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Research Article

Narrative fragmentation in child sexual abuse: The role of age and post-traumatic stress disorder

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ABSTRACT

The present study aimed to assess the effects of age and PTSD on the narrative fragmentation in memories for child sexual abuse. Lexical complexity, cohesion and coherence were analyzed within a group of 86 allegations of children (M = 10 years; SD = 3.7; range: 4–17) who were victims of sexual abuse. Results illustrated that age played an important role in establishing narrative coherence and predicted the level of orientation, the sequence of events and the level of evaluation of the event. Instead, PTSD was related to narrative coherence and cohesion. Therefore, in children, the narrative fragmentation could be an effective diagnostic tool for understanding the effects of PTSD. Moreover in a legal setting the traumatic effects of PTSD on the narrative coherence and cohesion could be significant indices in the evaluation of child testimony.

1. Introduction

The nature of trauma narratives is under considerable debate. Some researchers (e.g., Harvey & Bryant, 1999; van der Kolk & Fisler, 1995) suggest that traumatic experiences associated with personal salience and pervasive arousal, particularly in clinical populations, prevent the ability to produce a cohesive and consistent narrative. Many studies illustrate that traumatic memories are evaluated as more fragmented and disorganized in their narrative structure than memories of non-traumatic events (Byrne, Hyman, & Scott, 2001; Tromp, Koss, Figueredo, & Tharan, 1995) and that traumatized individuals are predicted to tell more fragmented narratives about their traumatic event (Amir, Stafford, Freshman, & Foa, 1998; Koss, Figueredo, Bell, Tharan, & Tromp, 1996; Neimeyer, 2004).

In literature, various definitions of trauma memory fragmentation exist (Bedard-Gilligan & Zoellner, 2012), including increased sensory components (Hopper & van der Kolk, 2001), abnormal chronology (Byrne, Hyman, & Scott, 2001), and memory confusion (Foa, Molnar, & Cashman, 1995; Halligan, Michael, Clark, & Ehlers, 2003). In particular, Foa et al. (1995) distinguish between fragmentation and disorganization by defining fragmentation as unnecessary repetitions and disorganization as confused or disjointed thoughts in the narrative. However, in our study we primarily use fragmentation to refer to disjointed thoughts in the narrative and to refer to both fragmentation and disorganization for simplicity and because in literature the terms are not well distinguished.

In terms of causal mechanisms, some authors (Halligan et al., 2003; Harvey & Bryant, 1999; van der Kolk & Fisler, 1995) interpret the narrative fragmentation as a result of the lack of elaboration of the memory due to high emotion and dissociation during the traumatic experience. Dissociation is generally conceived as a defensive response to intense stress or trauma. Dissociative adults and

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children have been shown to have less confidence in their memory (Camisasca & Miragoli, 2014; Cordon et al., 2004; Kenardy et al., 2007; Putnam, 1997; Quas et al., 1999). Peritraumatic dissociation would be able to prevent memory processing and organization during encoding, which disrupts both memory storage and retrieval (Halligan et al., 2003; Marshall & Shell, 2002). Starting from this assumption, some scholars (e.g. Camisasca, Miragoli, & Di Blasio, 2014; Ehlers & Clark, 2000; Halligan, Clark, & Ehlers, 2002; O'Kearney & Perrott, 2006; Zoellner & Bittinger, 2004) consider the dissociative response as a key mechanism underlying the development and persistence of post-traumatic stress disorder (PTSD) symptoms. Trauma victims, who develop PTSD symptoms, are assumed to experience difficulties in organizing their traumatic memory into a coherent narrative with an ordered sequence of events (Esterling, Abate, Murray, & Pennebaker, 1999). Horowitz (1986) argued that PTSD symptoms are maintained due to the trauma memory not being integrated within the individual's pre-trauma schemas. In particular, "disjointedness" of trauma memories is crucial in understanding re-experiencing of PTSD (Ehlers, Hackmann, & Michael, 2004; Evans, Ehlers, Mezey, & Clark, 2007). Therefore, dissociation may lead to fragmentation of the traumatic memory, which in turn may contribute to the PTSD symptoms (e.g., Brewin, Dalgleish, & Joseph, 1996; Ehlers & Clark, 2000; Ozer, Best, Lipsey & Weiss, 2003; Laposa & Alden, 2003).

