Self-defining memories related to illness and their integration into the self in patients with schizophrenia

Fabrice Berna [a,b,c,1], Mehdi Bennouna-Greene [a,b,c,1], Jevita Potheegadoo [a,b,c], Paulina Verry [b,c], Martin A. Conway [d], Jean-Marie Danion [a,b,c,*]

[a] Hôpitaux Universitaires de Strasbourg, Clinique Psychiatrique, Hôpital Civil, 1 Place de l'Hôpital, 67091 Strasbourg Cedex, France
[b] Université de Strasbourg, Faculté de Médecine, 4 rue Kirchleger, 67000 Strasbourg, France
[c] INSERM U666, Physiologie et Psychopathologie Cognitive de la Schizophrénie, Hôpitaux Universitaires de Strasbourg, 1 place de l'Hôpital, BP 426, 67091 Strasbourg Cedex, France
[d] The Leeds Memory Group, Institute of Psychological Sciences, University of Leeds, Leeds LS2 9JT, England, United Kingdom

ARTICLE INFO

ABSTRACT

Although schizophrenia alters the sense of personal identity, little is known about the impact of illness-related autobiographical events on patients' self-representation. We investigated self-defining memories (SDM) in 24 patients with schizophrenia and 24 controls to explore how illness-related SDM were integrated into the self at both the cognitive (how participants are able to give a meaning to past events: meaning making) and affective levels (how participants can re-experience past negative events as less negative: redemption and benefaction effects). We found that 26% of freely recalled SDM referred to their illness in patients. Further, while meaning making was impaired in patients for both illness-related and other SDM, illness-related SDM were characterized by a higher redemption and benefaction effects than other SDM. Our results highlight that despite a reduced ability to give a meaning to illness-related episodes, emotional processing seems to allow these events to become positively integrated into patients' life stories. This study provides new findings about the construction of the self in relation to psychotic episodes in patients with schizophrenia. We discuss clinical implications of our results that are helpful to guide cognitive interventions.

© 2011 Elsevier Ireland Ltd. All rights reserved.

1. Introduction

Patients with schizophrenia suffer from serious identity disorders, which despite long-standing clinical descriptions (Bleuler, 1911; Freedman, 1974; Minkowski, 2002) remain poorly understood. Given that the self is intimately linked to past personal experiences (Beike et al., 2004; Conway, 2005), studying autobiographical memory provides useful and relevant tools for addressing the question of disorders related to the self. Several autobiographical memory studies conducted with patients with schizophrenia have shown deficits in general memories of other past experiences but also in memories which play a critical role in the construction of one's personal identity. However, little is known about the impact of memories related to the illness in patients with schizophrenia and more specifically about how they are integrated or not into patients' representation of themselves. Psychotic episodes strongly alter both how reality is experienced and one's subjective sense of self; they are often experienced as traumatic by patients due to not only the psychotic symptoms themselves but

also the events related to the hospitalization (Shaw et al., 1997; Meyer et al., 1999; Harrison and Fowler, 2004).

Literature on post-traumatic stress disorder (PTSD) offers two contradictory hypotheses regarding the integration of traumatic memories into individuals' biography. The first considers that because traumatic experiences contradict prior schematized knowledge of the self they cannot be well integrated into the person's overall life story (Brewin et al., 1996; Nijenhuis and van der Hart, 1999). According to this view, traumatic memories are disconnected from other stored autobiographical experiences and emerge as intrusions. An alternative view posits that traumatic experiences in patients suffering from PTSD stand out as landmarks in the autobiographical knowledge base around which other life events are linked (Berntsen, 2001). These memories do not themselves contain traumatic information but are regarded as being thematically or causally related to the traumatic event. Further, PTSD patients often strive to attribute a meaning to traumatic experiences (Geninet and Marchand, 2007), considering them to be part of their current identity (Berntsen et al., 2003) and supporting current personal goals (Sutherland and Bryant, 2005). This argues in favor of a high, albeit dysfunctional integration of traumatic memories into individuals' identity (Berntsen et al., 2003). Reasoning that psychotic experiences represent highly stressful situations in individuals' lives leading them to reconsider their own self, life and other persons, sometimes in a completely different way (Chadwick,

---

* Corresponding author at: Hôpitaux Universitaires de Strasbourg, Clinique Psychiatrique, Hôpital Civil, 1 Place de l'Hôpital, 67091 Strasbourg Cedex, France. Tel.: +33 3 88 11 64 45; fax: +33 3 88 11 64 46.
E-mail address: jean-marie.danion@chru-strasbourg.fr (J.-M. Danion).
[1] These authors contributed equally to the study.

2007), two opposite hypotheses are possible. According to one, memories of psychotic experiences may be disconnected from other stored autobiographical experiences and emerge as intrusions. According to the other, psychotic experiences may become part of patients' identity. These hypotheses have yet to be investigated empirically.

