Life story chapters and narrative self-continuity in patients with schizophrenia

Tine Holm [a,b,c,*], Dorthe Kirkegaard Thomsen [a,b], Vibeke Bliksted [c]

[a] Department of Psychology, Aarhus University, Denmark
[b] Center on Autobiographical Memory Research (CON AMORE), Aarhus University, Denmark
[c] Aarhus University Hospital Risskov, Psychosis Research Unit, Denmark

ARTICLE INFO

ABSTRACT

The present study compared life story chapters and self-defining memories in 25 patients with schizophrenia and 25 matched controls. All participants were tested on neurocognition and rated on symptoms. Participants identified and rated life story chapters and self-defining memories on emotional valence, causal coherence, and self-continuity. Temporal coherence and temporal macrostructure were also assessed. Patients rated their life story chapters as more negative compared to controls, but there were few significant differences regarding temporal coherence, temporal macrostructure, and ratings of causal coherence and self-continuity. In patients, poorer neurocognitive function and higher degree of negative symptoms were related to less causal coherence and lower self-continuity in relation to chapters. In general, few differences were found between the patients and the controls. This may be due to the highly structured method used to assess life stories or to the fact that our patient group was cognitively well-functioning.

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1. Introduction

Schizophrenia has long been recognized as a disorder of the self (Lysaker & Lysaker, 2002; Sass & Parnas, 2003). While self-disorders are currently overlooked in diagnostic criteria (Parnas & Handest, 2003) they have been widely acknowledged by clinicians and described in first person accounts (e.g. Kean, 2009). They can persist even though diagnostic symptoms recede and be a source of enduring agony (Lysaker & Lysaker, 2004, 2011). One disturbed aspect of the self is a reduced sense of self-continuity which involves a feeling that the past self is not meaningfully connected to the present self (Danion et al., 2005). Self-continuity can be divided into two subtypes; phenomenological continuity, which is supported by mental travel in time to specific events in the past and future, and narrative continuity, which is supported by coherent narratives of one's life (Prebble, Addis, & Tippett, 2013). Most previous research examining self-continuity in patients with schizophrenia has focused on characteristics of mental time travel (for a full review see Berna et al., 2016), while ignoring life stories. Examining life stories can provide rich information about how individuals with schizophrenia construct their sense of self which is crucial in order to fully understand self-disorders characterizing the illness (Lysaker, Wickett, Wilke, & Lysaker, 2003). Furthermore, it has been suggested that developing a richer sense of self through the life story may be an important part of recovery (Lysaker, Ringer, Maxwell, McGuire, & Lecomte, 2010b). Indeed, recovery does not merely involve the resolution

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of symptoms but also changes in the way people view themselves and their lives (Kukla, Lysaker, & Salyers, 2013; Lysaker & Buck, 2008). Constructing a coherent life story may be one way to find meaning and purpose in life in the face of having a mental disorder. The increased attention to sense of self as a meaningful aspect of recovery calls for a better understanding of narrative self-continuity in schizophrenia.

In the present study, we examined whether individuals with schizophrenia evidence less coherent life stories by assessing how they describe and rate chapters and self-defining memories.

1.1. Life story chapters

The life story represents the self over the life span (McAdams, 1996, 2001). A coherent life story is essential in maintaining self-continuity because the story form allows integration of the personal past, present, and future. The overall coherence of the life story is achieved by establishing temporal order of events, explaining causal connections between events, and evaluating how events have influenced the self, which is also referred to as meaning-making (Habermas & Bluck, 2000; McLean, 2005; Singer, Blagov, Berry, & Oost, 2013).

The life story is based on autobiographical memory, which refers to, "memory for information relating to the self" (Brewer, 1986, p. 46). Autobiographical memory consists of both specific memories, that is, "circumscribed, one-moment-in-time event[s]…including what was seen, heard, thought, and felt" (Pillemer, 1998, p. 3), and conceptual autobiographical memory, such as lifetime periods (Conway, 2005; Thomsen, 2009). Lifetime periods may function as life story chapters, which are defined as representations of extended time periods with identifiable beginnings and endings, that include information about people, places, activities, and objects associated with the periods (e.g., "the years I studied at university"; Brown, Hansen, Lee, Vanderveen, & Conrad, 2012; Conway, 2005; Thomsen, 2015). These different types of autobiographical memory have been described as hierarchically organized (Conway, 2005; Conway & Pleydell-Pearce, 2000). The life story is the most abstract representation, within which lifetime periods or chapters are nested. Each chapter is associated with a number of specific memories and chapters can be used to access these memories (Conway, 2005). Studies show that when individuals recount their life stories, they often describe chapters, suggesting that chapters contribute to the overall coherence of the story, perhaps because the more limited number of chapters are easier to organize compared to the vast amount of specific memories (Steiner, Pillemer, Thomsen, & Minigan, 2014; Thomsen, 2009).

1.2. Previous research on self-continuity in schizophrenia

Despite their importance in establishing self-continuity, life story chapters have not been examined in patients with schizophrenia. Previous studies have primarily focused on mental time travel, which refers to the ability to remember and imagine specific events from the personal past and future (Suddendorf & Corballis, 2007; Tulving, 2002). These studies have demonstrated mental time travel deficits in patients with schizophrenia. For example, patients recall and imagine fewer events from their past and future and the events they recall and imagine are less specific and less detailed compared to healthy controls (Berna et al., 2016; D'Argembeau, Raffard, & Van der Linden, 2008; de Oliveira, Cuervo-Lombard, Salamé, & Danion, 2009).

However, the generation of specific past and future events is only one aspect of self-continuity and does not give people a sense of how they have developed across their lives (Prebble et al., 2013). For this purpose, more complex narrative skills are required in order to evaluate the relation between events and to give meaningful explanations as to how past experiences have influenced the self. Three previous studies examining self-defining memories in schizophrenia have shown that patients extract meaning from their memories less frequently than controls (Berna et al., 2011a, 2011b; Raffard et al., 2009, 2010). This implies that fewer links are established between the current self and past experiences in patients with schizophrenia, which might be one reason why patients experience a lack of self-continuity. However, these studies focus on specific memories and the role of conceptual autobiographical memory, like life stories, in the maintenance of narrative self-continuity needs to be assessed. To our knowledge only two studies have examined patients' narrations of their entire lives (Allé et al., 2015; Allé et al., 2016). The studies showed that patients had difficulties establishing the temporal order of events and had less causally coherent life stories compared to healthy controls.