Considerable research has examined the relations between PTSD and memory fragmentation in adults, with mixed results. Several studies have shown memory disorganization to be related to Acute Stress Disorder (Harvey & Bryant, 1999; Moulds & Bryant, 2005) and PTSD (e.g., Buck, Kindt, van den Hout, Steens, & Linders, 2006; David, Akerib, Gaston, & Brunet, 2010; Murray, Ehlers, & Mayou, 2002; O'Kearney, Hunt, & Wallace, 2011). For example, by measuring the degree of organization/fragmentation in the trauma narratives of individuals with PTSD, Foa et al. (1995) found that the trauma narratives became more organized and less fragmented as PTSD symptoms decreased throughout exposure to therapy. Moreover, Halligan et al. (2003) found that narrative disorganization predicted unique variance in PTSD symptoms six months after the trauma.

Conversely, several studies have failed to find a relationship between memory disorganization and PTSD symptoms. For example, van Minnen, Wessel, Dijkstra, and Roelofs (2002) compared PTSD patients who improved and did not improve through exposure to therapy. All patients showed significant decreases in disorganized thoughts over the course of therapy and these changes did not differ between the two groups even when using Foa et al.'s (1995) analysis of memory fragmentation. Similarly, Berntsen, Willert, and Rubin (2003) assessed traumatic memories associated with PTSD versus those that were not linked to PTSD. Overall, memories recalled by the PTSD group were no more fragmented than the non-PSTD group. Finally, Peace, Porter, and Brinke (2008) found that high levels of traumatic impact did not cause subsequent memory deficits and that memories for sexual trauma were not impaired or fragmented but were "superior" to other emotional memories.

The characteristics of children's memory fragmentation have received less attention. Developmental research showed that age certainly plays an important role in the organization of the stories. By the age of 6, children provide appropriate setting information and begin to include personal evaluations of the events (Stein, 1988). Instead, the inclusion of internal states and motivations is rare in children's narratives before the age of 8 (Kemper, 1984; Stein & Glenn, 1982) and corresponds to the improvement in children's ability to produce more sophisticated event sequences, which are causally related and integrated (Applebee, 1978; Peterson & McCabe, 1983; Shapiro & Hudson, 1991; Stein & Glenn, 1982). Moreover, some studies report that children provide more organized reports of negative events than neutral or emotionally positive events (Ackil, Van Abbema, & Bauer, 2003; Fivush, Hazzard, Sales, Sarfati, & Brown, 2003). However, findings about the narratives of traumatic events are less homogeneous. Berliner, Hyman, Thomas and Fitzgerald (2003) illustrated that children's memories for trauma have less sensory details and are less coherent than memories for positive events. These results are consistent with those reported by Fivush et al. (2003), in which the narrative disorganization was associated to the disconnections from the traumatic event. Conversely, Eisen, Goodman, Davis, and Qin (1999) reported that children who are victims of maltreatment with higher scores on measures of dissociation, were rated as having more (not less) detailed and cohesive memories of their abuse experiences.

Moreover, relatively few studies exist on memory in children who have been diagnosed with PTSD. O'Kearney, Speyer and Kenardy (2007) examined the connection between the quality of children's trauma memory (in terms of organization and structure) and their post-traumatic adjustment. Results illustrated a strong relationship between the attempts at making the event coherent and causally meaningful and intrusive symptoms in the process of children's adaptation to traumatic event. In order to identify individual differences in how youth process their experience of sexual abuse (occurred when they were between 8 and 15 years old) and to assess associations between processing strategies and adjustment, Simon, Feiring, and Kobielski McElroy (2010) detected that the meaning of the abuse was associated with narrative organization and to lesser psychopathological symptoms. In particular, youth with more PTSD and depressive symptoms produced narratives that reflected a rigid conceptualization of the sexual abuse with problems in maintaining a perspective on past traumatic experiences and in regulating their current emotional reactions. Another study (Moradi, Doost, Taghavi, Yule, & Dalgleish, 1999) suggested that children with PTSD have poorer overall memory on measures primarily tapping some aspects of long-term memory. Moreover, Kenardy et al. (2007) reported that disorganization of narratives was related to post-traumatic stress reactions among 7–15-year-olds who had been admitted to hospital. Instead, in a study of memory for a real-life stressful event (an ano-gential examination), Eisen, Qin, Goodman, and Davis (2002) found that, for maltreated 3- to 17-year-old children, PTSD symptoms were not a consistent predictor of event memory, but were associated with more commission errors to specific and misleading questions and with more correct information to free recall questions.