Bury (1982) proposed the term "biographical disruption" to explain the process following the onset of a chronic illness. It leads patients to rethink both their biography and their self-concept in light of their illness. It involves the mobilization of one's emotional and intellectual resources in an attempt to attribute a meaning to the illness in terms of both its consequences and symbolic significance. The notion of biographical disruption has recently led to further research studies, which set out to focus more on the reciprocal relationship between identity and illness, rather than merely the effects of illness on identity (Wilson, 2007). These studies have highlighted that an illness could represent a form of continuation of identity and even confirm this sense of identity in patients (Carricaburu and Pierret, 1995; Faircloth et al., 2004), or could result in a reinforcement of some aspect of patients' identity (Wilson, 2007). Williams (2000) also highlighted the importance of narratives referring to the illness for a better understanding of the relationship between identity and illness. In particular he demonstrated how illness could become part of one's personal biography, with life-events interpreted as factors that may have caused the illness. According to Brown and Harris (1989), this requires context-specific processes of meaning endowment and emotional processes to be well integrated. It is worth noting here that these theoretical developments have all focused on chronic physical illness. Scant attention has been given to chronic psychiatric illnesses like schizophrenia (Lysaker and Buck, 2007).

Focusing on autobiographical memories related to illness in schizophrenia would be of great importance for gaining a better understanding of patients' self-representation and how it is affected by the illness. One way of addressing this issue is to study illness-related self-defining memories (SDM) in patients. Such memories are defined as memories referring to highly significant events, which provide people with a better understanding of both themselves and others or the world (Singer and Moffitt, 1991). Two complementary methods have been proposed for assessing the integration of significant past experiences into the self from cognitive and affective perspectives. Blagov and Singer (2004) proposed the concept of meaning making to describe the ability to assign a meaning to self-defining memories. They postulated that this process allows individuals to stand back from a past event and to realize how this event has changed their personality or the way they see themselves, others or the world. Accordingly, individuals are held to have integrated a past personal event once they are able to make a link between this event and who they have become. A similar process can be addressed at an emotional level. This approach was developed by McAdams (2001), based on the observation that individuals who have experienced difficult life events tend to end their narration of these events with a positive evaluation ("redemption effect"). For example, a person might conclude the painful narrative of his brother's death by explaining how this event has led him to take more care of his relationships with close friends and how it has improved the quality of his bonds of friendship. In line with this, Wood and Conway (2006) proposed to measure the way in which individuals tend to lower the intensity of negative emotions in self-defining memories and to increase that of positive emotions. They described a benefaction pattern that can be observed when recalled and current emotions related to these memories are compared. Interestingly, both the process of redemption and the pattern of benefaction were shown to be essential for a positive, coherent sense of self or, in other words, for integrating difficult past events into a coherent life story (McAdams, 2001; Shimojima, 2004; Wood and Conway, 2006). We postulated that the integration of redemptive memories may result from the

psychotherapeutic process, inasmuch as this process leads patients to reconsider these memories and see them in a more positive way. Hence, a better understanding of the cognitive and emotional processes that are involved in the reappraisal of past significant events related to a psychotic illness is critical in that these researchers demonstrated that meaning making in self-defining memories was associated with better adjustment and impulse control, while several studies by McAdams (e.g., McAdams et al., 2001; McAdams, 2006) have found that individuals who generate more redemptive themes in their memories are less prone to depression, and have higher levels of subjective well-being, and better physical and mental health generally.

This study is part of a more general investigation of memory in schizophrenia, in which participants were asked to retrieve their self-defining memories freely (see Berna et al., in press). In this part, we focused on self-defining memories related to the illness by asking patients to recall such memories specifically. Our aim was to study how patients integrated these memories into the self. To this end, we assessed meaning making as well as the redemption, benefaction effects and symptoms of PTSD associated with self-defining memories related to the illness. We postulated that the ability to attribute a meaning to self-defining memories is impaired in patients with schizophrenia, as we found in the first part of the study and as was shown by Raffard et al. (2009, 2010). Further, we thought the affective processing of personal memories that are involved in both the redemption and benefaction effects might be challenged by the dysregulation of emotional processes largely described in schizophrenia (Myin-Germeys et al., 2001). Our assumption was that in patients a greater impairment of meaning making, or lower proportion of redemptive events in illness-related memories than other memories would suggest these former memories are less integrated into the self. Alternatively, evidence of benefaction and redemption effects would indicate that despite poor meaning making, those illness-related memories that became an integral part of the self were nevertheless positively integrated.

2. Method

2.1. Participants

Twenty-four outpatients (12 women) took part in the study. They were recruited from the Psychiatry Department of the University in Strasbourg. Patients all fulfilled the DSM-IV-TR criteria (APA, 2000) for schizophrenia (paranoid, $n = 21$; residual, $n = 2$; undifferentiated, $n = 1$) as determined by consensus of the current treating psychiatrist and two senior psychiatrists in the research team. All of the patients were clinically stabilized, i.e. they had not been hospitalized and their usual treatment had not been modified for a period of one month preceding the test; patients were aware of their diagnostic. Patients with a history of traumatic brain injury, epilepsy, alcohol and substance abuse (according to DSM-IV-TR criteria), or other neurological conditions were excluded from the study, as were those diagnosed as currently suffering from major depressive disorder, as defined by a score superior to 4 according to the Calgary Depression Scale for Schizophrenia (Addington et al., 1993), and patients with an IQ of less than 70, as assessed using a short form of the Wechsler Adult Intelligence Scale Revised (Crawford et al., 1996). All but one of the patients were taking long-term neuroleptic treatment (atypical, $n = 18$; typical, $n = 4$ and both typical and atypical, $n = 1$). Two were being treated with benzodiazepines, seven with antiparkinsonian treatment and none with mood stabilizer. The comparison group comprised 24 control participants (12 women) with no history of psychiatric, neurologic disorders or substance abuse. Control participants were recruited via newspaper advertisements. There was no difference between patients and controls in terms of age, level of education, premorbid IQ (f-NART: Mackinnon and Mulligan, 2005), current IQ (Crawford et al., 1996) and self-esteem (Rosenberg, 1965; Vallières and Vallerand, 1990). Characteristics of patients and controls are presented in Table 1.

