Published in final edited form as:

Am J Intellect Dev Disabil. 2017 September ; 122(5): 392–408. doi:10.1352/1944-7558-122.5.392.

Narrative Language and Reading Comprehension in Students With Mild Intellectual Disabilities

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Abstract

Past research shows positive correlations between oral narrative skill and reading comprehension in typically developing students. This study examined the relationship between reading comprehension and narrative language ability of 102 elementary students with mild intellectual disability. Results describe the students' narrative language microstructure and relative strengths and weaknesses in narrative macrostructure. Students' narrative macrostructure accounted for significant variance in reading comprehension beyond what was accounted for by narrative microstructure (i.e., mean length of utterance in morphemes, number of different words, total utterances). This study provides considerations for measuring narrative quality when characterizing the functional language skills of students with mild intellectual disability. Measurement tools that quantify the quality of language provide important information regarding targets of intervention beyond grammar and vocabulary.

Keywords

narrative language; intellectual disability; reading comprehension

Narratives are part of the everyday discourse of school-age children and teachers. Narratives are used by teachers to describe historical events or tell fictional stories. Students use narratives throughout their day to communicate about a range of topics. These topics may include an exciting event from home, an oral presentation in class, or a story to their parent about their school day. A narrative is a story that intends to engage a listener, convey information about characters related to a plot, and conclude a sequence of events in a meaningful way (Heilmann, Miller, Nockerts, & Dunaway, 2010; Justice, Bowles, Pence, & Gosse, 2010; Worsfold, Mahon, Yuen, & Kennedy, 2010). Narrative language skills are

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important in the development of functional communication with peers, teachers, and family and have been linked to later success in reading comprehension (Catts, Fey, Zhang, & Tomblin, 2001; Dickinson & McCabe, 2001; Norris & Bruning, 1988). During reading, students apply decoding skills to a printed narrative. Even the earliest reading materials convey simple printed narratives in the form of short stories. These stories contain a character, a plot with episodes, and a conclusion. There is strong evidence for bidirectional relationships between oral language and reading development (Dickinson & McCabe, 2001; Perfetti, 2009). Narratives, therefore, are a natural component of reading experience.

Children with mild levels of intellectual disability (MID) often have impairments in language that may limit their narrative comprehension, production, and reading development. Children with mild intellectual disabilities have limitations in both adaptive behavior and intellectual functioning, with IQ scores generally ranging between 50 and 70 (Shalock, et al., 2010). It is important to understand the strengths and limitations in narrative language ability for children with MID so practitioners are best able to support their functional language growth during school. Narrative language samples may be collected to describe these strengths and limitations. Narrative language samples provide a context to gain further information about oral communication skills related to maintaining a story structure, relating the order of events, describing character relationships, and overall cohesion. By evaluating narrative language skills, we may gain important insight into the language intervention needs of school-age children with MID, given that narratives are such an integral part of their daily lives. Additionally, oral language skills have been linked to reading comprehension (Catts, 1993; Catts, Adlof & Weismer, 2006) and support reading development in bilingual children within and across the Spanish and English languages (Miller, Heilmann, Nockerts, Iglesias, Fabiano & Francis, 2006). This study describes the narrative language ability of 102 students between 7 and 11 years of age with MID, and explores links between their narrative language ability and their reading comprehension.

Narrative Language Development

Bruner (1991) describes a narrative as being compiled of many individual parts that rely on each other for their ultimate viability. In order for a child to tell a story, he or she must first comprehend the individual events of a story and subsequently express those events using language that connects them with meaningful transitions and outcome. A complete story must have a setting and episode system. The setting provides important information regarding characters and context and the episode system provides problems, consequences, and outcomes (Heilmann et al., 2010). Children develop narrative skill as a gradual process that follows a developmental continuum marked by differing levels of complexity in organization (macrostructure), and linguistic features (microstructure; Petersen, Gillam, Spencer, & Gillam, 2010).

Narrative macrostructure.

Hudson and Shapiro (1991) describe narrative production generally as a cognitive and linguistic task that draws on a range of knowledge from the child. Components suggested to be important in the delivery of narratives include: 1) content knowledge of the event or

episode being described; 2) structural knowledge of the components required to tell a good narrative (e.g., character development, conflict/resolution, conclusion); 3) microlinguistic knowledge; and 4) contextual knowledge, or what the child knows about the perspective of their listener when telling the story. Hudson and Shapiro (1991) suggest that different types of narratives (e.g., scripts, personal narratives, fictional stories) require children to use more or less of these different types of knowledge. In order to tell a sophisticated narrative about a fictional story, the child must have general knowledge about events, people, and social situations. They must understand verb tense, language used in connective speech, and perspective of their listener. Children coordinate this knowledge into a narrative macrostructure. Ratings of narrative macrostructure describe the quality of a child's overall narrative. When telling narrative stories such as the ones elicited in the current study, Hudson and Shapiro (1991) suggest that children have an understanding of other's intentions in social situations well enough to articulate them by age 6. Children then use what they understand about causal relationships between individual events and characters to describe the whole of a story (Bishop & Donlan, 2005). During elementary school, children are expected to understand and produce narratives of increasingly more complex macrostructure (Petersen et al., 2010). These elements are founded in the format of traditional story grammar of a setting and episodes that follow. Skills required to tell an effective story should include the description of a setting that provides background information on the characters and the environment; the telling of an episode that includes a problem, an attempt to solve the problem, and the consequences/outcomes to that attempt; the use of literate language features that show ability to use mental state verbs; and language demonstrating referential, conjunctive, and lexical cohesion during the story telling (Heilmann, Miller, Nockerts, & Dunaway, 2010).

Narrative microstructure.

Microstructure components of narratives are those that are measured at the level of the child's individual utterances and quantify their structure. These elements of narrative production include measures of output at both the word and utterance level (Justice, Bowles, Kaderavek, Ukrainetz, & Gillam, 2006). Measures of output at the word level may quantify lexical diversity such as type-token ratio (TTR) and number of different words (NDW). Measures of output at the utterance level include those of syntactic complexity, such as mean length of utterances in words and/or morphemes, mean length of clause units, utterance length, and total number of utterances. Justice et al. (2006) found that children between the ages of 5 and 10 follow a consistent developmental increase in measures of microstructure followed by a decrease in performance at 11 and 12 years of age. These findings suggest that we should examine narratives at the level of both microstructure and macrostructure in order to best understand the language skills of children as they develop.