Life story chapters are important for maintaining self-continuity, because they convey information about the self as it exists over longer time intervals and hence are useful when constructing a story about one's entire life (Prebble et al., 2013; Steiner, Pillemer, & Thomsen, in preparation). However, no previous studies have examined life story chapters in patients with schizophrenia and this was the purpose of the present study.

1.3. The present study

In the present study, we compared patients with schizophrenia and a matched healthy control group on a range of life story measures assessing temporal and causal coherence as well as self-continuity. We examined emotional valence, centrality to identity, self-continuity, and causal coherence of life story chapters and self-defining memories. Furthermore, we examined the temporal coherence and temporal macrostructure of life story chapters and the relationship between self-defining memories and life story chapters. We explain the hypotheses below.

Studies examining the emotional valence of autobiographical memory in schizophrenia have shown mixed results. When eliciting self-defining memories, two studies did not find any difference in emotional valence when comparing patients with schizophrenia to healthy controls (Berna et al., 2011a; Raffard et al., 2010). One study found that when asked to recall personal memories in response to positive and negative pictures, patients remembered more positive than negative memories, whereas the opposite was the case in healthy controls (Neumann, Blairy, Lecompte, & Philippot, 2007). Finally, one study found that when asked to report the seven most important events from their lives, patients reported more negative memories compared to controls (Allé et al., 2015). A number of factors have been suggested to influence the emotional evaluation of past experiences, e.g. mood and self-esteem (Blaney, 1986; Eich, Macaulay, & Ryan, 1994). Several studies show that schizophrenia is associated with negative self-evaluation and low levels of self-esteem (Bradshaw & Brekke, 1999; Kesting, Mehl, Rief, Lindenmeyer, & Lincoln, 2011; Lysaker, Tsai, Yanos, & Roe, 2008; Xu et al., 2013). Thus, although previous studies on autobiographical memory have shown mixed results, we expected that patients would evaluate their life story chapters and self-defining memories more negatively compared to controls.

We also examined causal coherence and self-continuity in patients' life story chapters and self-defining memories. Impairments in establishing causal coherence between past events and between events and the self is a consistent finding in schizophrenia, when examining patients' self-defining memories (Berna et al., 2011a,b; Raffard et al., 2009, 2010). We therefore expected that patients would demonstrate less causal coherence in relation to their self-defining memories and chapters. Since establishing causal coherence is central to self-continuity, we also hypothesized that patients would rate the degree of self-continuity and centrality to identity lower in relation to their chapters and self-defining memories compared to control participants.

Schizophrenia has been associated with less temporally ordered life stories (Allé et al., 2015; Allé et al., 2016) and we therefore expected that patients would be less likely to describe their chapters in chronological order. In addition, we explored whether the temporal macrostructure would be impaired in patients. The temporal macrostructure refers to a life story that starts at the beginning, usually at birth, and continues in a chronological fashion ending in the present, potentially with an outlook into the future (Habermas, Ehlert-Lerche, & de Silveira, 2009; Köber, Schmiedek, & Habermas, 2015). The temporal macrostructure can be seen when people identify chapters in their stories, because they typically start with chapters from their childhood, often beginning at birth, and continues in a chronological manner (Thomsen, Olesen, Schnieber, & Tønnesvang, 2014). Furthermore people identify chapters that are ongoing, indicating that they are oriented to their present and future in their life stories. We explored the beginnings and endings of life stories in patients with schizophrenia by focusing on the age of their earliest life chapters and the number of ongoing chapters included in their life stories. We reasoned that because patients may have difficulties with the temporal macrostructure of life stories, their earliest chapter would start at a later age than control participants and they would have fewer ongoing chapters.

With respect to the relationship between self-defining memories and chapters, we expected that patients would be less likely to agree that their self-defining memories were a part of their chapters. A previous study has shown that the thematic links between self-images and specific memories was weaker in patients in comparison to controls (Bennouna-Greene et al., 2012). This may indicate a lack of integration across the different types of autobiographical memory, which could also be present when constructing life stories. Because chapters, like self-images, constitute conceptual autobiographical memory, we reasoned that patients may be less likely to link specific past experiences to chapters.

Schizophrenia is widely acknowledge to be an illness associated with neurocognitive deficits in a number of domains (see Fioravanti, Carlone, Vitale, Cinti, & Clare, 2005 for a review) and neurocognitive deficits may play a role in explaining the lower life story coherence (Allé et al., 2015). However, it is important to acknowledge that the illness is cognitively heterogeneous which implies that cognition is not equally impaired in schizophrenia and some cognitive processes may function normally (see Gold, Hahn, Strauss, & Waltz, 2009 for a review). Furthermore, several studies have identified subgroups of patients with intact cognitive function (e.g. Goldstein, Minshew, Allen, & Seaton, 2002; MacCabe et al., 2012; Palmer et al., 1997). The identification of such subgroups, constituting about 20% of patients, have lead researchers to question the universality of cognitive impairment in schizophrenia (Allen, Goldstein, & Warnick, 2003; Green, Horan, & Sugar, 2013). We included a battery of neurocognitive tests to examine the relationship between cognitive function, life story chapters, and self-defining memories. We hypothesized that lower cognitive performance would be associated with less causally and temporal coherent life story chapters and memories in patients.

Finally, we examined whether diagnostic symptoms associated with schizophrenia were related to the life story measures. Symptoms are typically divided into two categories; positive symptoms (e.g., hallucinations and delusions) and negative symptoms (e.g., lack of energy and social isolation). Studies seem to indicate that negative symptoms are more closely related to the coherence of memories than positive symptoms (Berna et al., 2011a; Raffard et al., 2010; but see Allé et al., 2015 for null results). Furthermore, a less integrated sense of self within narratives has been associated with severity of negative symptoms both concurrently and prospectively (Hamm et al., 2012; Lysaker, Wickett, & Davis, 2005; Lysaker et al., 2012; McLeod, Gumley, MacBeth, Schwannauer, & Lysaker, 2014). In this study, we therefore expected that higher levels of negative symptoms would be associated with lower levels of coherence and self-continuity in chapters and self-defining memories.

