5 Results Study I

In this section, following preliminary analyses for sex differences, all results will be displayed in regard to the specific research questions.

To investigate the first research question, *Which characteristics of narrative skills can be identified in generations of German fictional narratives by Turkish-German pre-school-age DLLs?*, the descriptive statistics for microstructural narrative measures, including specifications for lexical composition, will first be presented, followed by the descriptive statistics of the macrostructural measures and the speech production process. The results are presented per category, starting with a table displaying the observed microstructure scores. To pursue the second set of research questions, *Do narrative measures correlate within narrative samples?* and *To what extent do those measures of narrative ability correlate with age, concurrent measures of linguistic and cognitive skills, as well as characteristics of the home language environment?*, two-tailed Spearman correlation coefficients were computed and will be presented, including corresponding *p*-values, for all categories. Finally, to examine the third research question, *How much of the variance in the children's narrative complexity can be accounted for by three main factors known to be involved in narrative production—namely, chronological age, expressive vocabulary, and nonverbal intelligence?*, the outcome of a univariate and multiple regression model will be presented.

5.1 Preliminary Analysis for Sex Differences

To identify any sex differences, a Mann-Whitney U test was conducted comparing boys' ($n = 20$) and girls' ($n = 31$) ages (in months), German contact months, mothers' education in years, as well as scores on the language assessment and the Raven CPM, and all measures derived from the narratives (for means and standard deviations, see Table 7). As none of the measures yielded significant differences between female and male participants, gender was not included as an independent variable and all further analyses were conducted on the group of participants as a whole.

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Table 7. *Analysis of Sex Differences*

	Female		Male		
	Mean	***SD***	**Mean**	***SD***	***p***
Age (months)	57.10	7.35	58.95	7.19	.353
Contact months German	30.32	14.65	34.70	15.25	.267
Expressive language	28.07	15.20	33.50	13.15	.238
Receptive language	20.97	6.58	23.25	4.85	.275
Raven CPM	16.32	4.58	15.75	2.81	.705
Mothers' education	10.34	3.28	9.05	3.03	.390
EINC	11.45	6.64	12.55	4.95	.364
TNW	156.68	176.17	122.50	77.83	.758
TNCU	34.10	28.76	24.15	12.04	.120
NDW	41.71	28.34	40.70	21.08	.736
VOCD	17.36	10.48	20.00	6.61	.253
MLCU	4.11	1.35	4.78	1.51	.109
Maze Use	9.22	7.48	6.52	4.17	.349

Note. Scores reported for expressive and receptive language are sums based on LiSe-DaZ subtests (Schulz & Tracy, 2011); CPM, Coloured Progressive Matrices; provided data are raw scores; mother's education was measured in years. EINC = Extended Index of Narrative Complexity; MLCU = mean length of C-unit in words; NDW = number of different words in lemmas; TNCU = total number of utterances in C-units; TNW = total number of words; TTR = type-token ratio; VOCD = vocabulary diversity.

5.2 Narrative Characteristics in Generations of German Fictional Narratives by Turkish-German Preschool-Age DLLs

To examine the first research question, descriptive statistics for all targeted aspects of narrative microstructure, narrative complexity, and the speech production process were computed.

5.2.1 Descriptive Statistics for Microstructural Measures

In keeping with standard practice, the following measures were obtained for the analyzed data set: The total number of words as well as utterances in C-units as measures of narrative productivity, the number of different words and VOCD as measures of lexical diversity, and the mean length of C-units in words as a measure of syntactic complexity. For the measure of VOCD, nine children's stories precluded computation because of limited story length. Table 8 displays the mean score and standard deviation for each variable for the entirety of the sample. Inter-individual variability was pronounced for all variables. Additionally, one narrator produced an exceptionally long story (i.e., consisting of almost 1,000 words), resulting in greater variability for the group as a whole.

Table 8. *Performance on the Narrative Microstructural Sample Measures*

Measure	***M***	***SD***	**Range**
TNW	143.27	145.63	11-998
TNCU	30.20	23.99	7-172
NDW	41.31	25.52	4-120
VOCD[a]	18.30	9.28	1.50-46.23
MLCU	4.38	1.44	1.00-7.75

Note. $N = 51$. MLCU = mean length of C-unit in words; NDW = number of different words in lemmas; TNCU = total number of utterances in C-units; TNW = total number of words; TTR = type-token ratio; VOCD = vocabulary diversity.
[a] $n = 42$.

