's perspective and likely differs from the subjective perception of autistic individuals. Although subjective narrative coherence was not self-rated per se by participants, we observed that the subjective sense of coherence was also lower in autistic individuals than in nonautistic participants. The lower sense of coherence reflects that autistic individuals perceived their life events as less comprehensible, manageable and meaningful, aligning to a certain extent with the lower causal coherence observed in their life stories.

The relatively small sample size represents one of the limitations of the present study, possibly preventing us from grasping more subtle differences between autistic and nonautistic individuals. We also acknowledge that the female-to-male ratio in this study is 1:10, whereas the actual prevalence ratio is close to 1:3[40]. As a result, our findings may not fully represent the autistic population, particularly due to the under-representation of females. In addition, cognitive functioning was assessed using tests with low clinical specificity. A deeper and more specific cognitive investigation might be of interest to highlight the relationship between narrative identity differences in autism and autistic persons' cognitive functioning. In particular, updating (the ability to integrate new information into existing knowledge in memory) is worth investigating in relation to narrative identity coherence[41]. We recognize that narrating one's life story for the first time to an unfamiliar person may feel somewhat artificial. However, it is important to note that this paradigm is widely used in research on narrative identity due to its advantages of standardization and reproducibility. It has been applied repeatedly across various clinical and situational populations[42]. This task engages not only cognitive processes but also relational and affective ones, relying on the participant's trust in the experimenter. In this way, it is designed to simulate a social experience akin to meeting new people in real life.

In conclusion, this study suggests that differences in narrative identity in autism may be linked to variations in narrative coherence and temporal framework, potentially influenced by differences in perspective-taking. Autistic individuals' narrative identity is less sustained by connections between biographical experiences and personality, lowering autistic individuals' sense of self-continuity. Future research on narrative identity in autism should explore various factors influencing the coherence of life narratives to better understand the mechanisms underlying its differences. First, an assessment of the knowledge related to the cultural concept of biography is necessary to confirm its impact on narrative framework differences. Additionally, future research could delve into the thematic content of narratives from autistic individuals to gain a more nuanced understanding of their narrative identity. This could involve examining experiences specifically related to autism, such as diagnosis, stigma, and resilience, as well as the presence of traumatic experiences, more prevalent in autism[43], which may also shape how individuals construct and recount their life stories.

Our findings have putative therapeutic implications. First, psychotherapeutic interventions could target narrative coherence and the causal relationship within life events and between life events and one's self, fostering the selection of more positive events than those spontaneously chosen, to enhance autistic individuals' self-understanding, self-esteem, and sense of self-continuity across time. Second, the material of the life story (or some piece of it) could represent a relevant tool to support social skills training, and mentalization abilities in particular[44,45]. For autistic individuals motivated to improve social interaction, it could be of particular interest to make them aware of (1) the relevance of using personal memories to illustrate some aspects of their self or of the utility of providing arguments to illustrate to what extent aspects of their self are connected to their past experiences and (2) the importance of contextualizing one's personal experiences in time, considering others' perspectives.

Method

Participants

Twenty-two autistic individuals without intellectual disability (two women and 20 men) were included in the present study. The participants were recruited at the Autism Resource Center of Colmar (France) and at the Psychiatric Department of Strasbourg's University Hospital (France). All the individuals had obtained an established diagnosis of autism spectrum disorder (ASD) in these centers, according to the DSM-5 criteria and the French recommendations for the ASD diagnosis in adults. During the diagnosis process, all individuals were assessed with ADI-R[46] and ADOS module 4[47]. Individuals with intellectual quotient (IQ) lower than 70 were not included. A comparison group of 22 nonautistic participants was matched to the autistic individuals with respect to age, gender, and level of schooling (see Table 1). None of the nonautistic participants reported a history of psychiatric diagnosis or medication use. No participants from either group had a history of neurological disorders or substance abuse. Specific data on race or ethnicity are not allowed to be collected in France and are thus not presented in the present study. The Institutional Review Board of Lille III approved this study, and all experiments were conducted in accordance with approved guidelines and regulations. All participants provided written informed consent.

Material

Clinical measures

The Autism Spectrum Quotient (AQ)[48], validated in French[49], is a typical and rapid screening instrument for ASD. All participants completed this self-administered questionnaire of 50 items divided into five ten-item subscales assessing social skills, attention shifting, attention to detail, communication, and imagination. High scores reflect high levels of autism characteristics. The Empathy Quotient (EQ)[50], validated and translated in French[49], is a short 40-item self-administered questionnaire used to measure empathy in all participants. High scores represent high levels of empathy.