To summarize we hypothesized (1) that patients would evaluate chapters and self-defining memories more negatively compared with control participants; (2) that chapters and self-defining memories would be less causally coherent, less central to identity, and associated with less feelings of self-continuity in patients compared to controls; (3) that chapters would be less temporally coherent in patients both with regards to chronological order and with respect to the temporal

Table 1
Demographic information, clinical measures, and neurocognitive function.

Variables	Patients		Controls		t	d
	M	SD	M	SD		
Demographic information						
Age (years)	36.60	9.69	37.52	10.67	−0.32	0.08
Education (years)	15.77	3.01	16.16	1.92	−0.56	0.15
Mothers educational level	3.04	1.49	2.84	1.52	0.47	0.14
Fathers educational level	3.04	1.55	2.64	1.29	0.99	0.25
Clinical measures						
Duration of illness (years)	11.80	7.63	–	–	–	–
CMDQ depression	6.36	5.33	1.88	1.92	3.95[*]	1.13
CMDQ anxiety	4.60	2.84	2.04	2.01	3.68[*]	1.05
SAPS	6.92	4.13	0.08	0.40	8.24[*]	2.35
SANS	10.56	3.42	0.08	0.40	15.23[*]	4.33
Neurocognition						
Verbal memory	44.08	12.60	47.56	9.49	−1.10	0.31
Digit sequencing	18.40	3.93	19.92	3.65	−1.42	0.40
Token motor task	64.16	12.23	68.72	12.38	−1.31	0.37
Verbal fluency	55.36	19.63	59.36	12.63	−0.86	0.24
Symbol coding	51.40	11.35	60.80	10.15	−3.09[*]	0.87
Tower of London	18.72	2.51	18.48	2.24	0.36	0.10
Composite score (z-score)	−0.66	1.5	0.00	1	1.82	0.52

Note.
[*] $p < 0.01$.

macrostructure, including a later start age for the earliest chapter and fewer ongoing chapters; (4) that patients would be less likely to perceive links between self-defining memories and chapters compared to controls; and (5) that poorer neurocognitive function and more negative symptoms would be associated with less coherent chapters and self-defining memories in patients.

2. Methods

2.1. Participants

Patients were recruited at Aarhus University Hospital Risskov (Department of psychosis) where they received outpatient treatment. Twenty-five patients (11 women) with an ICD-10 (International Classification of Disease 10th edition, WHO) confirmed diagnosis of schizophrenia participated in the study (F20.0 paranoid = 17; F20.3 undifferentiated = 4; F20.5 residual = 1; F25.2 schizoaffective disorder, mixed type = 1; F25.9 schizoaffective disorder, unspecified = 2). Patients were in a stable phase of their illness, defined as having no hospitalizations, changes in housing, or medication within the month prior to participating in the study. Most patients were receiving early retirement or other incapacity benefits (n = 22), 1 was a student and 2 were in supported employment programs. Most patients lived alone (n = 20), 1 lived with a partner and 4 lived in residence homes. Patients were excluded if they had a history of traumatic brain injury or a neurological disorder. Furthermore, patients were excluded if they had a comorbid ICD-10 diagnosis of drug- or alcohol dependency and if they did not speak Danish fluently. All but two patients were receiving neuroleptic treatment (atypical = 18; typical = 1; both typical and atypical = 4).

Control participants were recruited by advertising the study on flyers and by word-of-mouth. Around 80 people responded to the advertisement and individuals who matched the patient group in terms of gender, age, and years of education were included in the study (see Table 1 for information on demographics). Twenty-five control participants (11 women) were included in the study. Potential control participants were excluded if they had a history of mental illness, traumatic brain injury, neurological disorder, drug- or alcohol dependency, if they did not speak Danish fluently, and if they had relatives suffering from schizophrenia.

2.2. Ethics

All participants received written and oral information about the study before inclusion and gave informed consent. The study was approved by The Central Denmark Region Ethics Committee, reference number: 1-10-72-107-14.

3. Procedure and materials

The procedure was identical for the two groups and consisted of two sessions divided by a lunch break. The first author conducted the data collection. In the first session, participants were screened for symptoms of depression and anxiety using

the Common Mental Disorder Questionnaire (CMDQ) (Christensen et al., 2005) and participants were rated with the Scale for the Assessment of Negative/Positive Symptoms (SANS/SAPS) (Andreasen, 1984a,b). Furthermore, the participants' neurocognitive function was evaluated using the Brief Assessment of Cognition in Schizophrenia (BACS) (Keefe et al., 2004). In the second session, participants completed three life story parts: Narration of their life story (not included in this paper), identification and rating of up to 10 life story chapters and 3 self-defining memories.

3.1. Depression and anxiety

The CMDQ is a brief screening instrument that has been validated in a Danish population and has shown excellent external validity (Christensen et al., 2005.) In this study, only the items for depression and anxiety were used. Anxiety was evaluated with four questions (e.g., having panic attacks) while depression was evaluated with six questions (e.g., feeling lonely and worthless), both within the past four weeks. Each question was rated on a scale ranging from 'not at all' to 'extremely' (0–4). The internal reliabilities of the subscales were satisfactory with Cronbach alphas of 0.67 for the anxiety scale and 0.86 for the depression scale.

3.2. Positive and negative symptoms

The SANS/SAPS (Andreasen, 1984a,b) were used to evaluate positive and negative symptoms. The scales are among the most widely used measures to assess psychopathology in patients with schizophrenia (van Erp et al., 2014). The SAPS consists of 34 items divided into four subscales covering: Hallucinations, delusions, bizarre behavior, and formal thought disorder. The SANS consists of 25 items divided into five subscales: Affective flattening, alogia, apathy, asociality, and inattention. In this study only the first four subscales of the SANS were included, because attentional difficulties may not be conceptually related to the negative symptom construct (Blanchard & Cohen, 2006). The time period covered by the SAPS and SANS is the past four weeks. Each SAPS and SANS subscale consists of a number of items assessing specific symptoms, such as auditory hallucinations or paranoid delusions. The severity of each symptom is rated on a six point scale (0–5), where higher score reflects more severe psychopathology. A global score (range 0–5) of each subscale was estimated leading to a total score of SAPS and SANS (range 0–20).