Strong relationships between macrostructure and microstructure elements, that is, the specific linguistic features of a narrative, have been found. The microstructure element of the number of different words used rather than syntactic complexity has been the major significant factor predicting the quality of a child's narrative (Heilmann et al., 2010). This finding suggests that there is a special relationship between vocabulary and narrative development in children between ages 5 and 7 when they are also developing reading skills.

Indices of syntax and grammar are often correlated with narrative macrostructure; however, children's narrative skills are not necessarily dependent on their mastery of grammatical structure (Finestack, Palmer, & Abbeduto, 2012).

Narrative Development in Children With Language Impairment

Children with language impairment often have difficulty producing narratives that are as complex, cohesive, and consistent in grammatical structure as their same age peers (Colozzo, Gillam, Wood, Schnell, & Johnston, 2011; Fey, Catts, Proctor-Williams, Tomblin, & Zhang, 2004; Petersen, Gillam, & Gillam, 2008). One primary difficulty for children with language impairment in telling narratives is their difficulty with appropriate grammar structure. Regardless of intellectual ability, children with difficulty encoding and producing language performed worse than children with typical language skills in narrative production (Bishop & Donlan, 2005). However, as Heilmann and colleagues (2010) suggest, narrative story telling is inclusive of skills beyond grammatical organization alone. Varying profiles of narrative ability have been found for children between 7 and 9 years of age with specific language impairment (SLI; Colozzo et al., 2011). Colozzo et al. (2011) reported that one subgroup of children with SLI produced stronger narrative macrostructure, with lower grammatical complexity, while a second subgroup produced narratives with less narrative macrostructure and greater grammatical complexity. Additionally, some children were found to have limited proficiency in either element. They concluded that the high processing demands of narratives led to some participants' frequent repetitions of words or phrases, use of sound effects to convey meaning, and grammatical errors that would ultimately reduce overall narrative quality. Therefore, narratives provide a context for a critical, deeper probe into the language production of individuals with language impairment so that we are able to learn more about the relationship between language form and function.

Narrative Language in Individuals With Intellectual Disability

The relationship between language form and function was further explored by Finestack, Palmer, and Abbeduto (2012) in adolescents and young adults with intellectual disability (ID). Finestack and colleagues found that adolescents and young adults with Down syndrome and fragile X syndrome may have relative strengths in narrative macrostructure, even though elements of microstructure may be significantly below average. Narratives provided a richer context to evaluate language ability beyond typical microstructure elements, such as mean length of utterance (MLU), and were found to be an appropriate setting to target intervention goals aimed at increasing functional language skills.

Language comprehension skills and mental age have been found to predict narrative growth in children and adolescents with Down syndrome (Cleave, Kay-Raining Bird, Cuzutrin & Smith, 2012). In 32 children and adolescents with Down syndrome, significant growth over a period of 1 year was observed for both vocabulary complexity and for language macrostructure, but not for specific microstructural elements such as syntax or narrative length. A study focused on children and adults with Williams syndrome found relative strengths in narrative microstructure compared to narrative macrostructure (Marini, Martelli, Gagliardi, Fabbro, & Borgatti, 2010). Individuals in this study showed similar

microstructural abilities to mental age matched peers, but a significant difference in overall narrative coherence and pragmatics in telling a story. Measurement of narrative language both at the level of macrostructure and microstructure may provide insight into language skills of individuals with ID that are not sensitive to measurement using standardized assessments of grammar structure often given to school-age children. Additionally, studying the correlates between narrative ability and reading comprehension in students with language impairment and intellectual disability (ID) may provide insights into the interrelated nature of language and reading comprehension (Perfetti, 2009).

Narrative Language and Reading Comprehension

Reading comprehension is inherently a complex linguistic process requiring the reader to decode and interpret the phonology, morphology, syntax, semantics, and pragmatics of printed language to make conclusions about the meaning of what they have read. One cannot overlook the relationship between written narratives and oral narratives in children. Oral narrative measures have predicted reading comprehension outcomes for bilingual children in kindergarten to third grade in English and Spanish, as well as the cross-language transfer of reading ability (Miller et al., 2006). Specific deficits in oral narrative comprehension and production were found in 14 children between the ages of 6;4 and 7;8 with reading disabilities (Westerveld, Gillon, & Moran, 2008). A number of studies have linked reading comprehension and word reading accuracy to oral language and narrative skills in children with SLI (Vandewalle, Boets, Boons, Ghesquière, & Zink, 2012). In children between 7–13 years of age who were deaf and hard of hearing (DHH), Arfé (2015) found that reading comprehension skills significantly accounted for the variance in children's ability to produce a narrative; working memory did not. There is substantial evidence of links between oral language and reading comprehension in children with language impairment.

Narrative Language and Reading Comprehension in Individuals With ID

Little is known about the relationship between reading comprehension and oral narrative skills in children with ID. One of the few studies to date evaluated single word identification and narrative skill in children with Down syndrome (Kay-Raining Bird, Cleave, White, Pike, & Helmkey, 2008). When matched on single word reading ability with typically developing peers, narrative ability was found to have a similar relationship with word identification in children with Down syndrome as it does with typically developing children (Kay-Raining Bird et al., 2008). Currently, the literature to date has not explored relationships between reading comprehension and narrative skill (both macrostructure and microstructure) in students with ID. A better understanding of links between component narrative language skills to reading comprehension can inform both language and reading instruction for children with MID.

Current Study

This study evaluates the relationship between the narrative story-telling ability of students with MID and their reading comprehension skills. Four main questions are asked:

1. What are the microstructure elements of the students' oral narratives in terms of MLU, intelligibility, total utterance length, and number of different root words used?
2. What are the macrostructure elements of the students' oral narratives, as defined by the adapted Narrative Scoring Scheme (NSS; Finestack et al., 2012)?
3. Are there differences in performance across elements of narrative macrostructure that reflect strengths or weaknesses in specific components of narrative language ability?
4. Does narrative ability of the students, as defined by the NSS, provide unique predictive information about reading comprehension skills of the students?

Method

The data used in this article were collected as a part of a larger project investigating the outcomes of reading instruction with a sample of elementary school students diagnosed with MID. The narratives described in this study were collected after 120 hours of reading intervention. Reading instruction was centered around a phonological core, with additional emphases on fluency, automaticity, vocabulary development, and the teaching of specific strategies for decoding and word retrieval. The larger reading intervention project took place over the course of 5 school years. A new cohort of participants began intervention at the start of each school year, and completed 120 hours of intervention by the end of each school year. Data used in this study were collected from participants who completed 120 hours of reading intervention during years three through five.