2. The present study

Although consistency is an important indicator of believability for jurors, relatively little is known about the factors connected with children's consistency (Ghetti, Goodman, Eisen, Qin, & Davis, 2002) and the existing results are controversial. On the basis of the considerations set out above, the present study aimed to explore the narrative fragmentation (in terms of features of lexical

complexity, cohesion and coherence) in memories for child sexual abuse. Specifically, this study aimed to: 1) investigate age and PTSD differences in the narrative fragmentation and 2) explore the predictive effects of age and PTSD in the organization of the traumatic narratives.

According to existing literature on children's eyewitness memory, we hypothesized that (H1) age may play an important role in structuring the traumatic narratives and that the accuracy generally increases with age (e.g., Brown et al., 1999; Eisen et al., 2002). In particular, we expected the accounts of younger children (preschool age children), compared to older children (school age children and adolescents) to be characterized by lower lexical complexity, simpler coordination between the propositions, and less narrative coherence (e.g. Allen, Kertoy, Sherblom, & Pettit, 1994; Applebee, 1978; Karmiloff-Smith, 1985; Hudson & Shapiro, 1991). Moreover, according to studies on PTSD, we hypothesized that (H2) the presence of post-traumatic symptoms may have a negative impact on the lexical complexity, cohesion and coherence of the traumatic narratives. In particular, we awaited the accounts of children with PTSD, compared to those without PTSD, to be lexically less complex, less cohesive and less consistent (Moradi et al., 1999). Finally, we presumed that (H3) age and PTSD are predictive of organization of traumatic narratives of children. In particular, we assumed that age may play a role of greater importance than the PTSD (Di Blasio, Miragoli, & Procaccia, 2012; Miragoli, Procaccia, & Di Blasio, 2014).

3. Method

3.1. Participants

The study analyzed the autobiographical narratives within a group of 86 Italian children who were victims of sexual abuse and were involved in criminal proceedings concluding in the conviction of the accused at the Criminal Court of Milan. At the time of the deposition, the mean age of the victims (55 female and 31 male) was 10 years (SD = 3.7 years; range: 4–17 years): 14% of children (n = 12) were preschool aged (4–6 years old), 50% (n = 43) school-aged (7–10 years old), and 36% (n = 31) were adolescents (11–17 years old). All children were considered to have average intelligence, without diagnosis of mental retardation and/or of learning disabilities.

We assessed the Socio-Economic Status (SES) of children' families by considering the parents' qualifications and jobs: 34.9% of children (n = 30) were from low class, 57% (n = 49) from middle class, and 8.1% (n = 7) from upper class. All the children were Italian and properly Italian speaking.

Regarding the characteristics of traumatic experiences, 45.3% of the cases were domestic sexual abuse, 33.7% occurred outside the family, and 20.9% occurred both within and outside the family. 59.3% of the acts of violence (n = 51) was committed with acts of penetration (genital, anal, and/or oral). In most cases (90.7%, n = 78), the sexual abuse was serial (with a minimum duration of one year), in the other cases (9.3%, n = 8) it referred to a single incident.

In this study 33 children (38.4%) presented all the symptoms required for a PTSD diagnosis (symptoms of re-experiencing the trauma, of avoidance/emotional numbing, and of increased arousal) and 53 (61.6%) did not present any symptoms. Table 1 shows direct comparisons between the proportion of children in each PTSD condition (with *versus* without PTSD) and sexual abuse characteristics (severity, duration and relationship with the perpetrator).

The information about the sexual abuse and about the PTSD profile were derived from the legal documentation of criminal proceedings.

3.2. Procedure

At the Criminal Court of Milan, forensic interviews were conducted with the aim of initiating a criminal investigation into the sexual abuse allegations. All interviews were conducted by skilled personnel trained in evaluating the cases of child sexual abuse. In line with the literature (Melinder et al., 2010), each interview was collected through a semi-structured protocol divided into four phases (relationship building, free narrative, questioning, and closure), audio-recorded, and transcribed verbatim. The abuse incident

Table 1
PTSD condition and sexual abuse characteristics.