3.3. Neurocognition

The Danish version of the BACS (Keefe et al., 2004) was used to measure neurocognition. The BACS is a valid and reliable battery of test that assesses the aspects of neurocognition most impaired in patients with schizophrenia (Keefe, Poe, Walker, & Harvey, 2006; Keefe et al., 2004, 2008). The battery consists of six tests measuring verbal memory, working memory (digit sequencing), motor speed (token motor task), verbal fluency, speed of information processing (symbol coding), and reasoning and problem solving (Tower of London). We created a weighted composite score by calculating the weighted mean of z-scores, separately computed for each subtest relative to the mean and standard deviation of the healthy control group (Keefe et al., 2004).

3.4. Life story chapters

Participants were asked to think about the life stories that they had described in the first part of the second session (not included in this paper) and identify up to 10 important chapters in their life stories (based on Thomsen & Berntsen, 2008). Participants were informed that they were allowed to include chapters that they had not mentioned in the first part. Three examples of life story chapters were given (see Appendix A for verbatim instructions). To ensure that participants understood the instructions, they were asked to give an example of what could constitute a life story chapter and all participants were able to do so, at their first attempt. They were told that the chapters identified should cover their entire life story and that they were allowed to include ongoing and overlapping chapters. Overlapping chapters were defined as occurring at the same time and an example was given to illustrate this. If participants asked in which order they should describe the chapters they were told that this was their own choice. If participants produced less than 10 chapters they were given up to two neutral prompts. Once participants had identified a chapter, they were asked to give the chapter a title and answer several questions regarding the chapter (see Table 2). The questions were derived from previous studies of autobiographical memories (questions 2 and 5; Berntsen & Rubin, 2006; Rubin, Schrauf, & Greenberg, 2003) or were developed for the present study (questions 3, 4, 6, and 7).

3.5. Self-defining memories

In the last part, participants were asked to identify three self-defining memories (see Appendix A for verbatim instructions). An adapted version of the procedure proposed by Singer and Moffitt (1991) translated into Danish by the first author (and back-translated by the second author) was used. The self-defining memory procedure was used in order to elicit specific memories important to life stories (Singer et al., 2013). Participants were given three examples of self-defining memories and were asked to give an example of what could constitute as a self-defining memory. If the example produced by the

Table 2
Questions for chapters and self-defining memories [variable labels].

Questions
1. How old were you when the event happened/when the chapter started and ended? (mark if the chapter is ongoing)
2. How would you describe the emotional content of the chapter/event? [emotional valence]
3. To what extend has the chapter/event caused changes in the way you view yourself? [causal connection, chapter/event-self]
4. To what extend has the chapter/event caused later events in your life? [causal connection, chapter/event-later events]
5. To what extend is the chapter/event a central part of your identity and self-understanding? [centrality]
6. Would you say that you are basically the same person now as you were during the chapter/event? [self-continuity, past-present]
7. Do you think the chapter/event will influence who you will become in the future? [self-continuity, present-future]

Note. Question 2 was rated on a 7-point Likert scale ranging from extremely negative to extremely positive. Questions 3–7 were rated on a 7-point Likert scale ranging from 'not at all' to 'very much.'

participants was not a specific memory, that is, if they produced a life story chapter or a categorical memory they were asked to give a new example. Similar to the procedure for chapters, participants were asked a number of questions in relation to the self-defining memory (see Table 2). For the questions regarding age, participants were instead asked to state their age at the time of the event. Furthermore, participants were asked whether the memory they had chosen was part of one of the chapters that they had previously identified (yes-no).

4. Results

As expected, patients experienced significantly more positive and negative symptoms and more anxiety and depression in comparison to the controls (see Table 1). On the individual neurocognitive tests, control participants' performance was only significantly better than patients' performance on the test of attention and speed of processing (symbol coding). When examining the BACS composite score, controls had a higher score compared to patients, but this difference only approached significance ($p = 0.08$) at a trend level (although with a medium sized effect).

4.1. Characteristics of chapters

Patients with schizophrenia ($M = 5.84$, $SD = 2.70$) did not differ significantly from controls ($M = 6.12$, $SD = 1.83$) regarding the number of chapters that they produced $t(48) = -0.43$, $p = 0.67$, $d = 0.12$. When examining self-ratings of chapters, we found that patients evaluated their chapters as significantly more negative in comparison to the controls (see Table 3). Interestingly, while having less positive life story chapters was significantly related to having more depressive symptoms in control participants $r(23) = -0.44$, $p = 0.03$, this was not the case in patients $r(23) = -0.15$, $p = 0.69$. Contrary to our expectations, patients did not rate the degree of causal coherence, self-continuity, or centrality to identity lower compared to controls.

The only significant difference between patients and control on the self-rated characteristics of chapters was that patients had more negative chapters than controls. In order to explore whether patients would associate more causal coherence and self-continuity with negative chapters, we calculated the correlation between the valence of the chapters and the other chapter measures (see Table 4). In the patient group, more negative ratings of chapters were significantly related to higher ratings of causal coherence. This was not the case in the control group. In both patients and controls more positive ratings of chapters was related to a higher rating of past-present continuity. Only in controls was a more positive rating of chapters related to a higher rating of past-future continuity.

Table 3
Characteristics of life story chapters.

