

Research Article

Adolescent Summaries of Narrative and Expository Discourse: Differences and Predictors

Jennifer P. Lundine,^{a,b} Stacy M. Harnish,^a Rebecca J. McCauley,^a
Deena Schwen Blackett,^a Alexandra Zezinka,^a
Wei Chen,^c and Robert A. Fox^a

Purpose: Summarizing expository passages is a critical academic skill that is understudied in language research. The purpose of this study was to compare the quality of verbal summaries produced by adolescents for 3 different discourse types and to determine whether a composite measure of cognitive skill or a test of expressive syntax predicted their performance.

Method: Fifty adolescents listened to, and then verbally summarized, 1 narrative and 2 expository lectures (compare–contrast and cause–effect). They also participated in testing that targeted expressive syntax and 5 cognitive subdomains.

Results: Summary quality scores were significantly different across discourse types, with a medium effect size. Analyses revealed significantly higher summary quality scores for cause–effect than compare–contrast summaries. Although the composite cognitive measure contributed significantly to the prediction of quality scores for both types of expository

summaries, the expressive syntax score only contributed significantly to the quality scores for narrative summaries.

Conclusions: These results support previous research indicating that type of expository discourse may impact student performance. These results also show, for the first time, that cognition may play a predictive role in determining summary quality for expository but not narrative passages in this population. In addition, despite the more complex syntax commonly associated with exposition versus narratives, an expressive syntax score was only predictive of performance on narrative summaries. These findings provide new information, questions, and directions for future research for those who study academic discourse and for professionals who must identify and manage the problems of students struggling with different types of academic discourse.

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Before the widespread adoption of the Common Core State Standards (Common Core State Standards Initiative, 2015b), narrative texts dominated the curriculum until fourth grade, with expository, or informational, textbooks and lectures becoming the primary source of teaching and learning in later grades (Snyder & Caccamise, 2010; Williams, 2005). Since the adoption of the Common Core, however, expository texts are being introduced at

earlier grade levels and more frequently across all grades (Kinsella, 2013; Murza, Malani, & Hahs-Vaughn, 2014). For adolescent students in later grades, expository texts and lectures make up a predominant portion of the curriculum, especially for students who focus on coursework related to science, technology, engineering, and math (Common Core State Standards Initiative, 2015b). Despite the rising academic importance of exposition, there is a dearth of knowledge about the skills needed for producing and understanding both verbal and written expository discourse passages, especially in comparison with the literature on narrative and conversational discourse skills (Lundine & McCauley, 2016). In addition, there has been little research investigating differences in skill set requirements across expository types. A better understanding of variables affecting expository discourse production and comprehension should lead not only to improvements in the regular curriculum but also to improved methods of identifying and treating the problems students may face with oral and written expository discourse. Closing the gap

^aDepartment of Speech & Hearing Science, The Ohio State University, Columbus

^bDivision of Clinical Therapies & Inpatient Rehabilitation Program, Nationwide Children's Hospital, Columbus, OH

^cResearch Information Solutions and Innovation, The Research Institute at Nationwide Children's Hospital, Columbus, OH

Correspondence to Jennifer P. Lundine: lundine.4@osu.edu

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between our meager knowledge of the underpinnings of expository competence and the more established knowledge base for narratives has become critically important. This article reports on a study designed to begin to address this gap.

Types of Discourse and the Curriculum

Narratives are typically organized chronologically and according to a single organizational structure—story grammar (i.e., setting, initiating events, characters' goals, attempts toward goals, outcomes; Mandler & Johnson, 1977). In contrast, expository discourse can be divided into several types, each with its own organizational structure. The purpose of an expository passage dictates the logical organization of ideas within it. Frequently encountered expository types include procedural, descriptive, compare–contrast, cause–effect, and problem–solution (Bliss, 2002; Nippold & Scott, 2010). Common Core English/Language Arts Standards (Common Core State Standards Initiative, 2015a) recommend that specific types be introduced at particular grade levels (e.g., compare–contrast in kindergarten, cause–effect in third grade), with the achievement of competence in comprehension and production for written and spoken modalities expected later.

Narratives communicate real-life scenarios and shared stories of human experience (Berman & Nir-Sagiv, 2007), whereas expository passages focus on ideas and concepts in an effort to share information with a reader or listener. Several studies examining intergenre performance differences show that verbal and written expository passages tend to have greater lexical and syntactic complexity than narratives (Berman & Nir-Sagiv, 2007; Scott & Windsor, 2000). On the other hand, in a study comparing written narratives and problem–solution expository passages, Berman and Nir-Sagiv (2007) found that competence in passage-level expository discourse lagged that of narratives. That is, not until early adulthood did individuals demonstrate the ability to convey important text level features (e.g., macrostructure, overall coherence) in written expository passages, whereas these skills were achieved much earlier in narrative writing for the same individuals. What remains unclear is whether these findings hold across the entire genre of exposition. Do we see mastery of some types of exposition before others? Answering this question could help to clarify when specific types of exposition should be introduced within the curriculum.