	Without PTSD%	With PTSD%	Chi^2
Severity of the Abuse			18.12**
Without Penetration	88.6	11.4	
With Penetration	43.1	56.9	
Duration of the Abuse			0.67
Single Incident	75.0	25.0	
Serial Abuse	60.3	39.7	
Relationship with the Perpetrator			11.69**
Intrafamilial Abuse	59.0	41.0	
Extrafamiliar Abuse	82.8	17.2	
Intrafamilial and Extrafamilial Abuse	33.3	66.7	

Notes: $^{*}p < 0.05$, $^{**}p < 0.01$.

was explored as much as possible using non-suggestive and open-ended prompts and invitations. Only the content referred to sexual abuse was analyzed and it could be reported by the victim to open-ended prompts and invitations (free narrative) and to specific questions (questioning). The interviewer's questions were not included. The interviews covered a wide range of themes concerning the abusive experience (e.g., severity, duration, type of abusive action, relationship to the perpetrator, and interactions with the perpetrator) as well as the child's thoughts and feelings about the traumatic experience.

3.3. Measures

3.3.1. Post-traumatic stress disorder

In the legal report phase, in order to investigate PTSD profile and to verify participants' diagnostic status, a structured interview was administered. A PTSD profile was defined as a specific pattern of mental effects from a traumatic experience, which matched the formal criteria for PTSD in the DSM IV–TR (APA, 2000).

3.3.2. Lexical complexity

In this study children's narratives were analyzed for percentage of words longer than 6 letters as a measure of the child's lexical complexity and as an appropriate index of language ability (O'Kearney & Perrott, 2006; Pennebaker & Francis, 1996).

3.3.3. Cohesion

Cohesion in a narrative is achieved through linguistic devices (i.e., interclausal connectives) that express the relationships between sentences and clauses, which create a narrative (Cain, 2003; Halliday & Hasan, 1976). In this study children's narratives were analyzed in their use of the conjunctions, which include connectives (such as and, but, then, because, so, etc.). The cohesive function of these markers can be classified as *Coordination* (coordinating conjunctions to combine short independent clauses into a single sentence), *Subordination* (subordinating conjunctions to transform independent clauses – main clauses – into dependent clauses – subordinate clauses), *Temporal* or *Causal* (Tomasello, 2003). Numbers of references in each category were converted into a percentage of the total number of cohesive markers and the narrative context was used to determine the function.

3.3.4. Coherence

Coherence represents how various parts of a narrative are interrelated in a meaningful way, sequencing the events within a temporal or causal framework (Cain, 2003; Hudson & Shapiro, 1991; Shapiro & Huston, 1991, 1997). This study used the classification of narrative coherence developed by Peterson and McCabe (1983) and by O'Kearney et al. (2007). As well as global ratings of coherence, this study assessed three elements for each narrative:

1) *Level of orientation*, which considers the stage for the narrated events and includes orientation to people, place(s), time(s) and behavior(s). On the bases of criteria developed by O'Kearney et al. (2007), narratives were rated in the following way: 0 = the narrative includes no orientation comments or only minimal information such as one statement referring to the setting or context of the events; 1 = the narrative provides enough orientation information to gain a general sense of who, when and where the events took place (or at least two of these pieces of information); 2 = the narrative provides precise information about the time of day, location, people involved, general conditions, etc.;
2) *Sequence of events*, which considers whether the events were narrated in chronological order or whether there were repetitions or disorganization in the temporal sequence. On the bases of criteria developed by O'Kearney et al. (2007), narratives were rated in the following way: 0 = the narrative contained no apparent sequence of events or the events appeared so disorganized that the order of events in the narrative was difficult to follow; 1 = the narrative appeared to be structured in chronological order but there was some evidence of disorganization or repetition of events; 2 = the events of the narrative were organized in chronological order;
3) *Level of evaluation*, which consists in explanations, judgements, emotional states, intentions and inferences in order to explain one's own point of view about the narrated event. On the bases of criteria developed by O'Kearney et al. (2007), narratives were rated in the following way: 0 = the narrative contained none or very little evaluation and consisted mainly of facts or a series of actions; 1 = the narrative contained some evaluative comments usually in the form of internal emotional states or intentions; 2 = the narrative contained detailed evaluative comments telling the reader what to think about the event being narrated.