Participants

Students were recruited from two school districts, which included 11 public elementary schools, in a large metropolitan area of the southeastern United States. Classroom teachers, who were informed of the selection criteria, referred children for participation. Children were eligible for inclusion if they were identified by their home school district as having MID and demonstrated difficulty in developing reading skills or were not yet reading. Students were excluded if they spoke English as a second language, demonstrated hearing impairment or uncorrected vision impairment, and had a history of serious emotional and/or psychiatric disturbance based on parental report and school records. The etiology of intellectual impairments was heterogeneous and included, but was not limited to Down syndrome, fragile X syndrome, and unspecified. After obtaining consent from parents, 102 students involved in the larger reading intervention project participated in this study.

Fifty-six students were male, 46 were female. With regard to race, 55 were classified as African-American, two Asian, 22 Caucasian, 16 Hispanic, and seven multiracial. Students' mean age in months was 112 months ($SD=15.65$, 9.3 years), range = 86–143 months. IQ scores were obtained from 82 of the 102 students. The mean IQ of participants was 64.17 ($SD = 10.64$, range = 44 – 90, $n = 82$). Table 1 reports participant descriptive information regarding standard performance on measures receptive and expressive vocabulary using the Peabody Picture Vocabulary Test-III (PPVT-III; Dunn & Dunn, 1997) and Expressive

Vocabulary Test (EVT; Williams, 1997), respectively. Portions of the Clinical Evaluation of Language Fundamentals—Fourth edition (CELF-4; Semel, Wiig, & Secord, 2003) were administered to provide descriptive information about receptive and expressive language ability.

Procedures

A narrative language sample was elicited, with each student using the wordless picture book *Frog Goes to Dinner* (Mayer, 1969). Administration generally lasted 15 to 25 minutes and took place within the students' school in a quiet room with minimal distractions and no other students present. In addition to narrative assessment, a battery of standardized assessments of language and reading were administered. Trained administrators followed each assessment's published instructions in presenting assessment material. The entire assessment battery including assessments not reported in this study took approximately three to five hours to administer. Assessment of standardized measures occurred over the course of multiple sessions.

Narrative assessment.—A similar protocol to Miller and Chapman (2006) was followed where a spontaneous narrative sample was elicited. A female examiner first asked the student to look at each page of the *Frog Goes to Dinner* (Mayer, 1969) story book. The student was next instructed to tell the story to the examiner. Examiner prompts were limited to a standard set of phrases of encouragement such as “tell me more,” “I’d like to hear more about that,” and “you’re doing great” to encourage students to continue to the end of the story when eliciting the spontaneous narrative sample. Each student’s narrative was videotaped and transcribed using the Systematic Analysis of Language Transcript (SALT) software (Miller & Iglesias, 2012).

Narrative transcription.—The student’s narrative language samples were transcribed by a team of trained graduate student research assistants who had experience using the SALT software. Before transcribing began, students demonstrated at least 90% agreement using SALT conventions with a pre-established standard set of transcripts. Utterances were transcribed using the SALT definition as “a sentence or phrase reflecting a single thought” (Miller & Chapman, 2006). Utterances were transcribed as unintelligible (XX) when the transcriber was unable to understand the student’s vocalization after listening to the utterance three times.

Each original transcript was reviewed by a second trained transcriber. During this review, a second trained transcriber independently watched the videotaped narrative and made corrections and changes as appropriate to the original transcript according to SALT conventions. This revised version of the spontaneous elicitation of the narrative was used for data analysis. Computation of microstructural elements was done using the SALT software. These elements included mean length of utterances in morphemes (MLUm, percent of intelligible utterances, total utterance length, and number of different root words. Additionally, this revised spontaneous narrative was used for coding of macrostructure elements using the Narrative Scoring Scheme.

Narrative scoring scheme (NSS).—An adapted version of the Narrative Scoring Scheme (NSS; Heilmann et al., 2010) by Finestack, Palmer, and Abbeduto (2012) was used to describe the macrostructure of students' narratives. Scores are based on a scale of 0 indicating poor performance and 5 indicating proficient use (See Appendix A for an example of the rubric) for each element of narrative macrostructure (introduction, character development, mental states, referencing, conflict/resolution, cohesion, and conclusion). A NSS composite score (maximum value of 35) was derived by adding scores for each of seven different elements. The adapted NSS scoring rubric was specific to the *Frog Goes to Dinner* story and used in the prior work of Finestack et al. (2012) to score narrative language of adolescents and young adults with Down syndrome and fragile X syndrome. This adapted version gave specific examples of how each element should be scored using events within the *Frog Goes to Dinner* story to increase reliability in scoring between coders and across students. Additionally, this adapted version of the NSS was particularly helpful for use with a population of students who may have less developed language so the observer could more specifically characterize the narrative skill observed.

The seven different elements of narrative macrostructure scored in the adapted NSS included introduction, character development, mental states, referencing, conflict/resolution, cohesion, and conclusion. Table 2 provides a summary and operational definition of each of the narrative elements captured using the NSS. The student's score for the element of introduction reflected the student's ability to introduce the main characters and provide settings and subsettings throughout the story. The student's score for character development reflected his or her ability to acknowledge specific main and subcharacters, state their significance, and provide adequate details of their behavior; the score for mental states reflected the student's ability to use vocabulary that conveyed character emotions and thought processes. The student's score for referencing reflected his or her ability to use consistent and accurate antecedents and clarifiers (e.g., "him," "they," "that," "all") throughout the story. The score for conflict resolution reflected the student's ability to describe the presence of an incident and its resolution to advance the plot of the story. The element of cohesion was scored based on the student's ability to sequence events and provide clear transitions during the story using vocabulary such as "then," "after," or "next." Finally, the student's score for conclusion reflected his or her ability to describe an ending to the entire story based on the final event.

Two graduate student researchers independently scored 102 transcripts using the adapted NSS. Individual scores for each of the NSS elements (introduction, character development, mental states, referencing, conflict/resolution, cohesion, and conclusion) were derived as well as a total NSS score reflecting the scores from each of these elements added together (maximum of 5 points for each element, maximum of 35 total score). Reliability for the scoring process using the NSS was examined at two levels. After scoring, the researchers reviewed their scores together, noted discrepancies, and reached consensus across each individual NSS element for all 102 transcripts. A third graduate student independently scored 20% of the transcripts. NSS reliability was calculated using Krippendorff's Alpha (Hayes & Krippendorff, 2007). Krippendorff's alpha has been used in prior studies using NSS analyses (Finestack et al., 2012; Heilmann et al., 2010) and is useful because it assesses

the agreement between two or more independent observers on multiple levels of measurement and takes into account the degree of difference between coders and chance agreement when using a rating scale. Krippendorff's alpha levels between .67 and .80 are acceptable for making tentative conclusions about adequate agreement, with alpha levels above .80 indicating adequate agreement. The following Krippendorff's alpha reliability measures were found for each element of the NSS: introduction $\alpha = .83$, character development $\alpha = .81$, mental States $\alpha = .87$, referencing $\alpha = .73$, conflict/resolution $\alpha = .89$, cohesion $\alpha = .84$, conclusion $\alpha = .75$, NSS total composite $\alpha = .93$. All agreement levels were considered acceptable.