Variables	Patients		Controls		t	d
	M	SD	M	SD		
Emotional valence	4.08	1.04	4.97	0.74	-3.51[**]	0.99
Causal connection (chapter-self)	5.14	0.95	5.12	0.92	0.09	0.02
Causal connection (chapter-later events)	5.16	0.94	5.29	0.96	-0.47	0.13
Centrality	5.08	0.83	5.36	0.68	-1.33	0.38
Self-continuity (past-present)	3.03	1.15	3.25	1.06	-0.71	0.20
Self-continuity (past-future)	4.99	0.97	4.69	1.23	0.96	0.27
Chronology of chapters	0.60	0.59	0.82	0.29	-1.68	0.47
Age at the start of first chapter	6.12	7.91	3.56	4.45	1.41	0.40
Number of ongoing chapters	1.16	0.85	1.76	1.20	-2.04[*]	0.57

Note.
 [*] $p < 0.05$.
 [**] $p < 0.01$.

Table 4
Correlations between chapter valence and causal coherence, self-continuity, and centrality.

Chapter ratings	Emotional valence	
	Chapters Patients $n = 146$	Chapters Controls $n = 153$
Causal connections (chapter-self)	-0.20[*]	0.03
Causal connections (chapter-later events)	-0.27[**]	0.10
Centrality	0.11	0.14
Self-continuity (past-present)	0.21[*]	0.26[**]
Self-continuity (past-future)	0.08	0.18[*]

Note.
 [*] $p < 0.05$.
 [**] $p < 0.01$.

Table 5
Characteristics of self-defining memories.

Variables	Patients		Controls		t	d
	M	SD	M	SD		
Emotional valence	3.70	1.80	4.47	1.50	−1.56	0.46
Causal connections (event-self)	5.36	1.35	4.91	1.28	−1.17	0.35
Causal connections (event-later events)	5.76	1.09	5.56	1.16	0.61	0.18
Centrality	5.23	1.21	5.26	1.12	−0.11	0.02
Self-continuity (past-present)	3.27	1.32	3.57	1.22	−0.79	0.24
Self-continuity (past-future)	4.83	1.52	4.56	1.38	0.63	0.18
Average age at time of events	21.40	6.70	26.39	6.95	−2.16*	0.73
Integrated in chapters (yes = 1, no = 2)	1.36	0.35	1.17	0.21	2.13*	0.66

Note.
* $p < 0.05$.

We then compared the groups on temporal coherence, that is, chronological order of the chapters (see Table 3). To obtain a measure of chronological order for each participant, we calculated the correlation between chapter number and the reported start age for the chapter. Each participant's correlation was then used as this participant's score of chronology. A higher correlation reflects a higher degree of chronological ordering. As expected, controls ordered chapters more chronologically compared to patients, but the difference only approached significance at a trend level ($p = 0.10$) (it did however represent a medium sized effect).

We then examined the temporal macrostructure by examining whether patients would have later earliest chapters and fewer ongoing chapters (see Table 3). The age of the earliest chapter was earlier for control participants compared to patients, but the difference was not significant (although it represented a medium sized effect). Control participants had significantly more ongoing chapters compared to the controls (this difference reflected a medium to high effect size).

4.2. Characteristics of self-defining memories

Patients with schizophrenia ($M = 2.36$ $SD = 1.08$) did not differ significantly from controls ($M = 2.60$, $SD = 0.82$) regarding the number of self-defining memories that they produced $t(48) = −0.89$, $p = 0.38$, $d = 0.25$. When examining self-rated characteristics of memories, we found that patients evaluated their memories as more negative in comparison to the healthy controls (see Table 5), but the difference failed to reach significance (although it represented a medium sized effect). Contrary to our expectations, patients did not rate the degree of causal coherence, self-continuity, or centrality to identity significantly lower compared to controls. However, patients were significantly less likely to identify self-defining memories

Table 6
Correlation between life story measures, cognitive function and negative/positive symptoms.

Life story measures	BACS composite score		SAPS	SANS
	Patients	Controls	Patients	Patients
Chapter ratings				
Emotional valence	0.03	0.20	0.07	0.13
Causal connections (chapter-self)	0.46*	−0.34	−0.23	−0.58**
Causal connections (chapter-later events)	0.36	0.40*	−0.19	−0.44*
Centrality	0.18	0.11	−0.46*	−0.36
Self-Continuity (past-present)	−0.15	−0.27	0.13	0.28
Self-Continuity (past-future)	0.44*	0.03	−0.02	−0.50*
Number of chapters	0.52**	0.02	−0.28	−0.23
Chronology of chapters	0.06	−0.13	−0.09	0.09
Age at the start of earliest chapter	−0.41*	−0.34	0.27	0.34
Number of ongoing chapters	0.15	0.09	0.03	−0.26
Self-defining memories ratings				
Emotional valence	0.30	0.31	0.16	−0.54*
Causal connections (event-self)	0.31	0.40	0.03	−0.17
Causal connections (event-later events)	0.57**	0.40	0.24	−0.14
Centrality	0.37	0.27	0.01	−0.01
Self-continuity (past-present)	0.15	0.05	0.23	0.20
Self-continuity (past-future)	0.53*	−0.07	0.01	−0.21
Age at event	0.18	0.37	−0.28	−0.43
Event part of chapter (yes 1, no 2)	0.14	−0.07	0.26	−0.01

Note.
* $p < 0.05$.
** $p < 0.01$.

that were part of their chapters. This indicates that important specific memories from patients' past are not integrated in the overall life story.

4.3. Relationships between life story measures, neurocognitive function and symptoms

We then examined the relationships between neurocognitive function and the life story measures. In general, performance on the neurocognitive test was more closely related to life story ratings in the patient group than in the control group (see Table 6). In patients and controls a better performance on cognitive tests was related to higher causal coherence ratings of life story chapters and self-defining memories. For both chapters and self-defining memories, better performance on the cognitive test was significantly related to a higher rating of past-future continuity, but only in the patient group. In patients, better cognitive performance was also significantly related to a higher number of chapters and earlier age of the first chapter in the story.

We next examined the relation between the life story measures and negative and positive symptoms in the patient group (see Table 6). In general, symptoms were more closely related to chapter ratings compared to the self-defining memory ratings and negative symptoms showed more significant correlations than positive symptoms. The correlations were all negative, suggesting that the more negative symptoms patients experienced, the lower they rated the causal coherence of chapters and the less continuity they experienced between their past and future self. Furthermore, the more positive symptoms patients experienced, the less central to identity they viewed their chapters.