Three judges knowledgeable of the coding system co-rated 25% of the narratives in order to ensure reliability. There was strong agreement between the raters for the cohesive measures (r to 0.72–.83) and for what the coherence measures were concerned, ratings were high for the criteria of orientation (96%), sequence (96%), and evaluation (82%). All discrepancies between the coders were resolved through discussions among the coders and a fourth experienced coder. Coding was carried out by coders who were blind to age of children and the presence/absence of the PTSD symptoms.

4. Results

4.1. Descriptive characteristics of the narratives

Narratives ranged in length from 111 to 8412 words (M = 1430; SD = 1257). The characteristics of the narratives measures

Table 2
Characteristics of the Narrative Measures.

	Total Sample	4–6 years	7–10 years	11–17 years
	M (SD)	M (SD)	M (SD)	M (SD)
Narrative Length (Word Count)	1450 (1257)	540 (417)	1298 (809)	1959 (1694)
Lexical Complexity	0.139 (0.026)	0.134 (0.037)	0.136 (0.026)	0.146 (0.021)
Cohesive Markers				
Coordination	0.021 (0.011)	0.020 (0.016)	0.021 (0.011)	0.022 (0.011)
Subordination	0.064 (.018)	0.052 (0.020)	0.062 (0.016)	0.070 (0.017)
Temporal	0.012 (0.006)	0.008 (0.006)	0.013 (0.007)	0.011 (0.004)
Causal	0.012 (0.006)	0.018 (0.009)	0.011 (0.005)	0.011 (0.005)
Coherence Ratings				
Orientation	1.37 (0.76)	0.33 (0.49)	1.42 (0.73)	1.71 (0.46)
Sequence	1.24 (0.75)	0.17 (0.39)	1.30 (0.71)	1.58 (0.50)
Evaluation	0.92 (0.77)	0.17 (0.32)	0.86 (0.71)	1.29 (0.74)

(lexical complexity, cohesion and coherence) are presented in Table 2 for the total sample and for the three age groups.

On average, the narratives were grammatically structured on good levels of subordinating conjunction ($M = 0.064$; $SD = 0.018$) and were considered to be rather well organized in terms of orientation (*Level of orientation*: $M = 1.37$; $SD = 0.75$) and of temporal sequence (*Sequence of events*: $M = 1.24$; $SD = 0.75$). However, the narratives were less adequate in respect to the evaluation of the event through the children's judgments, states of mind, and intentions (*Level of evaluation*: $M = 0.92$; $SD = 0.77$).

The narrative length was not associated with PTSD ($r = -0.08$, $p = 0.46$) or the characteristics of traumatic event (severity: $r = 0.12$, $p = 0.27$; duration: $r = 0.06$, $p = 0.58$; relationship with the perpetrator (intrafamilial *versus* extrafamilial abuse): $r = 0.81$, $p = 0.46$), but it was only associated with age of child ($r = 0.37$, $p < 0.001$).

Gender differences were not observed with respect to PTSD and narrative measures (lexical complexity, cohesion and coherence).

4.2. Age and PTSD differences

In order to examine initial bivariate associations and to identify possible covariates, the correlations among age, PTSD and the narratives measures (lexical complexity, cohesion and coherence) were calculated (Table 3). Second, to explore age differences into three age groups (4–6, 7–10 and 11–17 years old) and PTSD differences (with *versus* without PTSD) Analyses of Variance (ANOVA) and Student's *t* test were respectively conducted.

The correlation analyses showed the positive associations between age and lexical complexity ($r = 0.22$, $p < 0.05$), subordinating conjunction ($r = 0.33$, $p < 0.01$), level of orientation ($r = 0.50$, $p < 0.01$), sequence of events ($r = 0.54$, $p < 0.01$), and level of evaluation ($r = 0.52$, $p < 0.01$). In particular, older children produced more complex narratives than younger children from a lexical and grammatical point of view (with a larger number of subordinate clauses). Moreover, the narratives of older children appeared to be more consistent, as they provided more precise information about time, location and people involved in the abusive event, they were in chronological order and had a higher number of evaluative comments referring to the traumatic experience.