5.2.2 Descriptive Statistics for Narrative Complexity Measures

Children's EINC scores (maximum score: 26) ranged from 3 to 26, with a mean score of 11.88 ($SD = 6.00$). To gather a more detailed picture of child performance, the individual components of the EINC will also be presented.

Story Grammar

Overall, the EINC included six story grammar components. Character and setting were scored categorically (present or absent), as displayed in Figure 6.

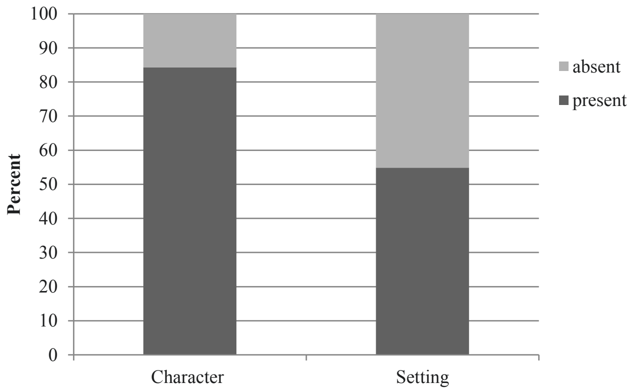

Figure 6. Relative Frequency of the Inclusion of Character and Setting Information (N = 51)

More specifically, the majority of children (84.3%) made direct references to the main character(s), i.e., the boy and/or the dog (see Bamberg, 1994), for example[33], „Da war so ein Frosch mit ein Hund und mit ein Junge. Die haben gespielt." *[There was a frog with a dog and with a boy. They were playing.]*. Meanwhile, information on the setting of the story, for example, „Ein Junge schläft mit den Hund. Das ist in der Nacht." *[A boy sleeps with the dog. It is in the night.]*, was only included in about half of the narratives (54.9%).

As displayed in Figure 7, the remaining story grammar components, which serve to elaborate the episode system, were assessed on a scale from 0 (absent) to 2 (elaborated) for a maximum total score of 10. Children's scores covered the whole range from 1 to 10, with a mean score of 5.41 (SD = 3.48). The inclusion of an initiating event (initial and elaborated, overall 58.8%), e.g., „Da ist der Frosch einfach abgehauen" *[There the frog simply ran off],* was usually tied to an elicited response from the character(s) (elaborated, 52.9%), e.g., „Die suchen Frosch" *[They are looking for frog]*. Also,

[33] All examples were taken from stories produced in the current study.

while 7.8% of stories were purely deictic and did not include any mention of actions or attempts taken by the main character(s), for example, „Da Junge. Die Hund. Zwei Biene.” *[Boy there. The dog. Two bees.]*, the majority of children included actions in their stories; even if in only 45.1% of the stories included actual attempts, that is, actions taken by the main character(s) that were directly related to the initiating event (see previous example).

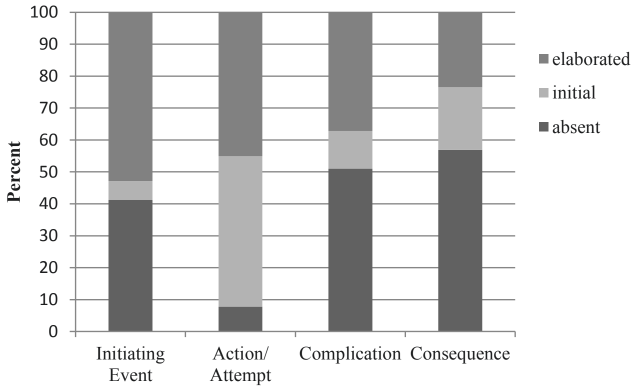

Figure 7. Relative Frequency of the Inclusion of Story Grammar Components ($N = 51$)

Approximately half of the stories (51.0%) did not include mentions of a complication, i.e. an event that prohibits the execution of a plan or action taken in response to an initiating event, while 11.8% children included one and 37.3% made mention of two complications (e.g., „Er suchte den ganzen Schnee durch, aber er hat ihn nicht gefunden. […] Und dann ist er runtergefallen und er ruft noch mal. Und er findet nicht.” *[He searched through the whole snow, but he did not find him. […] And then he fell down and he calls again. And he does not find.]*). Finally, consequences—meaning instances related to the initiating event resolving the problem (or not)—emerged in 43.1% of narratives, while 23.5% even included two consequences, for example, „Und da haben sie die Frösche gefunden. […] Und dann hat ein Frosch von den Kleine genehm(t) mit.“ *[And there they found the frogs. […] And then one frog of the little ones took with them.]*.