Cognitive measures

Two cognitive tests were administered to assess executive functions involved in the elaboration of life narratives in all participants. Verbal fluency was assessed using a semantic (animals) and a phonological (French words starting with P) fluency task of 120 s each[51]. Mental flexibility was assessed using the Trail Making Test (Parts A and B) by subtracting the connecting time in Part A from that in Part B[52]. An estimation of the participant's IQ was assessed using the French version of the national adult reading test[53].

Biographical practices

Given that the frequency of one's biographical practices can influence the construction of his or her life narrative, we assessed the frequency of various biographical activities (e.g., keeping a diary, looking at old pictures, and talking about problems with friends) in all participants[20].

Sense of coherence

Participants self-rated their subjective sense of coherence, a salutogenic index reflecting one's resilience abilities[27]. The scale measures the three components of the sense of coherence: the comprehensibility of external events, their manageability, and their meaning. Higher scores reflect a higher sense of coherence.

Life narratives

Procedure

Participants' life stories were collected using the protocol developed by Habermas and de Silveira[20]. First, participants were asked to recall the seven most important events they had ever experienced and to write them down on cards. Second, participants were asked to narrate their life story in approximately 20 min. Instructions specifically invited participants to orally narrate a story of their whole life, from birth to the present time, integrating the seven most important events previously recalled into the narrative and explaining how the individuals had become the person they are today. The experimenter did not interrupt participants but encouraged them to pursue the narrative if they had time remaining. All life narratives were audio-recorded and transcribed verbatim. Afterward, the participants dated the seven most important events and rated their vividness, emotional features, and consequences on 7-point Likert scales[42]. Participants also completed the short version of the Centrality of Event Scale (CES[54]), assessing the extent to which each event had become central to their identity.

Coding

All narratives were coded according to the coding schemes developed by Habermas and colleagues[25,26].

Segmentation

First, narratives were divided into propositions corresponding to minimal meaningful sentences. Two independent coders segmented 25% (n = 11) of the life stories into propositions with an agreement of 92.6%. Each disagreement was resolved by discussion, and the remaining narratives were segmented by one of the two coders.

Beginnings and endings

The degree of elaboration of beginnings and endings was assessed using 3-category (for beginnings) and 4-category (for endings) coding schemes. These coding schemes assessed the time of narrative beginnings (i.e., at birth, after birth or unclear) and the time and elaboration of narrative endings (i.e., at the present time, at

the present time with a retrospective, at the present time with future projections, at the present time with both retrospective and prospective thoughts, or an arbitrary ending). A life narrative starting at birth and ending in the present is considered more elaborate than a narrative starting implicitly in the middle of adolescence and ending with a random event[25].

Local indicators of coherence

The presence of local indicators of coherence was quantified for each type of coherence, temporal, causal-motivational and thematic. Indicators of temporal coherence include landmarks (such as date, life period, age, distance from the present, and historical events) that allow the listener (or the reader) to locate events within the course of the story. Indicators of causal-motivational coherence correspond to self-event connections reflecting identity changes (e.g., "*That journey changed many things for me; and since then I am a little more self-confident*") and other biographical arguments placing local experiences in the context of someone's entire life (e.g., "*Then, for the first time in my life, I had to take on responsibility*"). They indicate that the narrator intends to maintain self-continuity despite life disruptions or changes. Local indicators of thematic coherence include self-event connections reflecting the stability of identity (e.g., "*I've always been a shy person and had problems making friends*").

The proportion of indicators was calculated by dividing the number of local indicators coded by the total number of propositions separately for each type of coherence and considered in statistical analyses[26]. Based on Habermas and colleagues' manuals, all types of local indicators of coherence were coded by two independent coders for 23% of the life narratives, with good interrater reliability (temporal coherence, $_{K} = 0.83$; biographical arguments, $_{K} = 0.73$; self-event connections, $_{K} = 0.75$).

Global coherence

At the global level, temporal, causal-motivational and thematic coherences were rated using three 7-point Likert scales based on the overall impression gained while reading the entire narrative. Higher scores reflect higher levels of global coherence. The temporal orientation scale assesses how well the life narrative enables the interviewer to determine when and in what order something occurred in the narrator's life. The causal-motivational rating scale captures how clear the development of the personality becomes in terms of turning points and motives throughout the narratives. The thematic scale reflects the extent to which the individual elements of the life story are thematically connected.