This bears the ANOVA's findings, where significant differences in the three age groups (4–6, 7–10, and 11–17 years old) with regard to subordinating conjunction ($F_{(2.85)} = 5.10$, $p < 0.01$), temporal cohesion ($F_{(2.85)} = 4.79$, $p < 0.01$), level of orientation ($F_{(2.85)} = 21.82$, $p < 0.01$), sequence of events ($F_{(2.85)} = 24.10$, $p < 0.01$), and level of evaluation ($F_{(2.85)} = 11.88$, $p < 0.01$) were revealed. Specifically, children of preschool age (4–6 years), compared with school-age children and adolescents, were less able to provide structured narratives with subordinating and temporal conjunction. Instead, with regard to narrative coherence, significant differences were found in all three age groups: in fact, the level of orientation, the sequence of events, and the level of

Table 3
Age, PTSD and Narrative Measures (Lexical Complexity, Cohesion and Coherence).

	1	2	3	4	5	6	7	8	9	10
1. Age	–									
2. PTSD	−0.40**	–								
3. Lexical Complexity	0.22*	−0.04	–							
4. Coordination	0.02	−0.14	0.08	–						
5. Subordination	0.33**	−0.41**	0.05	0.07	–					
6. Temporal Markers	−0.06	−0.14	−0.01	0.10	0.40**	–				
7. Causal Markers	−0.09	0.06	−0.19	0.05	0.22*	−0.14	–			
8. Orientation	0.50**	−0.39**	0.23*	0.09	0.43**	0.09	−0.16	–		
9. Sequence	0.54**	−0.35**	0.29**	0.15	0.41**	0.23*	0.31*	0.80**	–	
10. Evaluation	0.52**	−0.26**	0.26*	0.11	0.30**	0.00	−0.06	0.54**	0.46**	–

Notes: $^{*}p < 0.05$, $^{**}p < 0.01$.

Table 4
PTSD Differences.

	With PTSD	Without PTSD	$t_{(84)}$	p
	Media (DS)	Media (DS)		
Subordination	0.06 (0.02)	007 (0.01)	3.81	0.000
Orientation	1.00 (0.83)	1.60 (0.60)	3.91	0.000
Sequence	0.91 (0.81)	1.45 (0.66)	3.29	0.002
Evaluation	0.67 (0.74)	1.08 (0.76)	2.48	0.016

evaluation were found to be considerably different between preschool children and school age children, and between the latter and adolescents.

For what the PTSD is concerned, the correlation analyses showed the negative associations between PTSD and subordinating conjunction ($r = -0.41$, $p < 0.01$), level of orientation ($r = -0.39$, $p < 0.01$), sequence of events ($r = -0.35$, $p < 0.01$), and level of evaluation ($r = -0.26$, $p < 0.01$). Specifically, children with PTSD symptoms were less able to provide grammatically complex (with less use of the subordinating conjunctions) and consistent (with less details of orientation, more disorganization of the temporal sequence, and less evaluative comments of the traumatic experience) narratives. These aspects were validated by the findings of the Student's test (Table 4).

4.3. Predictive effects of age and PTSD

Hierarchical multiple regression analyses were employed to determine if age and PTSD were predictor variables of for the organization of the traumatic narratives (through the features of lexical complexity, cohesion and coherence). Table 4 displays the unstandardized regression coefficients (B), standard error estimates (SEB), the standardized regression coefficients (β), and R^2 statistics. Only significant models for cohesion and coherence are presented. Age was significantly related to narrative coherence. In particular, age was the single predictor of the sequence of events ($\beta = 0.47$, $p < 0.01$) and of the level of evaluation ($\beta = 0.50$, $p < 0.01$), and together with the PTSD, age predicted the level of orientation ($\beta = 0.41$, $p < 0.01$). Instead, the PTSD was significantly related to both cohesion and coherence In particular, it was the single predictor of the subordinating conjunction ($\beta = -0.33$, $p < 0.01$) and, together with age, it predicted the level of orientation ($\beta = -0.23$, $p < 0.05$) (Table 5).