Standardized assessments.—In addition to narrative assessment, a battery of standardized assessments was done with each student. The Woodcock Reading Mastery Test–Revised (WRMT-R; Woodcock, 1998) word attack and passage comprehension subscales were used to assess reading. The word attack subtest of the WRMT-R assesses single word reading skill using nonsense words. The student must rely on methods of phonetic decoding to read the word aloud. The passage comprehension subtest uses a cloze procedure where students are required to read a sentence and provide the word necessary to complete the sentence. The assessment begins with single sentences, and progresses to 2 and 3 sentence passages where the student is required to produce the missing word. The Peabody Picture Vocabulary Test-III Form A (PPVT-III; Dunn & Dunn, 1997) was used to assess vocabulary comprehension. The PPVT-III assesses single word vocabulary comprehension by presenting four black and white line drawings to the student at a time. The student is asked to point to the picture named by the examiner. The Expressive Vocabulary Test (EVT; Williams, 1997) and CELF-4 Semel, Wiig, & Secord, 2003) were used for descriptive purposes of student's language ability in this study. The EVT is a test of single word vocabulary production. Students are presented one picture at a time and asked to name the picture aloud. The CELF-4 is an assessment of receptive and expressive language. Three subscales of the CELF-4 were administered. The concepts and following directions subscale assesses a student's ability to follow a series of oral directions increasing in length and complexity. The recalling sentences subscale assesses a student's ability to repeat a sentence of increasing length and grammatical complexity spoken by the examiner. The formulated sentences subtest assesses a student's ability to develop and produce a grammatical sentence when provided a single word given by the examiner to describe a picture presented to them. All assessments were administered according to standard published instructions by trained members of the research project team. Students were monitored for level of attention and engagement during assessment, with breaks taken as needed to ensure optimal engagement from each student. Assessment sessions did not last beyond the time students were observed to be capable of attending to what was asked of them.

Results

This study used measures of narrative language to evaluate the language skills of students with MID. Measures of narrative microstructure and macrostructure were used to describe strengths and weaknesses in narrative language and the relationship between narrative language and reading comprehension.

Narrative Microstructure Performance

Table 3 reports means, standard deviations and median values for the number of intelligible utterances, mean length of utterances in morphemes (MLUm), number of different words (NDW) and total utterances students used in narratives. On average, 82% of student's utterances were intelligible, students had a mean length of utterance in morphemes of 6.70, used an average of 71.78 different words, and 39.28 total utterances to tell narratives.

Narrative Macrostructure Performance

Macrostructure elements.—Table 4 reports means and standard deviations on all 7 elements of the NSS and the composite NSS score of students. Examining scores for the ratings of macrostructure across each of the 7 narrative elements revealed trends in performance relative to certain components of narrative language. Students had average scores that were highest on the elements rating their ability to provide introductions throughout changes in setting (introduction), convey character significance and detail (character development), and give information about specific conflicts and resolutions throughout the story (conflict/resolution). Students had average scores that were lowest on the elements that required the description of character emotions and thought processes (mental states), the use of consistent and accurate antecedents and clarifiers (referencing), sequencing events and vocabulary to note clear transitions during the story (cohesion), and description of an ending to the story (conclusion).

Differences in elements of narrative macrostructure.—To determine if differences in performance between the narrative elements were significant, macrostructure components of students' narratives were used in a one-way repeated measures analysis of variance (ANOVA). It should be noted that Mauchly's test of sphericity indicated that the assumption of sphericity was violated, $\chi^2(20) = 85.398$, $p = .000$ suggesting unequal variances between narrative elements being compared. Epsilon (ϵ) was 0.735 as calculated according to Greenhouse and Geisser (1959), and was used to correct the one-way repeated measures ANOVA. Significant differences in performance between narrative elements were found, $F(4.14, 445.43) = 100.528$, $p < .001$.

Figure 1 displays box plots for students' performance on each macrostructure element of the NSS. Bolded lines represent the median for each element. The box top and bottom represent the middle 50% of student performance for each element. Whiskers extend to the least and greatest scores, respectively, and represent the top and bottom 25% of performance. Circles represent outliers from the top or bottom 25% of scores. Asterisks note extreme outliers for the element of introduction. It should be noted that there was less range of scores for the element of introduction than for any other element. Fifty-five percent of the students performed at median performance, achieving scores of 3, and 20 percent performed just above, achieving scores of 4 for the introduction. This distribution created for a limited range surrounding the median and subsequent quartiles, noting an asymmetrical distribution in the boxplot. Therefore, the outliers represented in Figure 1 for the introduction represent the remaining participants that achieved very low or very high scores on this element. Table 4 reports means, standard deviations, and median values for each element of narrative macrostructure. Post hoc analysis with a Bonferroni adjustment revealed that performance

on the element of introduction was significantly greater than any other element ($p < .01$). Students performed significantly greater on conflict/resolution than on all elements except for introduction ($p < .01$). Students performed significantly greater on the element of character development ($p < .01$) than all other elements except for introduction and conflict/resolution. Student performance on the element of conclusion was significantly greater than performance on the element of cohesion ($p < .01$), but not for the elements of mental state verb use and referencing. There was no significant difference between student performance on the elements of mental state verb use, referencing, and cohesion ($p > .05$), with these three elements eliciting the lowest performance.

Relationship Between Narrative Language and Reading Comprehension

Table 5 presents a correlation matrix, means, and standard deviations for the raw scores of reading comprehension and word attack on the WRMT-R, narrative language measures of MLUm, NDW, total utterances, and NSS total score. There were strong, positive correlations between reading comprehension and word attack scores ($r = .723, p < .001$), as would be expected. Students with greater decoding skills were found to have greater comprehension of connected text. There were medium, positive correlations between reading comprehension and MLUm ($r = .443, p < .001$), NDW ($r = .349, p < .001$), and narrative ability ($r = .497, p < .001$). There was no significant correlation between the number of utterances used by the students and their reading comprehension outcomes ($r = .162, p = \text{NS}$). High positive correlations were found between narrative ability and MLUm ($r = .844, p < .001$) and NDW ($r = .889, p < .001$). The quality of students' narratives was correlated with the vocabulary skill and syntactic complexity of utterances.