This research study was completed in accordance with the Helsinki Declaration; it was approved by the local ethics committee and all participants gave their informed written consent.

2.2. Materials

2.2.1. Self-defining memories questionnaire

An adaptation of the procedure initially proposed by Singer and Moffitt (1991) was used. Participants were asked to search for 5 self-defining memories, defined as: (a) a memory that is at least one year old; (b) a memory from your life that you remember very clearly and that still feels important to you even when you think about it; (c) a memory that helps you understand who you are as an individual and which might be a

Table 1
Clinical characteristics of patients with schizophrenia and control participants.

	Control participants (n = 24)	Patients (n = 24)	Statistics t	P
Clinical measures				
Age (years)	36.2 (6.8)	35.3 (6.9)	0.42	0.68
Education (years)	11.8 (2.0)	11.5 (2.2)	0.34	0.74
RSE	33.1 (4.6)	32.0 (4.0)	0.91	0.37
WAIS-R (current IQ)	92.5 (10.5)	89.8 (13.3)	0.77	0.44
f-NART (premorbid IQ)	106.8 (6.6)	104.2 (7.3)	1.31	0.20
Duration of illness (years)	–	11.4 (5.0)		
Age at onset of the illness	–	24.0 (7.0)		
PANSS total score	–	61.4 (17.7)		
PANSS positive score	–	15.1 (5.2)		
PANSS negative score	–	15.1 (7.5)		
PANSS general score	–	31.2 (9.4)		

Values given as mean (standard deviation). RSE, Rosenberg-Self-Esteem; WAIS-R, Wechsler Adult Intelligence Scale − Revised; f-NART, French National Adult Reading Test; PANSS, Positive and Negative Symptoms Scale.

memory you would share with someone else if you wanted that person to understand you in a basic way; (d) a memory that may be positive or negative, or both, in terms of how it makes you feel now. The only important aspect is that it triggers strong feelings; and (e) a memory you have thought about many times. It should be familiar to you like a picture you have studied or a song you have learnt by heart.

2.2.2. Positive And Negative Affective States (PANAS; Watson et al., 1988; Gaudreau et al., 2006)

This adjective checklist comprises two 10-item subscales of positive (active, alert, attentive, determined, enthusiastic, excited, inspired, interested, proud, and strong) and negative (afraid, ashamed, distressed, guilty, hostile, irritated, jittery, nervous, scared, and upset) affects, the intensity of which is rated by participants on a score ranging from 1 to 5.

2.2.3. The impact of events scale − revised (Brunet et al., 2003)

This scale comprises 22 items on 5-point scales (from 0 to 4) assessing symptoms of post-traumatic stress disorder associated with memories. Memories associated with a score higher than 24 were defined as traumatic memories (Asukai et al., 2002).

2.2.4. Subjective impact and personal significance scales (Wood and Conway, 2006)

Subjective impact and general, non-specific aspects of personal significance of each memory were assessed using 7 items on 7-point scales (see, Appendix A). These scales were used to ensure that the retrieved memory met the criteria of a genuine self-defining memory, as described by the self-defining memory questionnaire.

2.3. Procedure

The procedure consisted of two sessions. In the first session, clinical (CDSS, RSE and for patients: PANSS; Kay et al., 1987) and psychometric assessments (WAIS-R, f-NART) were carried out. Participants were then asked to find five self-defining memories (SDM) according to the aforementioned definition (Singer and Moffitt, 1991). As it was important that they had sufficient time for introspection and to select the memories that best fitted the criteria, they were given one week to find the five memories, after first being given a sheet of paper which explained the self-defining memory criteria and instructed them to write both the title and details of each memory (where people were, whom they were with, what happened, and how they and the other people present responded to the event). We reasoned that in the case of patients, poor introspection capacity would lead them to select memories that are highly *accessible* but not especially highly *significant* for the self. The second session took place 7 ± 2 days after the first one. At the beginning of this second session, participants narrated each memory out loud. All the memories they recounted were recorded and then transcribed for analysis. After their narrative, participants were asked to rate the PANAS assessing the intensity of the emotions they had felt at the time of the event (recalled emotions) and their current emotions when remembering respectively (see, Wood and Conway, 2006) and completed the IES-R (Brunet et al., 2003). After telling their five memories, patients were asked to answer the following question "Is this memory related in any way to your psychological illness?" They were given no specific criteria regarding the kind of relationship this might be. Patients were free to categorize SDM as being related to their illness irrespective of the link. Control participants were asked a similar question: "Is this memory related in any way to an illness you have had?" For each participant, the number of illness-related SDM was counted. Insofar as we aimed to obtain at least 3 SDM related to the illness plus 5 other SDM, participants were invited to recall further memories related to their illness or not, depending on the number of SDM previously given in each category (illness vs. other). All these memories had to meet the criteria for self-defining memories. Regarding illness-related SDM, control participants were asked to recall memories related to a personal illness or highly emotional memories related to the illness of a close relative. When all the memories had been narrated, participants had to rate their subjective impact and personal significance according to the aforementioned scales (see, Appendix A). Finally, for each memory, they were asked to answer one last question: "To what extent was this event important for you, and how does

it help you to describe who you are?" Responses were again recorded and then transcribed. The last question was intended to determine whether memories not spontaneously associated with meaning making were associated with it nonetheless following an explicitly cue.