Conjunctions and Markers

In the area of connectivity, the use of additive, temporal, and causal markers was targeted. Of the 51 participants, 6 children (i.e., 11.8%) did not produce any markers, while the majority of narrators (88.2%) used at least one additive marker (see Figure 8).

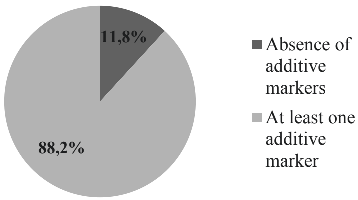

Figure 8. Relative Frequency of Use of Additive Markers ($N = 51$)

As displayed in Figure 9, conjunctions and markers referencing temporality were used by 66.7% of the children, with almost 40% of the DLLs using two or more temporal markers.

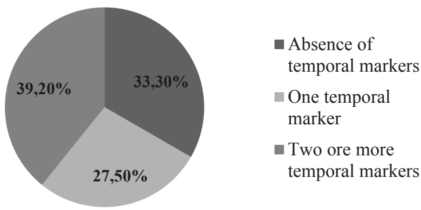

Figure 9. Relative Frequency of Use of Temporal Markers ($N = 51$)

Finally, almost 10% of the children used causal markers in their narrative productions (see Figure 10).

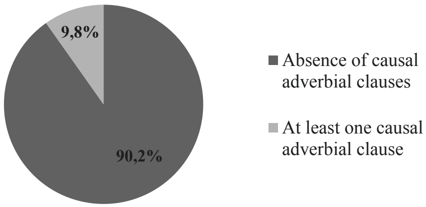

Figure 10. Relative Frequency of Use of Causal Markers ($N = 51$)

Overall Story Structure

Based on the binary decision tree structure (see section 4.4.2), narratives were scored holistically on their story structure level ranging from 1 (descriptive sequence) to 6 (complete episode). Figure 11 presents frequency distributions of the six categories across the sample.

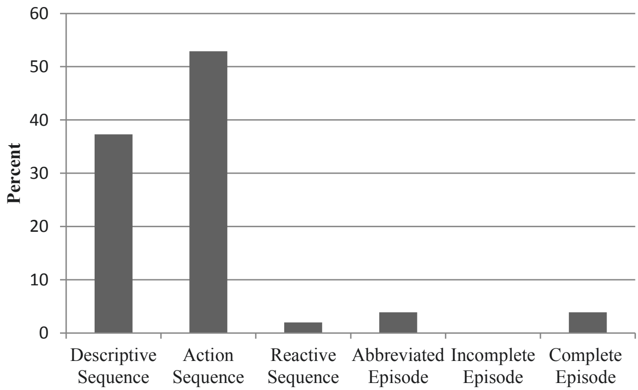

Figure 11. Relative Frequency of Story Structure Levels ($N = 51$)

The first two categories, descriptive and action sequences were clearly overrepresented in the sample. Most children produced action sequences (52.9%), that is, a narrative structure featuring a temporal cohesion, but no causally related sequences. More than one-third of the narratives were deemed descriptive sequences where a clear connection between the pictures was not elaborated. Only two children (3.9%) produced complete episodes which featured both goal-directed and intentional behavior as well as initiating event, attempt, and consequence.

Evaluative Language Use

The use of evaluative language aspects, as displayed in Figure 12, was differentially distributed across categories. By far the most commonly produced elements were modifiers (i.e., adjectives and adverbs), which serve to elaborate noun phrases (e.g., Frosch ist immer noch nicht da. *[Frog is still not there.]*; Und da riecht ekelig. *[And there smells gross.]*).