Hierarchical regression analyses were used to determine how much unique variance narrative macrostructure accounted for in student's reading comprehension after controlling for decoding skill and components of narrative microstructure. The data met assumptions necessary for regression analysis. As assessed by a Durbin-Watson statistic of 2.30, there was independence of residuals. A linear relationship existed between each independent variable (word attack score, microstructural language variables of total utterances, NDW, MLUm and NSS composite score) and the dependent variable (reading comprehension). The data did not violate multicollinearity, with tolerance scores above .10. A post hoc power analysis was done to examine the power to detect true interaction effects using regression analysis. The post hoc power analysis determined the likelihood of detecting significant interaction effects given the sample size of 102, a medium effect size, and an alpha level of .05 as .97. High power, along with medium effect size supports the interpretation of our findings.

Students' ability to decode was controlled for by entering word attack scores from the WRMT-R in step 1. Language microstructure was defined by the total number of utterances, mean length of utterances in morphemes, and number of different words, and was entered as a group in step 2. Language macrostructure was defined by NSS total score and was entered in step 3.

The final model of decoding ability, narrative microstructure, and narrative macrostructure (Model 3) was statistically significant, $R^2 = .674, F(5, 96) = 39.63, p < .001$; adjusted R^2

= .657. When word attack entered the equation (Model 1), it accounted for a statistically significant amount of variance in reading comprehension $R^2 = 0.523$, $F(1, 100) = 109.59$, $p < .001$. The addition of language microstructure (Model 2) led to a statistically significant increase in R^2 of .069, $F(3, 97) = 5.46$, $p < .01$, and the addition of macrostructure skills (Model 3) led to a statistically significant increase in R^2 of .082, $F(1, 96) = 24.054$, $p < .001$. These results suggest that, although microstructure and macrostructure narrative skills may be correlated, macrostructure narrative skills are uniquely related to reading comprehension skills and accounted for 8.2 % more of the variance in reading comprehension skills beyond what would be expected by decoding skills and language microstructure alone. See Table 6 for full details on each regression model.

Discussion

The purpose of this study was to describe the narrative ability of students with MID, and determine the relationship between narrative ability and reading comprehension skills to better understand links between oral and written language for students with MID. Relative strengths and weaknesses were noted between elements of narrative macrostructure. Students used stronger introductions, described conflicts/resolutions, and developed characters better than they were able to use mental state verbs, consistent and clear references (e.g., antecedents and clarifiers throughout the story), and cohesive language (e.g., vocabulary such as “then,” “after,” or “next” to describe clear sequences of events or transitions). Overall, the language skills of narrative macrostructure predicted reading comprehension skills beyond what would be expected by decoding skills and linguistic components of narrative microstructure. It is evident from these results that students with MID and language impairment have relative strengths and weaknesses in language ability that are made salient using a protocol such as the NSS. By examining both narrative microstructure and macrostructure, we are able to quantify students’ language in terms of linguistic form and language function.

Findings from Miller et al. (2006) linking oral narrative skills and reading performance in typically developing children were supported in this study with children with MID. This study is the first to provide evidence that, in children with MID, language skills beyond what are measured at the microstructure level are linked to reading comprehension. Children with MID in this study exhibited patterns similar to their typically developing peers in the relationship expected between reading comprehension and language ability. These results support findings from Wise, Sevcik, Ronski, & Morris (2010) who found students in this study have similar phonological awareness patterns as typically developing students and Barker et al. (2013) who determined that students with MID exhibited positive relationships between phonological awareness and standardized measures of receptive and expressive language and reading skills as would be expected in typically developing students. We know from this study that, for students who have additional skills in language macrostructure, those skills provide support for reading comprehension beyond what is supported by their narrative microstructure alone. This deeper probe into language macrostructure using the NSS to describe a student’s language skills provides important insight into links between oral and written language development for students with MID.

Students were found to have relative strengths and weaknesses in specific components of narrative macrostructure that contributed to unique variance observed in reading comprehension skills. Language used to describe introductions, conflicts/resolutions, and character traits was more readily used than language used to describe character mental states, antecedents, clarifiers, and vocabulary such as “then,” “after,” or “next” to relate sequences of events. Concrete visual referents were provided by drawings or images in the book that the students may have taken advantage of to introduce story elements and describe visible character traits and relationships, story conflicts, and resolutions. The language for these elements was often comprised of nouns, simple actions, and descriptions of what appeared on the pages of the book. It may have been easier for students to describe the relatively tangible events of the story as opposed to narrative elements that required vocabulary about spatial relationships, time, and mental states of characters. Furthermore, limitations in structural language evidenced by microstructure elements of MLUm may impact macrostructure elements that depend on the ability to use antecedents and clarifiers in a cohesive narrative. Future work should examine students’ comprehension and production of such cohesive language elements and the degree to which these elements could be targets for language intervention and, thus, impact overall reading comprehension. Often, children with MID may have difficulty understanding complex sentences that require sequencing of events (Johnels, Hagberg, Gillberg, & Miniscalco, 2013). These sentences are comprised of temporal language concepts such as “before,” “after,” and “next.” Mental states may be difficult for students with MID to comprehend and use appropriately. The use of mental state verbs requires a student to take a character’s perspective on a situation, which is more advanced than describing the action of the participant within a scene. The use of the NSS as a language evaluation tool when determining goals for language intervention may provide important information about a student’s functional use of narrative language elements. This information that could provide insight into targets for language intervention that could, thus, in turn influence reading development.

Clinical Implications

Targeting language macrostructure during intervention for school-age children may improve the quality of their overall functional language. Finestack, Palmer and Abbeduto (2012) make important conclusions when examining narrative language structure of adolescents and adults with Down syndrome and fragile X that provide insight for findings in this study. Finestack and colleagues found narrative macrostructure proved to be greater than what would be expected when compared to typically developing children matched on language microstructure. Although elements of syntax and grammar were similar in both groups, the adolescents and adults outperformed language-matched younger children on elements of conflict/resolution and cohesion. Results also suggested that language macrostructure was more closely associated with language microstructure than nonverbal cognitive skills (e.g., mental state verb use). It seems feasible then to suggest that language macrostructure be included as a target for language intervention that can improve functional language, even if skills related to syntax and morphology at the sentence level are below age expectations. In this study, elements of language macrostructure were important in explaining the variance in student’s reading comprehension that could not be explained by linguistic components of MLUm, NDW, and total utterances alone. Clinicians and researchers alike should continue

to examine the utility of the NSS to characterize the functional language skills of students with MID beyond what can be measured at the microstructure level alone. Measurement tools that quantify the quality of language in children with MID can provide a way to explain language skills that inform teachers, clinicians, and parents about what could be appropriate targets of intervention beyond grammar and vocabulary development. Furthermore, given the contribution of language macrostructure to reading comprehension in students in this study, a focus on the development of language macrostructure may in turn enhance reading comprehension for students with MID.