2.4. Scoring

2.4.1. Spontaneous meaning making (SMM)

Each memory was coded for the absence (0) or presence (1) of meaning making, using the criteria proposed by Singer and Blagov (2000). Meaning making was considered to be present when participants took a step back from narrative events and descriptions to make an additional statement about the significance or meaning of the memory (e.g., "during this period when my parents divorced I realized I had left the world of my childhood and had become mentally stronger but also harsher on others").

2.4.2. Cued meaning making (CMM)

The same procedure as for SMM was used to code the absence (0) or presence (1) of cued meaning making in explanations given by participants to the last question mentioned above: "To what extent was this event important for you and how does it help you to describe who you are"?

2.4.3. Redemptive events

The emotional valence of the event was rated first by the experimenters by taking into account both the situation described and the emotion experienced. Redemption was subsequently coded as present (1) or absent (0). A redemptive event had to contain an explicit transformation in the story from a decidedly negative-affect state to a decidedly positive-affect state (McAdams, 2001). The negative state of the event had to be clear and explicit and had to change into a decidedly positive situation or produce a positive outcome of some kind (see example in Appendix B). This analysis was performed on all the material available for each SDM (i.e. material used for the coding of both SMM and CMM).

The memories (377 events in total) were scored by two independent raters (JP and PV) blind to diagnosis ($\kappa = 0.83$ for SMM, $\kappa = 0.82$ for CMM, $\kappa = 0.93$ for valence, $\kappa = 0.92$ for redemption).

2.5. Statistical analysis

We used a multilevel statistical analysis, which is particularly relevant for autobiographical memory studies because it allows memories to be treated as the statistical unit while taking into account the intra-subject variance and the fact that memories are not independent in one individual (Wright, 1998). This method was also appropriate for our study because the number of memories was small and differed between categories of memories (5 vs. 3). The multilevel model assigned memories to level 1 and participants to level 2, and the analyses were performed using the MLwiN software, version 2.10. Whenever significant interactions were observed, post-hoc analyses were performed separately in each group.

2.5.1. Personal significance and meaning making

The global personal significance scores were subjected to an analysis of variance (ANOVA) with group (patients vs. controls) and category of memories (illness vs. other) as predictor variables. Meaning making was treated as a binary response and subjected to a two-level logistic regression for repeated measures using 3 predicting factors: cueing (spontaneous vs. cued), group, and category.

2.5.2. Redemption, emotions and traumatic memories

The emotional scores from the PANAS were subjected to an ANOVA for repeated measures, with group, category and time (recalled vs. current) as predictor variables. For each memory, a "benefaction effect" score was calculated by adding up the absolute values for the increase in positive emotions and reduction in negative emotions between the time the event occurred and the time of remembering (see, Wood and Conway, 2006). The benefaction effect score was subjected to an ANOVA using group and category as predictor variables. A binomial logistic regression using the same group and category factors was used to analyze the emotional valence of the events, redemption and traumatic memories (IES-score >24). According with the definition of redemption, the analysis was performed only on events with a negative valence.

To take account of the fact that participants had one week to find the 5 first SDM but then had to find the other 3 during the second session, we first performed the same analyses but at the same time incorporated a supplementary order factor (first vs. subsequently given SDM). Since there was no difference between the results with and without this additional factor, and since no interaction was found between the order factor and other factors, the results are presented here without the order factor.

3. Results

Considering the first 5 SDM given, 16 out of 24 patients (66.7%) mentioned at least one SDM as being related to their illness. Further, 26.6% of the patients' memories (1.33/5) were categorized as related to their illness. In control participants, 9.2% of their memories (0.46/5) referred to illnesses of people close to them but none to a personal

illness. Regarding patients' memories related to their illness, 83.9% (2.52/3) referred to a psychotic episode (1.36/3 taking place in a psychiatric hospital), and 16.1% (0.48/3) referred to other past events that patients considered to have contributed to their illness.

Considering all the SDM given, 3 patients categorized more than 3 of the first SDM given as being related to their illness, whereas 3 controls gave less than 3 illness-related SDM. In patients, three memories were not related to their psychological illness despite cueing, and these memories were excluded from the analysis. A total of 377 memories were obtained (out of 384 expected memories) and used for statistical analysis. Qualitative analysis of the illness-related memories revealed that 71.0% of the patients' memories (2.13/3) referred to a psychotic episode (1.46/3 taking place in a psychiatric hospital) and 29.0% (0.87/3) referred to other past events having contributed to their illness. In the control group, 15.6% of the illness-related memories (0.47/3) referred to a personal illness and 84.4% (2.53/3) to the illness of a close relative.