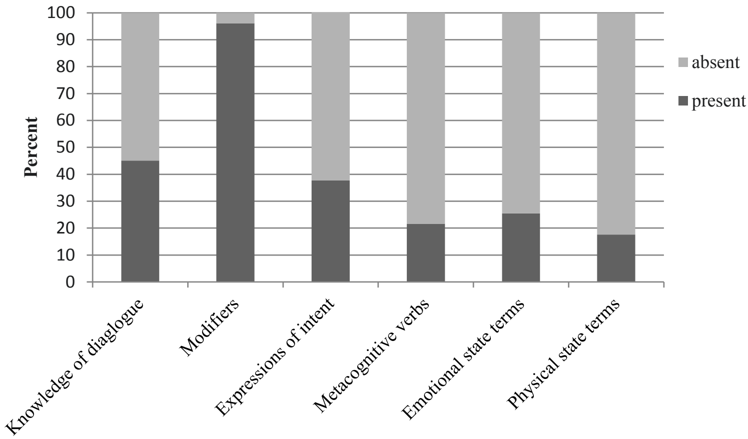

Figure 12. Relative Frequency of Use of Evaluative Language Aspects ($N = 51$)

Furthermore, 45.1% of children included dialogue, i.e., a comment or statement made by a character or by characters engaging in conversation (e.g., Und der sagt: „Das stinkt." *[And he says, 'That smells'],*) in their Frog Story narrations. The dialogue was introduced primarily using the verb sagen *[to say]* and primarily consisted of one line. Expressions of intent, which further help to convey the character's perspective, e.g., Und der will den finden *[And he wants to find it]*, was present in 37.3% of the stories. Further internal state terms were only included in a minority of the narrative samples (metacognitive verbs: 21.6%, emotional state terms: 25.5% and physical state terms: 17.6%).

In conclusion, it can be summarized that many children used evaluative language in their narratives. While little spontaneous mention of mental state terms were observed, modifiers were included in almost all stories, followed by dialogue included in almost half of the stories.

Speech Production Process

Maze use widely varied between children (0.00 to 24.32) with a mean percentage of 8.16 of maze-words per story (*SD* = 6.48).

After this descriptive overview of produced aspects of microstructure, macrostructure, evaluative language use, the combined score of narrative complexity, and the speech production process, the following steps of the analytical process explores how they are related to one another, with concurrent child assessments as well as with aspects from participants' home language and literacy environment.

5.3 Correlational Analyses

To address the second set of research questions, regarding which narrative measures were significantly correlated within narrative samples and to what extent measures of narrative ability correlated with age, in addition to the concurrent measures of linguistic skills as well as characteristics of the home language environment, Spearman correlations were calculated.

5.3.1 Correlational Patterns Between Narrative Measures

Among the microstructural variables, for measures of narrative productivity (total number of words (TNW) and total number of C-units (TNCU)), the highest correlations emerged with a measure of lexical diversity, specifically the number of different words in lemmas (NDW, $r_s = .81$ to .92). For syntactic complexity (mean length of C-unit, MLCU), the strongest correlations emerged with TNW ($r_s = .79$) and NDW ($r_s = .75$). Also, indices of narrative microstructure and macrostructure were clearly related to another; the correlations for all domains of narrative microstructure (TNW, TNCU, NDW, VOCD, MLCU) and narrative complexity (EINC) were positive, significant, and high in strength (r_s = .62 to .85), as displayed in Table 9. Maze use was the only exception and was not correlated with any of the other narrative measures.

Table 9. *Two-tailed Spearman Rank-Correlations between Narrative Performance and Child Measures*

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Age	—										
2. Ex. lang.[a]	.42**	—									
3. Rec. lang.	.48**	.55**	—								
4. CPM	.32*	-.56	.30*	—							
5. TNW	.42**	.49**	.52**	.29*	—						
6. TNCU	.26	.41**	.41**	.14	.90**	—					
7. NDW	.38**	.55**	.57**	.27	.92**	.81*	—				
8. VOCD	.27	.50**	.52**	.06	.49**	.38*	.74**	—			
9. MLCU	.46**	.44**	.47**	.36**	.79**	.46**	.75**	.28	—		
10. SG Score	.49**	.47**	.58**	.28*	.73**	.58**	.80**	.53**	.68**	—	
11. EINC	.53**	.59**	.68**	.29*	.77**	.63**	.85**	.62**	.71**	.93**	—
12. Maze use	-.13	.01	.05	-.27	.16	.22	.15	.09	.02	.15	.08

Note. *N* = 51. Expressive and receptive language are raw scores sums based on LiSe-DaZ subtests (Schulz & Tracy, 2011); nonverbal intelligence based on Raven Coloured Progressive Matrices (CPM) (Raven, 1995). EINC = Extended Index of Narrative Complexity; MLCU = mean length of C-units in words; NDW = number of different words in lemmas; SG Score = story grammar score; TNCU = total number of utterances in C-units; TNW = total number of words; VOCD = vocabulary diversity. Maze use was calculated by dividing all words containing disfluencies, such as false starts, filled pauses, repetitions, and revisions over total number of words.
[a] $n = 50$.
*$p < .05$. **$p < .01$.