Limitations and Future Work

This study used gross linguistic measures of MLUm, number of different words, and utterances to define narrative microstructure. This study did not examine linguistic features of grammar structure (e.g., past tense, finiteness marking, tense agreement, etc.) when describing narrative microstructure. Important, etiology-specific differences in grammar structure have been found in children with ID (Finestack, Sterling & Abbeduto, 2013; Rice, Warren & Betz, 2005). Future work should examine the nature of grammatical features used and those potentially omitted in children with MID during narratives to determine if there is a relationship between grammar structure and reading comprehension. Additionally, it is important to consider etiology specific language profiles that may contribute to reading comprehension skill. In conclusion, this study provides a first step in evaluating the correlational relationships between language microstructure, macrostructure, and reading comprehension. Further research is needed to understand potential reciprocal relationships between reading comprehension and language development in students with MID.

Acknowledgments

Portions of data from the manuscript being submitted was presented at the American Speech-Language Hearing Association's annual meeting in 2013, the Gatlinburg Conference on Research and Theory in Intellectual and Developmental Disabilities in 2014, and at the meeting of the Society for the Scientific Study of Reading in 2015.

We would like to thank the participants, their families and schools that supported this work. Research was funded by the United States Department of Education, Institute of Education Sciences grant number H324K040007 (P.I.: Rose A. Sevcik). This article was written with support from Georgia State University's Area of Focus Initiative in Research on the Challenges of Acquiring Language and Literacy with a Language and Literacy Fellowship awarded to the first author. Revisions of this manuscript were supported in part by the Eunice Kennedy Shriver National Institute of Child Health and Human Development of the NIH under Award Number T32HD007489 and P30HD03352.

Appendix A: Narrative Scoring Scheme Rubric for Frog Goes to Dinner

Developed by: Lizbeth H. Finestack and Meghan Palmer

INTRODUCTION
<p>INTRODUCTION: Presence/absence of main characters and qualitative depiction of setting components throughout the story</p> <p>--Beginning house/bedroom can be included if there is good detail used to describe first scene even if the words "home" or "bedroom" are left out (i.e., getting ready to go out/leave)</p>

INTRODUCTION					
Main Settings	Beginning bedroom/house or getting dressed/ready	Restaurant or eating (not just ordering), goes to dinner	Car/ending house/bedroom		
Subsettings	Frog in Pocket Frog in saxophone	Outside Restaurant Frog in salad	Inside restaurant/ sitting at table/ ordering/menu		
Main Characters	Boy (at beginning or end)	Frog	Frog in wineglass		
5 Proficient Use	4 Most details Included	3 Emerging/ Inconsistent	2 Minor Details Included	1 Immature or Minimal	0 Poor Performance
- Clearly provides all 3 main settings and 5–6 subsettings	-Clearly provides all 3 main settings and 3–4 sub-settings	-4–5 settings mentioned (main or sub) AND mentions at least 1 main character	-Provides 2–3 settings (main or sub)	-Provides 1 or less setting element	-Provides no setting or character elements of story
AND	AND	OR	AND	OR	
-Both main characters are clearly mentioned	-Both main characters are clearly mentioned	-Mentions 2 characters AND 2 main settings	-Mentions 1 main character	-Mentions 1 or less main character	-Child errors such as conversing with examiner, not completing/ refusing task, unintelligibility
AND	OR	OR			
<u>All components are well developed</u>	Includes all components, but not well developed	-Mentions 1 character AND 3 main settings			

References

- Arfé B (2015). Oral and written discourse skills in deaf and hard of hearing children. Topics in Language Disorders, 35(2), 180–197. 10.1097/TLD.0000000000000054
- Barker RM, Sevcik RA, Morris RD, & Ronski MA (2013). A model of phonological processing, language, and reading for students with mild intellectual disability. American Journal on Intellectual and Developmental Disabilities, 29, 997–1003.
- Bishop D, & Donlan C (2005). The role of syntax in encoding and recall of pictorial narratives: Evidence from specific language impairment. British Journal of Developmental Psychology, 23, 25–46. 10.1348/026151004X20685
- Bruner J (1991). The narrative construction of reality. Critical Inquiry, 18, 1–21. 10.1086/448619
- Catts HW (1993). The relationship between speech-language impairments and reading disabilities. Journal of Speech, Language, and Hearing Research, 36(5), 948–958. 10.1044/jshr.3605.948
- Catts HW, & Adlof S, Weismer SE (2006). Language deficits in poor comprehenders: A case for the simple view of reading. Journal of Speech, Language, and Hearing Research, 49(2), 278–293. 10.1044/1092-4388(2006/023)
- Catts HW, Fey ME, Zhang X, & Tomblin JB (2001). Estimating the risk of future reading difficulties in kindergarten children: A research-based model and its clinical implementation. Language, Speech, and Hearing Services in Schools, 32(1), 38–50. [http://doi:10.1044/0161-1461\(2001/004\)](http://doi:10.1044/0161-1461(2001/004))
- Cleave P, Kay-Raining Bird E, Cuzutrin R, & Smith L (2012). A longitudinal study of narrative development in children and adolescents with Down syndrome. Intellectual and Developmental Disabilities, 50(4), 332–342. 10.1352/1934-9556-50.4.332 [PubMed: 22861134]