3.1. Personal significance and meaning making

Personal significance did not differ between groups or category of events and no interaction was found. Patients had lower meaning making than controls ($P<0.001$) and cued meaning making was higher than spontaneous meaning making ($P<0.001$) in both groups. No significant difference was found between categories of SDM but a significant interaction between group and category of memories ($P=0.006$): in controls, meaning making was significantly lower in illness-related SDM than other SDM ($P=0.02$), whereas no significant difference was observed in patients ($P>0.05$). No other interaction was found (see Table 2).

3.2. Redemption, emotions and traumatic memories

Emotional scores (PANAS) were lower in current emotions than in recalled emotions ($P<0.001$), and higher in other SDM than in illness-related SDM ($P=0.003$). A significant interaction between group and time ($P=0.004$) showed that the reduction of emotional intensity between recalled and current emotions was weaker in patients than control participants. The significant interaction between group and category ($P<0.001$) was explained by a lower emotional intensity in illness-related SDM than in other SDM in controls ($P<0.001$), whereas no significant difference was found in patients ($P>0.05$). No other effect or interaction was found.

A significant interaction between group and category ($P=0.04$) was found for the benefaction effect score: this was explained by significantly higher scores in illness-related SDM than in other SDM in patients ($P=0.02$), whereas no significant difference was found in controls ($P>0.05$). Regarding the valence of the events, illness-related SDM were more negative than other SDM ($P<0.001$). A significant interaction between group and category ($P=0.04$) was found for redemption: in patients the proportion of redemptive events was higher in illness-related SDM than other SDM, whereas it was lower in control participants, but these differences were not significant (all $Ps>0.05$). Finally, patients displayed more traumatic memories than controls ($P=0.04$). No other effect or interaction was found for the benefaction effect, redemption, valence or traumatic memories.

We performed secondary analyses after splitting the group of patients into two subgroups, one with good insight (PANSS-G12 = 1–2; $n=15$), the other with impaired insight (PANSS-G12 item>2; $n=9$; the median score of G12 item was 2). Given the small number of subjects in each subgroup, we performed Mann–Whitney U-tests. We found no difference between patients with good vs. impaired insight with respect to the proportion of events associated with redemption ($M=0.13$, S.D.$=0.19$ and $M=0.17$, S.D.$=0.19$, respectively; $U=58$, $P=0.59$), the mean benefaction effect score ($M=6.49$, S.D.$=7.83$ and $M=3.29$, S.D.$=3.31$, respectively; $U=51.5$, $P=0.36$) and the proportion of events associated with SMM ($M=0.19$, S.D.$=0.20$ and $M=0.14$, S.D.$=0.16$, respectively; $U=61.5$, $P=0.74$) and CMM ($M=0.52$, S.D.$=0.24$ and $M=0.53$, S.D.$=0.30$, respectively; $U=64$, $P=0.86$). Finally, age of memories related to illness was significantly higher than other SDM ($P<0.01$). No effect of group and no interaction were found (see Table 2).

4. Discussion

Our results show that more than two thirds of the patients spontaneously mentioned at least one of the five self-defining memories

Table 2
Cognitive and emotional characteristics of self-defining memories (SDM) related or not to the illness.

	Control participants (n = 24)		Patients with schizophrenia (n = 24)		Statistics	
					Main effects	Interactions
	Illness-related SDM	Other SDM	Illness-related SDM	Other SDM		
Age at the time of the events	23.1 (9.3)	20.5 (5.1)	25.6 (6.9)	21.5 (7.1)	Group n.s. Category**	Group × Category n.s.
Cognitive characteristics						
Meaning making					Group***	Group × Category**
Spontaneous meaning making[a]	37.0 (33.3)	48.8 (27.6)	24.7 (31.4)	17.5 (17.2)	Cueing***	Group × Cueing n.s.
Cued meaning making[a]	61.6 (33.9)	81.3 (20.6)	52.9 (34.1)	51.6 (26.7)	Category n.s.	Cueing × Category n.s.
						Group × Cueing × Category n.s.
Global personal significance score	31.5 (7.3)	35.7 (7.3)	34.8 (9.0)	35.2 (7.2)	Group n.s. Category n.s.	Group × Category n.s.
Emotional characteristics						
PANAS score					Group n.s.	Group × Category***
Recalled emotions	39.1 (10.7)	47.5 (9.6)	50.8 (10.2)	49.7 (8.4)	Time***	Group × Time**
Current emotions	29.8 (9.4)	34.9 (7.6)	42.4 (10.9)	41.8 (9.3)	Category**	Time × Category n.s.
						Group × Category × Time n.s.
Memories with negative valence[a]	92.8 (14.1)	57.9 (29.0)	81.3 (24.7)	66.1 (21.6)	Group n.s. Category***	Group × Category n.s.
Benefaction effect	0.73 (12.3)	4.23 (8.17)	7.89 (11.1)	5.22 (6.56)	Group n.s. Category n.s.	Group × Category*
Redemption[a]	13.8 (17.9)	31.8 (33.1)	25.7 (34.7)	12.7 (16.5)	Group n.s. Category n.s.	Group × Category*
Traumatic events[a] (IES-score >24)	4.4 (11.5)	11.1 (15.7)	18.1 (32.6)	18.4 (24.4)	Group* Category n.s.	Group × Category n.s.