5. Discussion

This study sought to investigate the narrative fragmentation in memories for child sexual abuse. Specifically, we explored the effects of age and PTSD on lexical complexity, cohesion and coherence in children who were sexually abused.

As we expected, age played an important role in organizing the traumatic memory of children (Di Blasio, Miragoli, & Procaccia, 2012; Miragoli, Procaccia, & Di Blasio, 2014, Miragoli, Procaccia, & Di Blasio, 2016). In particular, in our study age was significantly

Table 5
Predictors of the Narrative Measures.

	B	SEB	β
Outcome: Subordination			
$R^2 = 0.20$			
$F = 10.23^{**}$			
Age	0.001	0.001	0.20
PTSD	−0.012	0.004	-0.33^{**}
Outcome: Level of Orientation			
$R^2 = 0.29$			
$F = 17.22^{**}$			
Age	0.083	0.021	0.41^{**}
PTSD	−0.350	0.155	-0.23^{*}
Outcome: Sequence of Events			
$R^2 = 0.30$			
$F = 18.81^{**}$			
Age	0.096	0.020	0.47^{**}
PTSD	−0.251	0.153	−0.16
Outcome: Level of Evaluation			
$R^2 = 0.27$			
$F = 15.63^{**}$			
Age	0.103	0.021	0.50^{**}
PTSD	−0.093	0.161	−0.06

Notes: $^{*}p < 0.05$, $^{**}p < 0.01$.

related to the coherence of the traumatic narratives in terms of level of orientation, sequence of events, and level of evaluation. In establishing coherence, children had to draw on a shared knowledge in order to temporally and causally organize a narrative into a sequence that was meaningful to themselves and their listeners. School-age children and adolescents, compared to preschool age children, were more competent in this aspect. Namely, their narratives were more linguistically cohesive (with a larger number of subordinate clauses), more consistent in terms of temporal and space dimensions, and presented an overall evaluation of the traumatic event. Therefore, they were more able to use connectives with consistency and without incongruence, not impairing the comprehension of the discourse (Bamberg, 1987; Hudson & Shapiro, 1991; Karmiloff-Smith, 1985; Peterson & McCabe, 1991). These findings were in line with the research evaluating children's ability to tell stories, which explains how young children are less able to construct coherent or cohesive narratives, which are frequently in lack of basic constituent units (Allen, Kertoy, Sherblom, & Pettit, 1994; Applebee, 1978; Berman & Slobin, 1994; Karmiloff-Smith, 1985; Hudson & Shapiro, 1991). Another aspect to note is that in the traumatic narratives age was related to the linguistic cohesion, but it was not a significant predictor as we had supposed. In fact, in the narratives of ordinary events, children use the interclausal connectives to provide cohesion between the different sentences and clauses became more sophisticated in children between 5 and 10 years of age (Shapiro & Hudson, 1991; Stenning & Michell, 1985). Our findings described this trend in traumatic narratives, although age did not represent the most explanatory factor.

With regard to the PTSD, our findings illustrated that children with PTSD symptoms, compared with children without PTSD symptoms, were less able to provide complex and consistent narratives. From a structural point of view, their narratives were simply organized, were characterized by less details of orientation (less information about time, location, and people involved in the abusive event), were not in chronological order and had scant evaluative comments. Our findings illustrated that PTSD correlated with the coherence, but above all with the cohesion of the traumatic narratives. In particular, PTSD was associated with the subordinating conjunction among the clauses and the amount of orientation information to gain a general sense of who, when and where the events took place. From an organizational and structural point of view, the recall of traumatic experiences appeared generally fragmented, poor and disjointed in children with post-traumatic symptomatology. Indeed, cohesion creates connectivity and clarity both within and between sentences and it plays a fundamental role in introducing and maintaining references to actors, places, and events (Schneider, Dubé, & Hayward, 2005). In this sense, cohesion is more than a linguistic measure since it organizes the narrative so that the meanings are communicated effectively (Horton-Ikard, 2009; Manhardt & Rescorla, 2002) and concerns the semantic relations between different sentences and events in terms of causality and temporal sequence (Cain, 2003; Karmiloff-Smith, 1985; Peterson & McCabe, 1991; Shapiro & Hudson, 1991, 1997). Cohesive connectives may be crucial to the construction of a coherent integrated representation of an event and may indicate how the individuals integrate information into memories (Gernsbacher, 1997). The fact that, in our study, PTSD was the only significant predictor of cohesion in traumatic narratives, is an interesting aspect. These results were in line with the clinical impression that traumatized children exhibit poor autobiographical memory and they supported the view that reduced specificity of autobiographical memory extends beyond the episodic domain to include semantic aspects of recollection (Meesters, Merckelbach, Muris, & Wessel, 2000; Moradi et al., 1999). When asked to recall an autobiographical memory, individuals with PTSD tend to exhibit difficulties in recalling unique memories that took place on a specific time and day, often producing the "overgeneralized" autobiographical memories (Brown et al., 2013, 2014). Conway and Pleydell-Pearce (2000) propose a hierarchical representation of autobiographical memory based on the temporal specificity. In traumatic memories of individuals with PTSD, retrieval does not progress beyond the level of general events and its narrative appears lacking in details (people, places, time and behaviors), little cohesive and fragmented in its causal and temporal connections (Williams et al., 2007).