5. Discussion

The purpose of the present study was to examine narrative self-continuity in schizophrenia by eliciting chapters and self-defining memories in patients' life stories. To our knowledge this is the first study to examine chapters in patients with schizophrenia. Surprisingly, we found that the chapters and self-defining memories identified by patients in general did not differ significantly with regard to their temporal and causal coherence compared with controls. This conflicts with previous studies examining coherence of self-defining memories and life stories in patients with schizophrenia (Allé et al., 2015; Berna et al., 2011a,b; Raffard et al., 2009, 2010). However, patients did have more negative life story chapters in comparison with controls. Furthermore, in patients, better cognitive function and fewer negative symptoms were associated with more causally coherent life stories and a higher degree of self-continuity. In the next sections, we discuss the main findings in more detail.

5.1. Life story coherence

A few of our results indicated that patients had less coherent life stories compared to controls, that is, the lower number of ongoing chapters and the lower integration of self-defining memories into chapters. However, most of the results did not replicate previous studies on the coherence of patients' life stories and self-defining memories. One possible reason for this discrepancy is that we used a different procedure to assess coherence. In previous studies, meaning-making (causal coherence) was coded from participants' verbal descriptions. This measures the extent to which patients were able to *verbalize* meaningful causal relations in their narratives. In the present study, a self-report procedure was used, where patients were asked to evaluate the causal coherence of their chapters and self-defining memories on scales. The results showed that patients experienced meaningful connections between their past experiences and their present self, to the same extent as controls. It is possible that using a procedure that did not rely on verbal abilities made the task easier. Furthermore, rating experiences on a scale is a more structured task than verbally narrating them. Providing patients with an easier and more structured task could have facilitated the reporting of causal coherence. However, using self-report scales can also be problematic because it only allows for a superficial evaluation of narrative coherence. If patients were required to make more sophisticated causal inferences about their past, they might exhibit greater difficulties. Importantly, however, not all aspects of coherence were assessed through rating scales of subjectively experienced coherence (e.g., temporal order). Thus, even when using a different procedure to assess coherence, patients and controls still did not differ significantly from each other. This suggests that difference in procedure is not the only explanation for the discrepancy between the present and previous studies.

Another explanation why no differences were found may be that cognitive performance was quite high in patients. Control participants performed slightly better than patients on cognitive tests, but in general the differences failed to reach significance. Better cognitive functioning may be important to constructing coherent life stories, because such construction is an advanced cognitive skill (Köber et al., 2015). It can be described as a type of self-reflection, where people evaluate the personal meaning and consequences of their past experiences, and self-reflection has been found to be related to cognitive abilities in patients with schizophrenia (Lysaker et al., 2010a).

The finding that patients did not differ significantly from controls on most cognitive tests, calls into question whether they are representative of the general population of individuals with schizophrenia, who are commonly known to perform at lower levels on cognitive tasks. Indeed, most previous research, examining cognitive function in schizophrenia, report cognitive performance of 1–2 standard deviations below age-matched controls (Kahn & Keefe, 2013; Keefe & Fenton, 2007). In

the present study, patients performed around 0.6 standard deviation below the control group, indicating that they are cognitively intact and may represent a high-functioning subgroup of patients. If patients included in previous studies were more cognitively impaired in comparison to patients included in the present study, this could help explain why we failed to replicate previous findings. This is difficult to directly examine but supporting the idea, the patients in the present study had more years of education in comparison with patients included in previous studies (Allé et al., 2015; Berna et al., 2011a,b; Raffard et al., 2009, 2010) and educational achievement can be regarded as an indicator of cognitive performance (Kahn & Keefe, 2013). The overall good performance of the patients in the present study raises the more general possibility that the lower levels of narrative coherence observed in previous studies actually reflect the lower levels of cognition, rather than other aspects of schizophrenia.

It should be emphasized that while patients in the present study where cognitively well-functioning this does not imply that they were not suffering from their illness. They displayed more anxiety and depression in comparison with controls and levels of negative and positive symptoms comparable to patients within the same age group (van Erp et al., 2014). However, it suggests that within a subgroup of patients narrative coherence may be preserved and normal cognitive function could be a protective factor. Paradoxically, the high degree of narrative coherence may have negative consequences in this group of patients. Creating a coherent narrative of illness is associated with more illness-awareness (Lysaker, Clements, Plascak-Hallberg, Knipscheer, & Wright, 2002; Lysaker, France, Hunter, & Davis, 2005) and a recent meta-analysis demonstrated that a greater capacity to engage in self-reflection about having a mental illness was associated with worsening mood in patients with schizophrenia (Palmer, Gilleen, & David, 2015). Thus, self-reflection and coherent life stories may lead to illness awareness, which could also play a role in explaining why patients constructed more negative life stories than controls, a finding we turn to next.

5.2. Life story valence

We found that patients viewed their life story chapters more negatively in comparison with controls, which is consistent with a recent study examining life stories in schizophrenia (Allé et al., 2015). Our finding could simply reflect that patients have experienced more negative events in their lives compared with controls. Certainly many people suffering from schizophrenia have experienced traumatic and negative events (Berna et al., 2011b; Harrison & Fowler, 2004; Mueser, Rosenberg, Goodman, & Trumbetta, 2002). Furthermore, the illness is associated with a great loss of social functioning preventing many from completing their education and starting a family and thus robbing them of the opportunity to experience positive events. However, it is important to distinguish between the reality of the past and the past as it is remembered and interpreted in life stories. Creating life stories is a selective process where some experiences are emphasized while others are ignored (McAdams, 1996; Thomsen et al., 2015). It is possible that part of the reason why patients have more negative life stories is that they selectively focus on negative aspects of their past in their stories. In support of this view, we found that patients attributed more causal meaning to chapters that were negative, suggesting that negative experiences were emphasized in how they view themselves. Being aware of having a mental illness can be associated with reductions in mood, especially if this awareness leads to self-stigma, which refers to a process where people internalize negative stereotypes about their mental illness (Watson, Corrigan, Larson, & Sells, 2007). This can have negative consequences, such as negative self-views and reduced self-esteem (Karidi et al., 2010). It can also influence how the past is reconstructed in life stories, because memories that cohere with current self-views may be more likely to be included in the story (Bluck & Habermas, 2000; Conway, Singer, & Tagini, 2004). If having a diagnosis of schizophrenia is a dominant part of the way patients view themselves, negative experiences related to the development and progression of the illness are likely to be emphasized in the story. Focusing on these experiences could be one reason why patients evaluated their life stories as more negative.