*$P<0.05$; **$P<0.01$; ***$P<0.001$.
[a] Proportion of events ($\pm$S.D.). PANAS, Positive And Negative Affective States; IES, Impact of Event Scale.

(SDM) as being related to their psychological illness. According to the definition of SDM (Singer and Blagov, 2000), patients experienced these events as being significant both for self-understanding and for explaining to other people who they really are. This suggests that some illness-related SDM are part of patients' representation of themselves (Blagov and Singer, 2004). However, these events referred mostly to highly emotional experiences of psychotic episodes and/or hospitalization, which raises the question of whether memories of such events could really be integrated in patients' personal identity (Berntsen et al., 2003; Sutherland and Bryant, 2005). Our study addressed this issue at both cognitive and emotional levels.

At the cognitive level, we first found that the ability to attribute a meaning to SDM was globally impaired in patients with schizophrenia. These results confirmed those obtained in the first part of our study and those of Raffard et al. (2009, 2010). Secondly, patients' ability to give a meaning to past events was similar in both categories of events. This remained true even when participants were explicitly asked to give a meaning to their SDM. On the other hand, control participants displayed lower meaning making for illness-related SDM than other SDM. It is worth noting that personal significance scores did not differ between categories of SDM or between groups. This suggests the explanation for our results could not lie with differences regarding the significance of the selected memories or with the way the task instructions were understood. The ability to assign a meaning to past experiences was shown to be a critical mechanism for allowing personally significant events to be integrated into the self (Blagov and Singer, 2004). Our results confirm that this ability was also reduced for illness-related SDM in patients, but also show that this reduction was not more pronounced than that observed with other SDM. At the emotional level, while both categories of SDM had a similar emotional intensity in patients and controls, the benefaction effect score was significantly higher in illness-related SDM than in other SDM in patients but not in controls. These results of subjective ratings were in keeping with redemption ratings showing more redemptive events in illness-related SDM than other SDM in patients contrary to controls. However, the differences failed to reach significance when performed in each group separately. According to McAdams (2001), the ability to transform the emotional charge of an event by lowering its negative component while increasing its positive component is crucial for preserving self-esteem as well as a sense of life coherence. Taken together, our results suggest that, despite their reduced meaning making ability, patients were still able to stand back from their highly emotional illness-related memories and to experience more positive emotions at the time of remembering. The reduced ability to give sense to illness-related SDM does not seem to prevent these memories to be positively integrated into the self.

Patients had more traumatic SDM than controls. Our results are in keeping with those of Raffard et al. (2009) who showed that patients' SDM referred more frequently to life-threatening events than those of controls. Several studies have also shown that patients with schizophrenia reported a higher incidence of traumatic events (Resnick et al., 2003; Spence et al., 2006) and suffered more frequently from PTSD (Mueser et al., 2002) than the general population. However, about 15.8% of patients' illness-related SDM were accompanied by symptoms of PTSD, which is less than what previous studies had described (Shaw et al., 1997; Meyer et al., 1999). This relatively low frequency of traumatic memories may be explained by the task requirement to select SDM. But it is worth mentioning that traumatic illness-related memories that were not selected may have an influence on self-definition even if forgotten (see also, Fivush, 2004).

To the best of our knowledge this study is the first that has systematically addressed the issue of SDM related to illness in patients with schizophrenia and explored the cognitive and emotional mechanisms related to their integration into the patients' self. The proportion of freely recalled SDM relating to the illness was substantially higher in our study than in the study by Raffard et al. (2010). Unlike Raffard and colleagues, who investigated 3 freely recalled SDM, we investigated 5; this may have led to a higher probability for SDM related to illness to be selected. However, a limitation of this study has to do with our control group, insofar as control participants were not suffering from any psychological or physical illness, and controls' memories mainly referred to illness involving close relatives. Thus, it would be worthwhile conducting a further study involving a control group made up of patients suffering from a chronic physical illness in order to compare the impact of schizophrenia on subjective identity to that of another chronic illness. To make up for this limitation, our interpretation was based mainly on differences observed in the group of patients between illness-related SDM and other SDM and to a lesser extent on group differences. Moreover, it is worth noting that the vast majority of our patients were seen regularly by a psychiatrist. Thus, the effects of the psychotherapeutic process could account for some of our results. It is possible that by inviting patients to speak about past psychotic episodes, and by helping them to distance themselves from these events, the emotional and possibly traumatic impact of events related to psychotic episodes may have been reduced. Lysaker and Buck (2007) advocate that both the significance attached to psychotic episodes, when these events can be replaced in the context of the patients' overall life story, and the information given to patients about their illness, are crucial for helping patients incorporate these events into their personal life narratives. Our results also suggest that even if patients have difficulty making sense of past illness-related experiences, the therapist must not think patients necessarily remember these events as being negative. On the contrary, patients would benefit from having their therapist encourage a positive reappraisal of these past events (Lazarus and Folkman, 1984). Finally, patients' medications might possibly have an impact on autobiographical memory and affective processes, but it is not known whether this impact is negative or positive, due for instance to stabilization of the illness.