5.3.2 Correlational Patterns Between Narrative Measures and Further Child Data

Further correlation analyses targeted relations between measures of narrative abilities and further child data, including age, concurrent measures of linguistic skills, as well as the exploration of relations between narrative sample measures and variables of the home language environment.

Age in Months

For the quantitative measures of narrative productivity, age was significantly and moderately correlated with TNW ($r_s = .42$, $p < .01$), but not with TNCU ($r_s = .26$, $p = .069$). For the lexical diversity measures, only one variable was moderately correlated with age, namely number of different words (in lemmas) ($r_s = .38$, $p < .01$), while no correlations were found between age and the D statistic ($r_s = .27$, $p = .079$) in this group. Age was also moderately correlated with MLCU ($r_s = .46$, $p < .01$). Also, positive correlations emerged between age and macrostructure (Story grammar (SG) score, $r_s = .49$, $p < .01$) and narrative complexity (EINC, $r_s = .53$, $p < .01$). The percentage of maze use at the word level, i.e., the measure of speech production, was not correlated with age ($r_s = -.13$, $p = .734$).

German Language Skills

Correlations between expressive and receptive language and all measures of narrative microstructure and narrative complexity were positive, significant, and moderate-to-high in strength ($r_s = .41$ to .68), with the strongest correlations surfacing between expressive and receptive language and lexical diversity (NDW and VOCD, $r_s = .50$ to .57) as well as expressive and receptive language and narrative macrostructure and narrative complexity (SG score and EINC, $r_s = .47$ to .68). No significant correlation emerged between German language skills and the percentage of maze use at the word level (expressive language skills, $r_s = .01$, $p = .932$; receptive language skills, $r_s = .05$, $p = .734$).

Language Contact

The average language contact of a child during the week (mainly Turkish, approximately balanced, or mainly German) was positively and moderately correlated with German expressive language measures ($r_s = .30$, $p = .032$), such that the more exposure to German children had over a typical week, the higher their expressive language scores. However, for receptive language, the relationship was not significant (r_s = .23, p = .111). In relation to narrative measures, the only significant correlations were small-to-medium in magnitude and emerged with lexical diversity (NDW, r_s = .30, p = .032, macrostructure (SG score, r_s = .29, p = .028), and narrative complexity (EINC, r_s = .31, p = .028).

Turkish Language Skills

Participants' Turkish language skills were assessed via parent rating. While not being correlated with age in months (r_s = -.17, p = .249), the proficiency level of Turkish skills in children was negatively correlated with standardized measures of German expressive language (r_s = -.46, $p < .01$) as well as German receptive language (r_s = -.43, $p < .01$), indicating that children who were rated as having higher Turkish language skills achieved lower raw scores on the German language assessment. Furthermore, Turkish proficiency ratings were correlated with the average language input patterns over the course of a week, such that the more German was used, the lower Turkish ratings were (r_s = -.50, $p < .01$). Also, there was a small but significant correlation between the amount of different speakers of Turkish in a child's environment and that child's individual Turkish skills (r_s = .29, p = .044).

In relation to narrative measures, most significant correlations were negative and emerged with lexical diversity (NDW, r_s = -.30, p = .033), syntactic complexity (MLCU, r_s = -.30, p = .028), and narrative complexity (EINC, r_s = -.32, p = .025), such that the higher the child's Turkish skills, the lower the number of different words produced, the lower the mean length of C-unit, and the lower the narrative complexity in the children's German Frog Story productions. Also, Turkish language proficiency and the overall number of speakers in the home environment addressing the child in Turkish were positively and moderately correlated with maze use (r_s = .38, $p < .01$ and r_s = .41, p = .01, respectively), such that children whose Turkish proficiency was rated higher and who were exposed to more Turkish-speaking interlocutors, produced more maze-influenced words in their German narratives. Meanwhile, maze use was not correlated with the amount of language mixing by primary caregivers (mother's frequency of language mixing, $r_s = .12$, $p = .404$; father's frequency of language mixing, $r_s = .09$, $p = .516$).

Home Literacy Environment

While the number of books in the home (both Turkish and German) was correlated with the frequency of shared book reading ($r_s = .46$, $p < .01$), no other significant correlations emerged with respect to measures of the home language environment, child measures, or measures of narrative ability.