We believe that the present study could lead to reflections in both the clinical and legal settings. Indeed, in a clinical setting, these findings further illustrate how episodic specificity may differ between children with or without PTSD, and how less cohesive and more fragmented narratives may be an important predictor of symptoms' severity and a useful indicator of prognosis for children too (Foa et al., 1995; Miragoli et al., 2014; O'Kearney & Perrott, 2006). This consideration underlines the importance of evaluating the narrative fragmentation in the treatment of stress disorders in children (Smith et al., 2007). On the other hand, in a legal setting, the role of PTSD on narrative coherence and cohesion is important to be considered in the evaluation of child testimony. The psychological assessment of trauma may assist the interpretation of allegations provided by children (O'Donohue et al., 2013) and could assess how some apparently inconsistent elements may instead support the hypothesis that a traumatic event has occurred (Procaccia, Miragoli, & Di Blasio, 2013) and that the child is still so traumatized as not to be able to provide a linear testimony of the facts.

The results of this study are suggestive, but a number of limitations should be considered. First, the sample size was rather small and with children involved in different types of sexual traumatic experiences, which had occurred at varying periods in the past. More recent episode of abuse could be expected to yield greater details while more distant episode of abuse might be expected to yield a more structured account. Second, in this study, we used dichotomous categories rather than continuous measures for the assessment of PTSD, while more objective indeces of PTSD severity would be useful. In particular, it would be important to separate the specific post-traumatic clusters (re-experiencing, avoidance and numbing, and increased arousal symptoms) to better understand their connections with the narrative fragmentation. Especially with regard to the effects of re-experiencing symptoms and of dissociation, which the literature indicates as key mechanisms of PTSD and of the memory fragmentation in traumatized individuals (e.g., Brewin, Dalgleish, & Joseph, 1996; Ehlers & Clark, 2000; Laposa & Alden,2003; Ozer, Best, Lipsey & Weiss, 2003). Third, this study considered age of the child and PTSD as the only factors related to quality of narration. However, children's memory for events may also be influenced by other important aspects. For instance, narratives may be influenced by a reluctance to discuss the trauma or by the interviewing procedure (e. g. poor or haphazard interviewing). Moreover, it is important to underline that analyzing only children's responses can produce narratives that could be more fragmentary and lacking in cohesion, compared to extended free narratives. Finally, although developmental research shows that children provide more organized reports of negative events than of neutral or emotionally positive events (Ackil et al., 2003; Fivush et al., 2003), this study did not include a comparison narrative in order to

determine the specificity of any traumatic narrative characteristics.

In future studies, researchers should consider larger and more homogenous samples (compared to the characteristics of the traumatic experience), assessing different clusters of PTSD symptoms (dissociation, re-experiencing, avoidance and numbing, and increased arousal symptoms). Moreover, it would be interesting to compare traumatic narratives of sexual abuse with ordinary memories and to analyze extended free narratives of child sexual abuse, without the influence of questioning.

Despite these limitations, we believe that these findings could contribute to the scientific understanding of childhood trauma and autobiographical memory functioning and underscore the importance of considering the important role of age and degree of traumatization in children within the study of autobiographical memory and the legal witness.

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