Appendix A

Seven-point scales assessing subjective impact and personal significance (Wood and Conway, 2006).

a   This past event has had a big impact on me
b   I feel I have grown as a person since experiencing this past event
c   Having had this experience, I have more insight into who I am and what is important to me
d   Having had this experience, I have learned more about what life is all about
e   Having had this experience, I have learned more about what other people are like
f   Even when I think of the event now, I think about how it has affected me
g   I have often spent time thinking about what this event means to me

Appendix B

Example of illness-related SDM associated with redemption in a patient with schizophrenia.

"I went to Italy with my sister five years ago. I got sick because of my psychiatric problems and didn't want to stay in Italy any longer. I didn't want to because I was very sick, I couldn't do anything, I was depressed, deluded. My sister called my father and he said he would come to take me home by coach. So he came especially from Strasbourg to Italy to pick me up. I was very surprised and touched that my father came but also satisfied because I couldn't stay there any longer. I thought I was not really a bad person".

References

Addington, D., Addington, J., Maticka-Tyndale, E., 1993. Assessing depression in schizophrenia: the Calgary Depression Scale. British Journal of Psychiatry (Suppl.) 22, 39–44.

APA, 2000. Diagnostic and Statistical Manual of Mental Disorders DSM-IV-TR, 4th ed. American Psychiatric Association Press, Washington.

Asukai, N., Kato, H., Kawamura, N., Kim, Y., Yamamoto, K., Kishimoto, J., Miyake, Y., Nishizono-Maher, A., 2002. Reliability and validity of the Japanese-language version of the impact of event scale-revised (IES-R-J): four studies of different traumatic events. The Journal of Nervous and Mental Disease 190 (3), 175–182.

Beike, D.R., Lampinen, J.M., Behrend, D.A., 2004. The Self and Memory. Psychology Press, Hove.

Berna, F., Bennouna-Greene, M., Potheegadoo, J., Verry, P., Conway, M.A., Danion, J.M. in press. Impaired ability to give a meaning to personally significant events in patients with schizophrenia. Consciousness and Cognition.

Berntsen, D., 2001. Involuntary memories of emotional events: do memories of traumas and extremely happy events differ? Applied Cognitive Psychology 15 (7), 135–158.

Berntsen, D., Willert, M., Rubin, D.C., 2003. Splintered memories or vivid landmarks? Qualities and organization of traumatic memories with and without PTSD. Applied Cognitive Psychology 17 (6), 675–693.

Blagov, P.S., Singer, J.A., 2004. Four dimensions of self-defining memories (specificity, meaning, content, and affect) and their relationships to self-restraint, distress, and repressive defensiveness. Journal of Personality 72 (3), 481–511.

Bleuler, E., 1911. Dementia Praecox or The Group of Schizophrenias. Translated by Zinkin, J International Universities Press, New York.

Brewin, C.R., Dalgleish, T., Joseph, S., 1996. A dual representation theory of posttraumatic stress disorder. Psychological Review 103 (4), 670–686.

Brown, G.W., Harris, T.O., 1989. Life Events and Illness. The Guilford Press, New York.

Brunet, A., St-Hilaire, A., Jehel, L., King, S., 2003. Validation of a French version of the Impact of Event Scale-Revised. Canadian Journal of Psychiatry 48 (1), 56–61.

Bury, M., 1982. Chronic illness as biographical disruption. Sociology of Health & Illness 4 (2), 167–182.

Carricaburu, D., Pierret, J., 1995. From biographical disruption to biographical reinforcement: the case of HIV-positive men. Sociology of Health & Illness 17 (1), 65–88.

Chadwick, P.K., 2007. Peer-professional first-person account: schizophrenia from the inside—phenomenology and the integration of causes and meanings. Schizophrenia Bulletin 33 (1), 166–173.

Conway, M.A., 2005. Memory and the self. Journal of Memory and Language 53 (4), 594–628.

Crawford, J.R., Mychalkiw, B., Johnson, D.A., Moore, J.W., 1996. WAIS-R short-forms: criterion validity in healthy and clinical samples. The British Journal of Clinical Psychology 35 (4), 638–640.

Faircloth, C.A., Rittman, M., Boylstein, C., Young, M.E., Van Puymbroeck, M., 2004. Energizing the ordinary: biographical work and the future in stroke recovery narratives. Journal of Aging Studies 18 (4), 399–413.

Fivush, R., 2004. The silenced self: constructing self from memories. In: Beike, D.R., Lampinen, J.M., Behrend, D.A. (Eds.), The Self and Memory. Psychology Press, Oxford, pp. 75–93.

Freedman, B.J., 1974. The subjective experience of perceptual and cognitive disturbances in schizophrenia: a review of autobiographical accounts. Archives of General Psychiatry 30 (3), 333–340.

Gaudreau, P., Sanchez, X., Blondin, J., 2006. Positive and negative affective states in a performance-related setting: testing the factorial structure of the PANAS across two samples of French–Canadian participants. European Journal of Psychological Assessment 22 (4), 240–249.

Geninet, I., Marchand, A., 2007. La recherche de sens à la suite d'un événement traumatique. Santé Mentale au Québec 32 (2), 11–35.

Harrison, C.L., Fowler, D., 2004. Negative symptoms, trauma, and autobiographical memory: an investigation of individuals recovering from psychosis. The Journal of Nervous and Mental Disease 192 (11), 745–753.