- Colozzo P, Gillam RB, Wood M, Schnell RD, & Johnston JR (2011). Content and form in the narratives of children with specific language impairment. *Journal of Speech, Language, and Hearing Research*, 54(6), 1609–1627. 10.1044/1092-4388(2011/100247)
- Dickinson DK, & McCabe A (2001). Bringing it all together : The multiple origins, skills, and environmental supports of early literacy. *Educational Research*, 16(4), 186–202. 10.1111/0938-8982.00019
- Dunn LM, & Dunn LM (1997). PPVT-III: Peabody picture vocabulary test. Circle Pines, MN: American Guidance Service.
- Fey ME, Catts HW, Proctor-Williams K, Tomblin JB, & Zhang X (2004). Oral and written story composition skills of children with language impairment. *Journal of Speech, Language, and Hearing Research*, 47(6), 1301–1318. 10.1044/1092-4388(2004/098)
- Finestack LH, Palmer M, & Abbeduto L (2012). Macrostructural narrative language of adolescents and young adults with Down syndrome or Fragile X syndrome. *American Journal of Speech-Language Pathology*, 21(1), 29–46. 10.1044/1058-0360(2011/10-0095) [PubMed: 22049405]
- Finestack LH, Sterling AM, & Abbeduto L (2013). Discriminating Down syndrome and fragile X syndrome based on language ability. *Journal of Child Language*, 40(1), 244–265. 10.1017/S0305000912000207 [PubMed: 23217297]
- Greenhouse SW, & Geisser S (1959). On methods in the analysis of profile data. *Psychometrika*, 24(2), 95–112.
- Hayes AF, & Krippendorff K (2007). Answering the call for a standard reliability measure for coding data. *Communication Methods and Measures*, 1, 77–89. <http://dx.doi.org/10.1080/19312450709336664>
- Heilmann J, Miller JF, Nockerts A, & Dunaway C (2010). Properties of the narrative scoring scheme using narrative retells in young school-age children. *American Journal of Speech Language Pathology*, 19(2), 154–167. 10.1044/1058-0360(2009/08-0024) [PubMed: 20008470]
- Hudson JA, & Shapiro LR (1991). From knowing to telling: The development of children's scripts, stories, and personal narratives In McCabe A & Peterson C (Eds.), *Developing narrative structure* (pp. 89–136). Hillsdale, NJ: Lawrence Erlbaum.
- Johnels JÅ, Hagberg B, Gillberg C, & Miniscalco C (2013). Narrative retelling in children with neurodevelopmental disorders: Is there a role for nonverbal temporal-sequencing skills? *Scandinavian Journal of Psychology*, 54(5), 376–385. 10.1111/sjop.12067 [PubMed: 23855443]
- Justice LM, Bowles RP, Kaderavek JN, Ukrainetz TA, & Gillam RB (2006). The index of narrative microstructure: A clinical tool for analyzing school-age children's narrative performance. *American Journal of Speech-Language Pathology*, 15(2), 177–191. 10.1044/1058-0360(2006/017) [PubMed: 16782689]
- Justice LM, Bowles R, Pence K, & Gosse C (2010). A scalable tool for assessing children's language abilities within a narrative context: The NAP (Narrative Assessment Protocol). *Early Childhood Research Quarterly*, 25, 218–234. 10.1016/j.ecresq.2009.11.002
- Kay-Raining Bird E, Cleave PL, White D, Pike H, & Helmke A (2008). Written and oral narratives of children and adolescents with Down syndrome. *Journal of Speech, Language and Hearing Research*, 51(2), 436–451. 10.1044/1092-4388(2008/032)
- Marini A, Martelli S, Gagliardi C, Fabbro F, & Borgatti R (2010). Narrative language in Williams Syndrome and its neuropsychological correlates. *Journal of Neurolinguistics*, 23(2), 97–111. 10.1016/j.jneuroling.2009.10.002
- Mayer M (1969). *Frog goes to dinner*. New York, NY: Dial Press.
- Miller JF, & Iglesias A (2012). *Systematic Analysis of Language Transcripts*. Middleton, WI: SALT.
- Miller J, & Chapman R (2006). *Systematic Analysis of Language Transcripts (SALT) Version 9 manual*. Madison, WI: University of Wisconsin-Madison.
- Miller JF, Heilmann J, Nockerts A, Iglesias A, Fabiano L, & Francis DJ (2006). Oral language and reading in bilingual children. *Learning Disabilities Research and Practice*, 21(1), 30–43. 10.1111/j.1540-5826.2006.00205.x
- Norris JA, & Bruning RH (1988). Cohesion in the narratives of good and poor readers. *Journal of Speech and Hearing Disorders*, 53(4), 416–424. 10.1044/jshd.5304.416 [PubMed: 3184902]

- Perfetti C (2009). The universal grammar of reading. *Scientific Studies of Reading*, 7(1), 3–24. 10.1207/S1532799XSSR0701
- Petersen DB, Gillam SL, & Gillam RB (2008). Emerging procedures in narrative assessment: The index of narrative complexity. *Topics in Language Disorders*, 28(2), 115–130. 10.1097/01.TLD.0000318933.46925.86
- Petersen DB, Gillam SL, Spencer T, & Gillam RB (2010). The effects of literate narrative intervention on children with neurologically based language impairments: An early stage study. *Journal of Speech, Language, and Hearing Research*, 53, 961–981. [http://dx.doi.org/10.1044/1092-4388\(2009/09-0001\)](http://dx.doi.org/10.1044/1092-4388(2009/09-0001))
- Rice ML, Warren SF, & Betz SK (2005). Language symptoms of developmental language disorders: An overview of autism, Down syndrome, fragile X, specific language impairment, and Williams syndrome. *Applied Psycholinguistics*, 26, 7–27. 10.1017/S0142716405050034
- Semel E, Wiig E, & Secord W (2003). *Clinical evaluation of language fundamentals-IV*. Marickville: Harcourt Assessment.
- Schalock RL, Borthwick-Duffy SA, Bradley VJ, Buntinx WH, Coulter DL, Craig EM, ... & Shogren KA (2010). *Intellectual disability: Definition, classification, and systems of supports*. Washington, DC: American Association on Intellectual and Developmental Disabilities.
- Vandewalle E, Boets B, Boons T, Ghesquière P, & Zink I (2012). Oral language and narrative skills in children with specific language impairment with and without literacy delay: A three-year longitudinal study. *Research in Developmental Disabilities*, 33, 1857–1870. 10.1016/j.ridd.2012.05.004 [PubMed: 22699257]
- Westerveld MF, Gillon GT, & Moran C (2008). A longitudinal investigation of oral narrative skills in children with mixed reading disability. *International Journal of Speech-Language Pathology*, 10, 132–145. 10.1080/14417040701422390 [PubMed: 20840047]
- Williams KT (1997). Expressive Vocabulary Test Second Edition. *Journal of the American Academy of Child & Adolescent Psychiatry*, 42, 864–872.
- Wise JC, Sevcik R. a., Ronski M, & Morris RD (2010). The relationship between phonological processing skills and word and nonword identification performance in children with mild intellectual disabilities. *Research in Developmental Disabilities*, 31(6), 1170–1175. 10.1016/j.ridd.2010.08.004 [PubMed: 20846821]
- Woodcock RW (1998). *Woodcock Reading Mastery Tests, Revised*. Circle Pines, MN: American Guidance Service.
- Worsfold S, Mahon M, Yuen HM, & Kennedy C (2010). Narrative skills following early confirmation of permanent childhood hearing impairment. *Developmental Medicine and Child Neurology*, 52(10), 922–928. 10.1111/j.1469-8749.2010.03641.x [PubMed: 20187874]

Figure 1.