Another possible reason why patients had more negative life stories compared to controls is that they scored higher on depression and anxiety. Emotional disturbance is a recognized clinical feature of schizophrenia (Blanchard, Mueser, & Bellack, 1998; Kring, Kerr, Smith, & Neale, 1993) and one previous study have demonstrated that patients with depression have more negative life story chapters of their past (Dalgleish, Hill, Golden, Morant, & Dunn, 2011). However, the valence of patients' chapters was not related to depressive symptoms, suggesting that the negative evaluation of the past was not due to depression.

5.3. Neurocognition, negative symptoms, and life stories

Poor performance on neurocognitive tests was associated with identifying fewer life story chapters and having a later start age of the earliest chapter, indicating that the temporal macrostructure was affected. Furthermore, poor cognitive performance and a high level of negative symptoms were associated with lower ratings of causal coherence and self-continuity. This is in agreement with previous studies, where executive dysfunctions and higher levels of negative symptoms was associated with less coherent narratives in schizophrenia (Allé et al., 2015; Berna et al., 2011a; Raffard et al., 2010). These findings are also consistent with studies showing that a less integrated sense of self within narratives is associated with severity of negative symptoms both concurrently and prospectively (Hamm et al., 2012; Lysaker et al., 2005, 2012; McLeod et al., 2014). As previously mentioned, cognitive function may influence the self-reflective processes involved in evaluating causal coherence and experiencing self-continuity. This could help explain why higher cognitive performance was related to higher ratings of causal coherence and self-continuity in patients. However, if a high cognitive performance is required to engage in

these reflective processes it is puzzling that life story ratings were not similarly related to cognitive performance in control participants. Thus, it may be the combined effect of many negative symptoms as well as cognitive dysfunction that impairs coherence and continuity in patients' life stories. Some negative symptoms, like social isolation, may be especially critical in life story construction, because the skills required to coherently narrate past experiences are learned in social interactions (Nelson & Fivush, 2004). In addition, the construction of meaning in narratives is facilitated by sharing memories with others (McLean, 2005; Pasupathi, 2001; Thorne, 2000). Avoiding social contexts may thus limit patients' opportunity to develop and practice the skills that are required to elaborate on past experiences and the self in life stories.

It is possible that the difficulties some patients exhibit in coherently narrating past experiences is part of a broader category of social cognitive deficits related to theory of mind and social problem solving. Engaging in narrative practices, such as reflecting on the past, serves social functions. For example, people use their own experiences to understand the motivations of others (Bluck, Alea, Habermas, & Rubin, 2005; Dimaggio, Lysaker, Carcione, Nicolò, & Semerari, 2008). Sharing a personal memory is a useful strategy to display and receive empathy and is a tool to establish and maintain intimate relations (Bluck, 2003; Pillemer, 1998). Directly relating social cognition to autobiographical memory and self-reflection in patients with schizophrenia, two studies have demonstrated that difficulties in reflecting on past experiences and the self was associated with problems in empathizing with others (Corcoran & Frith, 2003; Lysaker, Dimaggio, Buck, Carcione, & Nicolò, 2007). Thus, facilitating patients' ability to meaningfully narrate experiences from their past could help improve their sense of self-continuity as well as their ability to navigate in social interactions, which would be critical for functional outcome (Green, Olivier, Crawley, Penn, & Silverstein, 2005). This, however, needs to be combined with social cognitive training where patients receive psychoeducation about different aspects of social cognitive deficits in schizophrenia combined with roleplay and homework where these skills are practiced (Eichner & Berna, 2016).

A few studies have started to examine cognitive interventions specifically designed to improve autobiographical memory in patients with schizophrenia (Blairy et al., 2008; Ricarte, Hernández-Viadel, Latorre, & Ros, 2012; Ricarte, Hernández-Viadel, Latorre, Ros, & Serrano, 2014). In these studies, patients practiced remembering and imagining specific events from their past and future and memory improvement was documented in all studies. Interestingly, in two out of three studies memory improvement was not followed by changes in mood (Blairy et al., 2008; Ricarte et al., 2014). This suggests that practicing mental time travel is not enough to improve mood in schizophrenia, perhaps because the evaluation patients make in relation to important memories from their lives is not targeted in the intervention. As suggested above, better cognitive functioning, also in terms of improved autobiographical memory, may be associated with illness insight, which could lead to negative self-evaluations and worsening of mood (Palmer et al., 2015). Therefore, it would be important to also focus on positive aspects of the past and to practice adaptive integration of negative experiences in the life story. The group based treatment: Narrative Enhancement and Cognitive Therapy (NECT) seem especially promising for this purpose as it combines different techniques in order to challenge negative self-beliefs and practice narrative skills in patients (Yanos, Roe, & Lysaker, 2011). In addition to narrative coherence, the treatment targets the way individuals position themselves within their life stories and the themes they emphasize. The purpose of which is to replace themes of adversity with themes of success and to situate the patient as the central protagonist of the story. The intervention has been shown to increase self-esteem and quality of life while decreasing self-stigma (Roe et al., 2014). Metacognitive orientated psychotherapy has also been shown to enhance personal narratives (de Jong, van Donkersgoed, Pijnenborg, & Lysaker, 2016; Hamm & Leonhardt, 2016; Hillis et al., 2015) and taken together these approaches demonstrate the potential for psychotherapy to enhance sense of self in schizophrenia which is a central aspect of recovery.