Kay, S.R., Fiszbein, A., Opler, L.A., 1987. The positive and negative syndrome scale (PANSS) for schizophrenia. Schizophrenia Bulletin 13 (2), 261–276.

Lazarus, R., Folkman, S., 1984. Stress, Appraisal, and Coping. Springer, New York.

Lysaker, P.H., Buck, K.D., 2007. Illness and the disruption of autobiography: accounting for the complex effect of awareness in schizophrenia. Journal of Psychosocial Nursing and Mental Health Services 45 (9), 39–45.

Mackinnon, A., Mulligan, R., 2005. The estimation of premorbid intelligence levels in French speakers. L'Encéphale 31 (1), 31–43.

McAdams, D.P., 2001. The psychology of life stories. Review of General Psychology 5 (2), 100–122.

McAdams, D.P., 2006. The Redemptive Self: Stories Americans Live by. Oxford University Press, New York.

McAdams, D.P., Reynolds, J., Lewis, M., Patten, A., Bowman, P.J., 2001. When bad things turn good and good things turn bad: sequences of redemption and contamination in life narrative, and their relation to psychosocial adaptation in midlife and in students. Personality and Social Psychology Bulletin 27, 208–230.

Meyer, H., Taiminen, T., Vuori, T., Äijälä, A., Helenius, H., 1999. Posttraumatic stress disorder symptoms related to psychosis and acute involuntary hospitalization in schizophrenic and delusional patients. The Journal of Nervous and Mental Disease 187 (6), 343–352.

Minkowski, E., 2002. La Schizophrénie. Payot, Paris.

Mueser, K.T., Rosenberg, S.D., Goodman, L.A., Trumbetta, S.L., 2002. Trauma, PTSD, and the course of severe mental illness: an interactive model. Schizophrenia Research 53 (1–2), 123–143.

Myin-Germeys, I., van Os, J., Schwartz, J.E., Stone, A.A., Delespaul, P.A., 2001. Emotional reactivity to daily life stress in psychosis. Archives of General Psychiatry 58 (12), 1137–1144.

Nijenhuis, E.R., van der Hart, O., 1999. Forgetting and reexperiencing trauma. In: Goodwin, J., Attias, R. (Eds.), Splintered Reflections: Images of the Body in Trauma. Basic Books, New York, pp. 39–65.

Raffard, S., D'Argembeau, A., Lardi, C., Bayard, S., Boulenger, J., Van Der Linden, M., 2009. Exploring self-defining memories in schizophrenia. Memory 17 (1), 26–38.

Raffard, S., D'Argembeau, A., Lardi, C., Bayard, S., Boulenger, J., Van der Linden, M., 2010. Narrative identity in schizophrenia. Consciousness and Cognition 19 (1), 328–340.

Resnick, S.G., Bond, G.R., Mueser, K.T., 2003. Trauma and posttraumatic stress disorder in people with schizophrenia. Journal of Abnormal Psychology 112 (3), 415–423.

Rosenberg, M., 1965. Society and the Adolescent Self-Image. Princeton University Press, Princeton.

Shaw, K., McFarlane, A., Bookless, C., 1997. The phenomenology of traumatic reactions to psychotic illness. The Journal of Nervous and Mental Disease 185 (7), 434–441.

Shimojima, Y., 2004. On feeling negative past as a part of current self: subjective temporal organization of autobiographical memories. Psychological Reports 95 (3/1), 907–913.

Singer, J.A., Blagov, P.S., 2000. Classification system and scoring manual for self-defining autobiographical memories. Annual Meeting of the Society for Applied Research in Memory and Cognition. Miami Beach.

Singer, J.A., Moffitt, K.H., 1991. An experimental investigation of specificity and generality in memory narratives. Imagination, Cognition, and Personality 11, 233–257.

Spence, W., Mulholland, C., Lynch, G., McHugh, S., Dempster, M., Shannon, C., 2006. Rates of childhood trauma in a sample of patients with schizophrenia as compared with a sample of patients with non-psychotic psychiatric diagnoses. Journal of Trauma & Dissociation 7 (3), 7–22.

Sutherland, K., Bryant, R.A., 2005. Self-defining memories in post-traumatic stress disorder. The British Journal of Clinical Psychology 44 (4), 591–598.

Vallières, E.F., Vallerand, R.J., 1990. Traduction et validation canadienne-française de l'échelle de l'estime de soi de Rosenberg. International Journal of Psychology 25 (2), 305–316.

Watson, D., Clark, L.A., Tellegen, A., 1988. Development and validation of brief measures of positive and negative affect: the PANAS scales. Journal of Personality and Social Psychology 54 (6), 1063–1070.

Williams, S.J., 2000. Chronic illness as biographical disruption or biographical disruption as chronic illness? Reflections on a core concept. Sociology of Health & Illness 22 (1), 40–67.

Wilson, S., 2007. 'When you have children, you're obliged to live': motherhood, chronic illness and biographical disruption. Sociology of Health & Illness 29 (4), 610–626.

Wood, W., Conway, M., 2006. Subjective impact, meaning making, and current and recalled emotions for self-defining memories. Journal of Personality 74 (3), 811–845.

Wright, D.B., 1998. Modelling clustered data in autobiographical memory research: the multilevel approach. Applied Cognitive Psychology 12 (4), 339–357.