Box plots of student's performance on elements of narrative macrostructure. Lines in bold represent the median. The box top and bottom represent the middle 50% of student performance for each element. Whiskers extend to the least and greatest scores respectively and represent the top and bottom 25% of performance. Circles represent outliers from the top or bottom 25% of scores. Asterisks represent extreme outliers to median performance. NSS = Narrative scoring scheme.

Table 1

Participant Standard Score Performance on the PPVT-III, EVT, and CELF-4

	PPVT-III	EVT	CELF-4		
			Concepts and following directions	Recalling Sentences	Formulated Sentences
Mean(SD)	65.63(13.06)	60.89(14.69)	1.34(1.01)	2.26(2.00)	1.94(2.27)
Range	40 – 117	40 – 101	1 – 6	1 – 8	1 – 14

Note. $N = 102$. PPVT-III = Peabody Picture Vocabulary Test-III (Dunn & Dunn, 1997); EVT = Expressive Vocabulary Test (Williams, 1997); CELF-4 = Clinical Evaluation of Language Fundamentals- 4th edition (Semel, Wiig, & Secord, 2003). Standard scores for the PPVT-III and EVT are based on a mean of 100 and standard deviation of 15. Scores for subscales of the CELF-4 are based on an average scaled score of 10 and the standard deviation of 3.

Table 2

Description of Macrostructure Elements Scored Using the Narrative Scoring Scheme (NSS)

Element	Description
Introduction	Ability to introduce the main characters and provide settings and subsettings throughout the story
Character Development	Acknowledgement of characters and subcharacters, state their significance, and provide details of their behavior
Mental States	Frequent and diverse use of vocabulary words to convey characters' emotions and thought processes
Referencing	Consistent and accurate use of antecedents and clarifiers (e.g., him, they, that, all) throughout the story
Conflict Resolution	Ability to clearly state the presence of an incident and its resolution critical to advancing the plot of the story
Cohesion	The sequencing of events and description of clear transitions between events using vocabulary such as then, after, or next.
Conclusion	Ability to describe an ending of the entire story based on the final event
NSS Composite Score	Sum of scores for the 7 elements above

Table 3

Microstructure Elements

	Mean (SD)	Median	Range	95% CI
Total Utterances	39.28(13.10)	31.50	0 – 84	± 2.54
% Intelligible	0.82(0.26)	0.92	0 – 1.00	± 0.05
MLUm	6.70(2.52)	6.76	0 – 12.39	± 0.49
NDW	71.78(32.27)	74.50	0 – 141	± 6.26

Note. CI = Confidence interval; MLUm = Mean length of utterance in morphemes; NDW = Number of different words.

Table 4

Macrostructure Narrative Scoring Scheme Elements

	Mean (SD)	Median	Range	95% CI
Introduction	2.93(1.05)	3.00	0 – 5	± 0.20
Character Development	2.37(1.10)	2.00	0 – 5	± 0.21
Mental States	1.68(1.08)	1.00	0 – 4	± 0.21
Referencing	1.59(.99)	1.00	0 – 4	± 0.19
Conflict/Resolution	2.43(1.16)	2.00	0 – 5	± 0.23
Cohesion	1.46(1.03)	1.00	0 – 4	± 0.20
Conclusion	1.80(1.09)	2.00	0 – 5	± 0.21
Composite	14.27(6.60)	14	0 – 29	± 1.28

Note. CI = Confidence interval.

Table 5

Summary of Intercorrelations, Means, and Standard Deviations for Microstructure and Macrostructure Elements of Narrative Ability and Reading Comprehension

Measure	1	2	3	4	5	6
1. Reading Comprehension	-					
2. Word Attack	.723 **	-				
3. MLUm	.443 **	.294 **	-			
4. NDW	.349 **	.324 **	.793 **	-		
5. Total Utterances	.162	.255 *	.337 **	.730 **	-	
6. NSS Score	.497 **	.319 **	.844 **	.889 **	.550 **	-
<i>M</i>	11.18	9.01	6.70	71.78	32.09	14.27
<i>SD</i>	8.52	7.94	2.52	32.27	13.27	6.60

Note.

*
 $p < .01$

**
 $p < .001$.

Reading Comprehension = Woodcock Reading Mastery Test- Revised (Woodcock, 1987), reading comprehension subtest raw score, Word Attack = Woodcock Reading Mastery Test-Revised (Woodcock, 1987), word attack subtest raw score, MLUm = Mean length of utterance in morphemes, NDW= Number of different words, NSS Score = Narrative Scoring Scheme composite score.

Table 6
 Hierarchical Multiple Regression Analyses Predicting Reading Comprehension From Narrative Ability Controlling for Word Attack Skills

Predictor	Entry Block 1					Entry Block 2					Entry Block 3				
	<i>B</i>	<i>SE B</i>	β	95% CI	<i>B</i>	<i>SE B</i>	β	95% CI	<i>B</i>	<i>SE B</i>	β	95% CI	<i>B</i>	<i>SE B</i>	95% CI
Constant	4.19	0.89		2.43 – 5.95	-0.20	2.09		-4.34 – 3.94	0.53	1.88		-3.20 – 4.27			
Word Attack	0.78	0.07	0.72**	0.63 – 0.92	0.72	0.74	0.67**	0.57 – 0.86	0.70	0.07	0.65**	0.57 – 0.83			
MLU-m					1.20	0.44	0.36*	0.32 – 2.08	0.34	0.44	0.10	-0.53 – 1.20			
NDW					-0.03	0.05	-0.12	-0.13 – 0.06	-0.15	0.05	-0.57*	-0.25 – 0.05			
Total Utterances					-0.03	0.08	-0.04	-0.18 – 0.12	-0.01	0.07	-0.02	-0.15 – 0.12			
NSS total Score									0.93	0.19	0.72**	0.55 – 1.30			
<i>R</i> ²			0.523				0.592				0.674				
<i>F</i>			109.59**				35.16**				39.63**				
<i>R</i> ²			0.523				0.069				0.082				
<i>F</i>			109.59**				5.46*				24.05**				

Note. MLU-M = mean length of utterances- morphemes, NDW = number of different words, NSS = Narrative Scoring Scheme.

* $p < .01$

** $p < .001$.