5.4. Implications for future research

The unexpected finding of preserved life story coherence in some patients may have implications for future research. The value of such unexpected findings is that they force a greater degree of precision and nuance in the way autobiographical memory impairments are conceptualized and studied in schizophrenia. Our results lend support to previous research demonstrating intact cognitive function in some patients with schizophrenia (e.g. Goldstein et al., 2002; MacCabe et al., 2012; Palmer et al., 1997) and more generally to the idea of schizophrenia as a spectrum disorder. Recognizing that schizophrenia is a heterogeneous illness, it would be important to examine life stories in different subgroups as life stories may not be equally impaired in all patients. Furthermore, by simply studying the presence or absence of life story functions we may overlook important nuances that can enrich our understanding of self-disorders in schizophrenia. For example, in addition to examining whether patients can establish causal connections in their narratives it may be valuable to study the types of connections that are established and their impact on the sense of self.

6. Limitations

Some limitations of the study should be acknowledged. First, while it seems plausible that cognitive dysfunction and a high level of negative symptoms would contribute to lower narrative coherence, the study is correlational, preventing inferences about causal directions. Second, relying on self-report measures to assess narrative coherence may be problematic because such measures may be biased by social desirability. Furthermore, using self-reports in patients with schizophrenia may be especially problematic since the disease is associated with cognitive problems and distorted perceptions of reality.

However, there is some evidence that patients can reliably self-report their symptoms as well as aspects of their personality (Bell, Fiszdon, Richardson, Lysaker, & Bryson, 2007; Ready, Watson, & Clarck, 2002). Furthermore, since the purpose of the study was to examine aspects of self-continuity, which by its very definition refers to a subjectively experienced phenomenon, it seems reasonable to include self-report measures. Lastly, making negative evaluation of the past in life stories is not specific to schizophrenia but has also been observed in patients with depression (Dalgleish et al., 2011). Therefore, including a comparison group of patients with depression would allow for an examination of the diagnostic specificity of the findings reported here.

7. Conclusion

We found little evidence that patients with schizophrenia had less coherent life stories, when assessed as life story chapters and self-defining memories. The lack of difference between patients and control may be due to our use of self-report rather than coding of verbalization, a more structured method to assess coherence, or the fact that our patients were cognitively well-functioning. We did find that patients had more negative life story chapters, indicating that they have a negative view of themselves. Finally, patients with poorer cognitive function and more negative symptoms had less causally coherent chapters and experienced less self-continuity, possibly reflecting the detrimental effects of social isolation in combination with reduced cognitive function.

Acknowledgements

Appendix A

A.1. Verbatim instruction given for the identification of life story chapters

"I would like you to think of your life story and identify important chapters in the story. A chapter in your life story refers to a period of your life. Examples of chapters could be: 'school years', 'teenage years' or 'single-life.' Chapters does not necessarily have a clear beginning or ending. Can you give me an example of a period that could constitute as a chapter in a life story?" In case a participant describes a specific event the following instructions are given: "What you are describing is a type of event that typically takes place within a relatively short time span of for example a few hours or a day. A chapter refers to a longer period in your life, lasting several months or years. Can you think of another example?" In case a participant describes a categorical event the following instructions are given: "What you are describing is a type of event that typically takes place within a relatively short time span of for example a few hours or a day. It is a type of event that has occurred several times. A period can be associated with events that repeat themselves for example you can have a school period in your life, where one type of event for example gym classes occurs several times during the period. Can you think of another example?" When participants have identified a chapter the following instructions are given: "It is important that the chapters cover your entire life story, so you should think of your entire life span when identifying chapters. You are welcome to include overlapping chapters, which means chapters that refer to the same part of your life story. For example, it is possible to have a chapter concerning a job that takes place at the same time as a chapter concerning a romantic relationship. Do you have any questions so far?" Then the following instructions are given: "You are allowed to include chapters that are ongoing. You will be asked to give each chapter a title and answer some questions regarding the chapter. I will read the questions and possible answers out load as we go along. Some people choose to include a few chapters in their life story while others include many chapters. There is no right or wrong way to divide a life story into chapters and it is completely up to you which chapters and how many you include. We will start with the first chapter and finish when you feel that the chapters you have identified sufficiently describe your life story. You can include up to 10 chapters." If participants ask in which order they should describe the chapters they are told that this is their own choice. Furthermore, if participants produce less than 10 chapters they are given the following instruction: "I can see that you haven't identified 10 chapters. Can you think of any other periods in your life that could constitute as important chapters in your life story?" This instruction is repeated up to 2 times.

A.2. Verbatim instruction given for the identification of self-defining memories

"In this part of the interview I would like you to identify the 3 most important specific memories from your life. A specific memory refers to a memory of a circumscribed event, lasting no more than a day, where you remember many details. So, unlike chapters specific memories are of short duration. The memories should be self-defining and a self-defining memory

is (1) at least one year old. (2) It is a memory from your life that you remember very clearly and that still feels important to you even as you think about it. (3) It is a memory that helps you to understand who you are as an individual and might be the memory you would tell someone else if you wanted that person to understand you in a more profound way. (4) It may be a memory that is positive or negative, or both, in how it makes you feel. The only important aspect is that it leads to strong feelings. (5) It is a memory that you have thought about many times. It should be familiar to you like a picture you have studied or a song you have learned by heart. Examples of specific self-defining memories could be: 'when my sister was born,' 'my graduation,' or 'when I meet my boy/girlfriend.' Can you think of an example of a specific self-defining memory?" If the participant identifies a period the following instructions are given: "What you are describing is period. A period often last for months or years whereas a specific event typically takes place within a relatively short time span of for example a few hours or a day. Can you think of another example?" In case a participant identifies a categorical event the following instructions are given: "What you are describing is a type of event that has happened several times. It is an event that is hard to distinguish from other similar events. A self-defining memory refers to a memory of a unique event that has only happened once in your life. Can you think of another example?" The interviewer continues to ask for examples until the participant can give an example of a specific self-defining memory. Then the following instructions are given: "It is completely up to you which memories you choose it just has to be those that are most self-defining. For each memory you will be asked to give a short description and answer some questions regarding the memory. Just like in the last part I will go through each question with you. Do you have any questions?" If participants produce less than 3 memories they are given the following instruction: "I can see that you haven't identified 3 memories. Can you remember another event in your life that could constitute as a self-defining memory?" This instruction is repeated up to 2 times.

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