5.4 Regression Analysis

The final research question was posed to explore whether chronological age, LiSe-DaZ expressive vocabulary scores, and performance on the CPM—or all three together—could predict the complexity of children's narrative generations (as measured by EINC), and how much of the variance they predict. These predictors were chosen for specific reasons, as outlined below.

Previously discussed in chapters 2 and 3, the production of a successful fictional narrative requires the cognitive coordination of a story's global organization (macrostructure) and linguistic explication (microstructure) of a series of made-up events. In DLLs, macrostructure was found to be largely language-independent, as research findings indicated that early literacy skills and narrative macrostructure components are more likely to be associated between the two languages of DLL children than more language-specific lexical and morphosyntactic oral language abilities that come to play in narrative microsturcure (e.g., Cárdenas-Hagan et al., 2007). However, research including DLLs with varying skill levels in their respective languages revealed that both narrative coherence and linguistic expression might suffer when the learner's array of linguistic devices in the respective language is very limited (Montanari, 2004). Furthermore, the notion that narrative expression improves with chronological age is well documented in research with typically developing children (e.g., Berman & Slobin, 1994; Hughes et al., 1997). For these reasons, it was expected that age in months (independent variable 1), expressive language (independent variable 2), and nonverbal intelligence (independent variable 3) would all significantly predict and account for a high amount of variance in DLLs' narrative complexity (as measured by EINC, dependent variable).

As displayed in Table 9, correlations (Spearman, two-tailed) between predictor variables (age in months, expressive language, and nonverbal intelligence) were small to moderate, with none above 0.50, suggesting that the variables were representing reasonably separate aspects contributing to narrative complexity. As to be expected, the correlation between the nonverbal intelligence measure and the expressive language score was not significant. Univariate regression analyses were performed first to identify the contribution of individual factors to the multivariate model. When tested individually, age, expressive language, and nonverbal intelligence all contributed significantly to the variance of the outcome. Table 10 summarizes the results of the univariate and multiple regressions. When computed by multiple regression, the model with the same three independent variables predicting narrative complexity was statistically significant: ($F(3, 46) = 18.14$, $p < .01$, $R^2 = .54$, $R^2_{Adj} = .51$).

Table 10. *Summary of Regression Analyses for Variables Predicting Narrative Complexity*

	Univariate analysis		
Factor	***B***	***SE B***	***ß***
Age	0.46	0.10	$.54^{**}$
Expressive language[a]	0.26	0.05	$.62^{**}$
Nonverbal intelligence	0.53	0.20	$.35^{*}$
	Multivariate analysis		
Factor	***B***	***SE B***	***ß***
Age	0.17	0.10	.21
Expressive language[a]	0.22	0.05	$.53^{**}$
Nonverbal intelligence	0.41	0.16	$.28^{*}$

Note. $N = 51$. Expressive language is a sum based on LiSe-DaZ expressive subtests (Schulz & Tracy, 2011); nonverbal intelligence is based on Raven Coloured Progressive Matrices (CPM) (Raven, 1995). Provided data are raw scores. Reported are Spearman's correlation coefficients (two-tailed).
[a] $n = 50$.
$^{*}p < .05$. $^{**}p < .01$.

The three independent variables accounted for 54.2% of variance in the narrative complexity. More specifically, the standardized discriminant coefficients for the multiple regression model revealed that the strongest predictor was expressive language. Accordingly, it should be noted that expressive language contributed more to the EINC score variance than the other two predictors in terms of the relatively higher beta coefficient, explaining a significant proportion of variance in narrative complexity. Nonverbal intelligence was the second highest contributor, while age was the smallest.[34]

[34] Note that the EINC score included story grammar, connective devices, and evaluative language use (see Appendix B). As the latter two aspects were possibly also heavily influenced by language skills, an additional multiple regression analysis was conducted, which only targeted narrative macrostructure (as measured via story grammar score, i.e., the sum of used story grammar elements). Results were comparable to the EINC model: The model with age in months, expressive language, and nonverbal intelligence predicting narrative story grammar was statistically significant ($F(3, 46) = 12.85$, $p < .01$, $R^2 = .46$, $R^2_{Adj} = .42$). The three independent variables accounted for 45.6% of variance in the expression of narrative story grammar. Similar to the analysis featuring the EINC score, expressive language emerged as the strongest contributor. For further information, see Appendix E.