Based on Habermas and colleagues' manuals, all types of global coherence were rated by two independent coders for 23% of the life narratives, with good interrater reliability (temporal coherence, ICC = 0.91; causal coherence, $_{K} = 0.81$; thematic coherence, $_{K} = 0.74$).

Statistics

Statistical analyses were performed under a Bayesian framework[55]. In addition to avoiding reasoning based on the criticized p values, Bayesian statistics provide a distribution of the probability that the performance of participants in one group (autism = A) differs from the other comparison group (non-autism = NA). This should not be confounded with the null hypothesis testing of classical statistics, although *p* values are often misleadingly considered to reflect this probability.

For all analyses, the probability of the score of each measure being higher in the ASD group than in the comparison group [indicated as $Pr(A > NA)$] was calculated. A probability higher than 97.5% (i.e., $Pr(A > NA) > 0.975$) that scores of autistic individuals would be higher than those of nonautistic participants was considered meaningful. It is worth noting that $Pr\,(A > NA) > 0.975$ is equivalent to a probability lower than 2.5% that scores of autistic individuals are lower than those of nonautistic participants (i.e., $Pr\,(A > NA) < 0.025$). Therefore, $Pr\,(A > NA) < 0.025$ was also considered meaningful. Interactions between factors were written as $Pr\,(OR > 1)$, OR corresponding to the exponential of the interaction coefficient. All analyses were performed using noninformative priors.

A burn-in of 5000 iterations followed by 100,000 iterations was used for each of the three chains, yielding a final 300,000-iteration sample for retrieving posterior distribution characteristics. The convergence of the MCMC sample chains was checked graphically and observed in each case. All computations were performed using R software (R, Development Core Team, 2018) with all the required additional packages (in particular, Rjags; Plummer et al., 2018).

No community members were involved in the present research.

Data availability

Data will be made available upon request, addressed directly to the first author of the article (Mélissa C. Allé; melissa.alle@univ-lille.fr).

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References

1. Coutelle, R., Berna, F. & Danion, J.-M. mémoire autobiographique et le self dans les troubles du spectre autistique sans déficience intellectuelle (TSASDI) à l'âge adulte. *Ann. Méd.-Psychol. Rev. Psychiatr.* **175**, 630–635 (2017).
2. Lombardo, M. V., Barnes, J. L., Wheelwright, S. J. & Baron-Cohen, S. Self-referential cognition and empathy in autism. *PLoS ONE* **2**, e883 (2007).
3. Lombardo, M. V. & Baron-Cohen, S. Unraveling the paradox of the autistic self. *Wiley Interdiscip. Rev. Cogn. Sci.* **1**, 393–403 (2010).

4. Westby, C. Nature and effects of autobiographical memory issues in persons with autism spectrum disorders. *Neuropsychiatr. Dis. Treat.* **18**, 2279–2293 (2022).
5. Lyons, V., Fitzgerald, M., Lyons, V. & Fitzgerald, M. Atypical sense of self in autism spectrum disorders: A neuro- cognitive perspective. In *Recent Advances in Autism Spectrum Disorders - Volume I* (IntechOpen, 2013). https://doi.org/10.5772/53680.
6. Prebble, S. C., Addis, D. R. & Tippett, L. J. Autobiographical memory and sense of self. *Psychol. Bull.* **139**, 815–840 (2013).
7. Chaput, V. et al. Episodic memory and self-awareness in asperger syndrome: Analysis of memory narratives. *Res. Autism Spectr. Disord.* **7**, 1062–1067 (2013).
8. Crane, L. & Goddard, L. Episodic and semantic autobiographical memory in adults with autism spectrum disorders. *J. Autism Dev. Disord.* **38**, 498–506 (2007).
9. Lee, A. & Hobson, R. P. On developing self-concepts: A controlled study of children and adolescents with autism. *J. Child Psychol. Psychiatry* **39**, 1131–1144 (1998).
10. Jackson, P., Skirrow, P. & Hare, D. J. Asperger through the looking glass: An exploratory study of self-understanding in people with Asperger's syndrome. *J. Autism Dev. Disord.* **42**, 697–706 (2012).
11. Coutelle, R. et al. Self-concept clarity and autobiographical memory functions in adults with autism spectrum disorder without intellectual deficiency. *J. Autism Dev. Disord.* **50**, 3874–3882 (2020).
12. McCabe, A., Hillier, A. & Shapiro, C. Brief report: Structure of personal narratives of adults with autism spectrum disorder. *J. Autism Dev. Disord.* **43**, 733–738 (2013).
13. Losh, M. & Capps, L. Narrative ability in high-functioning children with autism or Asperger's syndrome. *J. Autism Dev. Disord.* **33**, 239–251 (2003).
14. Blagov, P. S. & Singer, J. A. Four dimensions of self-defining memories (specificity, meaning, content, and affect) and their relationships to self-restraint, distress, and repressive defensiveness. *J. Pers.* **72**, 481–511 (2004).
15. Crane, L., Goddard, L. & Pring, L. Brief report: Self-defining and everyday autobiographical memories in adults with autism spectrum disorders. *J. Autism Dev. Disord.* **40**, 383–391 (2010).
16. Goddard, L., O'Dowda, H. & Pring, L. Knowing me, knowing you: Self defining memories in adolescents with and without an autism spectrum disorder. *Res. Autism Spectr. Disord.* **37**, 31–40 (2017).
17. Berna, F. et al. Self-disorders in individuals with autistic traits: Contribution of reduced autobiographical reasoning capacities. *J. Autism Dev. Disord.* **46**, 2587–2598 (2016).
18. Habermas, T. & Bluck, S. Getting a life: The emergence of the life story in adolescence. *Psychol. Bull.* **126**, 748–769 (2000).
19. McAdams, D. P. *Power, Intimacy, and the Life Story: Personological Inquiries Into Identity* (Guilford Press, 1988).
20. Habermas, T. & de Silveira, C. The development of global coherence in life narratives across adolescence: Temporal, causal, and thematic aspects. *Dev. Psychol.* **44**, 707–721 (2008).
21. Conway, M. A. Memory and the self. *J. Mem. Lang.* **53**, 594–628 (2005).
22. Thomsen, D. K. There is more to life stories than memories. *Mem. Hove Engl.* **17**, 445–457 (2009).
23. Habermas, T. How to tell a life: The development of the cultural concept of biography. *J. Cogn. Dev.* **8**, 1–31 (2007).
24. Berntsen, D. & Rubin, D. C. Cultural life scripts structure recall from autobiographical memory. *Mem. Cognit.* **32**, 427–442 (2004).
25. Habermas, T., Ehlert-Lerche, S. & de Silveira, C. The development of the temporal macrostructure of life narratives across adolescence: Beginnings, linear narrative form, and endings. *J. Pers.* **77**, 527–559 (2009).
26. Köber, C., Schmiedek, F. & Habermas, T. Characterizing lifespan development of three aspects of coherence in life narratives: A cohort-sequential study. *Dev. Psychol.* **51**, 260–275 (2015).
27. Antonovsky, A. The life cycle, mental health and the sense of coherence. *Isr. J. Psychiatry Relat. Sci.* **22**, 273–280 (1985).
28. Happé, F. & Frith, U. The weak coherence account: detail-focused cognitive style in autism spectrum disorders. *J. Autism Dev. Disord.* **36**, 5–25 (2006).
29. Coutelle, R. *Les spécificités du self dans les troubles du spectre de l'autisme sans déficience intellectuelle à l'âge adulte* (Université de Strasbourg, 2019).
30. Smith, I. C. & White, S. W. Socio-emotional determinants of depressive symptoms in adolescents and adults with autism spectrum disorder: A systematic review. *Autism* **24**, 995–1010 (2020).
31. Petrolini, V., Jorba, M. & Vicente, A. What does it take to be rigid? Reflections on the notion of rigidity in autism. *Front. Psychiatry* **14** (2023).
32. Habermas, T. & Köber, C. Autobiographical reasoning in life narratives buffers the effect of biographical disruptions on the sense of self-continuity. *Mem. Hove Engl.* **23**, 664–674 (2015).
33. Callenmark, B., Kjellin, L., Rönnqvist, L. & Bölte, S. Explicit versus implicit social cognition testing in autism spectrum disorder. *Autism Int. J. Res. Pract.* **18**, 684–693 (2014).
34. Guivarch, J. et al. Impact of an implicit social skills training group in children with autism spectrum disorder without intellectual disability: A before-and-after study. *PLoS ONE* **12**, e0181159 (2017).
35. Frith, U. & De Vignemont, F. Egocentrism, allocentrism, and Asperger syndrome. *Conscious. Cogn. Int. J.* **14**, 719–738 (2005).
36. Bohn, A. & Berntsen, D. Pleasantness bias in flashbulb memories: positive and negative flashbulb memories of the fall of the Berlin Wall among East and West Germans. *Mem. Cognit.* **35**, 565–577 (2007).
37. Bluck, S., Alea, N., Habermas, T. & Rubin, D. C. A tale of three functions: The self-reported uses of autobiographical memory. *Soc. Cogn.* **23**, 91–117 (2005).
38. Lind, S. E., Bowler, D. M. & Raber, J. Spatial navigation, episodic memory, episodic future thinking, and theory of mind in children with autism spectrum disorder: Evidence for impairments in mental simulation?. *Front. Psychol.* **5**, 1411 (2014).
39. Lind, S. E., Williams, D. M., Bowler, D. M. & Peel, A. Episodic memory and episodic future thinking impairments in high-functioning autism spectrum disorder: An underlying difficulty with scene construction or self-projection?. *Neuropsychology* **28**, 55–67 (2014).
40. Loomes, R., Hull, L. & Mandy, W. P. L. What is the male-to-female ratio in autism spectrum disorder? A systematic review and meta-analysis. *J. Am. Acad. Child Adolesc. Psychiatry* **56**, 466–474 (2017).
41. El Haj, M. & Gallouj, K. Self-defining memories in normal aging. *Curr. Aging Sci.* **12**, 43–48 (2019).
42. Allé, M. C. et al. Impaired coherence of life narratives of patients with schizophrenia. *Sci. Rep.* **5**, 12934 (2015).
43. Palmer, S. J. & Dvir, Y. Trauma and psychosocial adversity in youth with autism spectrum disorder and intellectual disability. *Front. Psychiatry* **15**, 1322056 (2024).
44. Camia, C. & Allé, M. Évaluation de l'élaboration mentale par l'analyse du récit de vie (Evaluating mental elaboration in the analyses of life narratives). in 398–408 (2021).
45. Köber, C., Kuhn, M. M., Peters, I. & Habermas, T. Mentalizing oneself: detecting reflective functioning in life narratives. *Attach. Hum. Dev.* **21**, 313–331 (2019).
46. Lord, C., Rutter, M. & Le Couteur, A. Autism diagnostic interview-revised: A revised version of a diagnostic interview for caregivers of individuals with possible pervasive developmental disorders. *J. Autism Dev. Disord.* **24**, 659–685 (1994).
47. Lord, C. et al. Autism diagnostic observation schedule: A standardized observation of communicative and social behavior. *J. Autism Dev. Disord.* **19**, 185–212 (1989).
48. Baron-Cohen, S., Wheelwright, S., Skinner, R., Martin, J. & Clubley, E. The autism-spectrum quotient (AQ): Evidence from Asperger syndrome/high-functioning autism, males and females, scientists and mathematicians. *J. Autism Dev. Disord.* **31**, 5–17 (2001).

49. Lepage, J.-F., Lortie, M., Taschereau-Dumouchel, V. & Théoret, H. Validation of French-Canadian versions of the empathy quotient and autism spectrum quotient. *Can. J. Behav. Sci. Rev. Can. Sci. Comport.* **41**, 272–276 (2009).
50. Baron-Cohen, S. & Wheelwright, S. The empathy quotient: an investigation of adults with Asperger syndrome or high functioning autism, and normal sex differences. *J. Autism Dev. Disord.* **34**, 163–175 (2004).
51. Cardebat, D., Doyon, B., Puel, M., Goulet, P. & Joanette, Y. Formal and semantic lexical evocation in normal subjects. Performance and dynamics of production as a function of sex, age and educational level. *Acta Neurol. Belg.* **90**, 207–217 (1990).
52. Reitan, R. M. The relation of the trail making test to organic brain damage. *J. Consult. Psychol.* **19**, 393–394 (1955).
53. Mackinnon, A. & Mulligan, R. The estimation of premorbid intelligence levels in French speakers. *L'Encéphale* **31**, 31–43 (2005).
54. Berntsen, D. & Rubin, D. C. The centrality of event scale: A measure of integrating a trauma into one's identity and its relation to post-traumatic stress disorder symptoms. *Behav. Res. Ther.* **44**, 219–231 (2006).
55. Vandekerckhove, J., Rouder, J. N. & Kruschke, J. K. Editorial: Bayesian methods for advancing psychological science. *Psychon. Bull. Rev.* **25**, 1–4 (2018).

Author contributions

F.B and J.M.D conceptualized the study. R.C. and P.S. collected the data. M.C.A, L.R and M-C.G. analyzed the data. M.C.A wrote the first draft of the manuscript. All authors provided substantial revisions to the manuscript and approved the final version of the manuscript.

Declarations

Competing interests

The authors declare no competing interests.

Additional information

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