The existence of different types of expository discourse (e.g., compare–contrast, cause–effect) creates challenges for educators, clinicians, and researchers. Despite incorporation of expository passages in recent curricular advances (Murza et al., 2014), little is known about how the structure of a passage might influence student performance on expository comprehension and production tasks. For example, some studies have shown that students are more aware of certain expository types than others, but results have not been consistent for expository type or age/grade groupings (e.g., Chevront, 2002; Englert & Thomas, 1987; Richgels, McGee, Lomax, & Sheard, 1987). Other studies have shown that students' language performance differs by expository type,

particularly at the lexical and syntactic levels (e.g., productivity, syntactic complexity; e.g., Koutsoftas & Gray, 2012; Nippold, Mansfield, & Billow, 2007; Scott & Windsor, 2000; Westerveld & Moran, 2013). For example, in one study (Nippold et al., 2007), syntactic complexity was higher when adolescents and young adults retold a problem–solution expository passage than when they spontaneously generated a procedural passage. In another study of 12- to 14-year-old students with normal language and those with language impairments (Ward-Lonergan, Liles, & Anderson, 1999), productivity (the amount of language produced) was higher for compare–contrast retellings than for cause–effect retellings, regardless of group. Therefore, although existing studies provide preliminary evidence suggesting that student performance differs by expository type, many questions remain regarding the ways in which expository type and other methodological variables (e.g., method or modality of elicitation) might lead to differences in performance.

Further complicating our understanding of narrative and expository discourse development is the methodological variation found in past studies. These differences include variations in the mode of presentation for model stimuli (written vs. oral; e.g., Eason, Goldberg, Young, Geist, & Cutting, 2012; Westerveld & Moran, 2013; Wolfe, 2005) as well as the type of exposition studied (compare–contrast, cause–effect; e.g., Ward-Lonergan et al., 1999; Westby, Culatta, Lawrence, & Hall-Kenyon, 2010). Prior studies have varied in the methods used to elicit discourse samples (i.e., spontaneous generation, retell, summary; e.g., Nippold, 2009; Westerveld & Moran, 2013) and in the different modalities used (i.e., written vs. verbal; e.g., Heilmann & Malone, 2014; Nippold & Sun, 2010). Because of these varied methods, it is difficult to compare findings across studies.

Another major difference in existing studies of narrative and expository discourse has been whether they included only children with typical language development or included comparison groups with language disorders (e.g., Nippold, Hesketh, Duthie, & Mansfield, 2005; Scott & Windsor, 2000). Studies examining the abilities of students with language disorders (e.g., Scott & Windsor, 2000; Ward-Lonergan et al., 1999) have shown general group differences when expository abilities are compared with those of students with typical language development. Yet, even children with language impairments have been shown to increase the syntactic complexity of their spoken and written language in expository passages compared with narratives, only not to the degree shown by their peers with typical development (Scott & Windsor, 2000). Whereas research investigating typical development allows educators to properly design and teach curricula, studies examining discourse performance in those with language disorders and controls with typical development allow us not only to contribute to school curricula but also to improve assessment and treatment of discourse for these students who might struggle in the academic setting. In summary, the differences in methodology across narrative and expository discourse studies have produced variability in findings that make it difficult to draw broad conclusions.

Expository Discourse and Cognitive Abilities

Whereas discourse genre (narrative vs. expository) appears to affect the production of a discourse passage, an individual's cognitive abilities might also be expected to impact discourse performance, particularly in the realm of exposition. Yet, in past studies of expository discourse, cognitive variables have not been explored to any real depth. Most research that compares exposition with narrative discourse focuses on the linguistic differences between passages (e.g., vocabulary, syntax; e.g., Berman & Nir-Sagiv, 2007; Scott & Windsor, 2000), with only a few studies considering the cognitive demands of expository production and comprehension (e.g., Berninger et al., 2010; Wolfe & Mienko, 2007). This is unfortunate because there are reasons to suspect that exposition may be more cognitively demanding than narratives (Berman & Nir-Sagiv, 2007; Eason et al., 2012), especially if cognition is seen as representing an array of distinct processes, such as attention, memory, and executive function, that are needed for planning, organizing, and monitoring. For example, expository discourse requires "top-down, topic-motivated global-level text construction" (Berman & Nir-Sagiv, 2007, p. 108), necessitating rapid access to prior knowledge and use of higher-level abstract thinking and planning skills. These higher-level skills depend on complex cognitive functions, such as processing speed, working memory, and attention. In fact, in the few studies that have examined this relationship, these cognitive functions have been found to be related to expository discourse comprehension specifically (Berninger et al., 2010; St. Clair-Thompson & Gathercole, 2006).

Children with typical development tend to show a simultaneously increasing command over more complex vocabulary and syntax during the later school years as well as an accompanying development of increased control over higher-level cognitive skills, such as processing speed, working memory, and attention (Best, Miller, & Naglieri, 2011). Thus, older students who are typically developing can focus on "higher order cognitive processes such as planning, organizing, monitoring, and evaluating, while at the same time holding in mind several different dimensions of a topic or a problem" (Berman & Nir-Sagiv, 2007, p. 108). They can then use these higher-order cognitive processes for expository discourse tasks. The suggestion that expository discourse is more dependent on later developing, higher-level cognitive skills than narrative discourse is supported by findings showing students' earlier mastery of global discourse level skills (e.g., coherence) for written narratives than for written exposition (Berman & Nir-Sagiv, 2007).

Cognitive Skills Related to Exposition

In children and adolescents with typical development, the simultaneous development of more sophisticated language abilities and cognitive skills, particularly executive functions (which include inhibition, updating working memory, and set-shifting), likely assists students in producing and comprehending expository discourse passages of greater complexity (Wolfe & Mienko, 2007; Wolfe & Woodwyk,

2010). Sophisticated language abilities are required to meet the lexical and syntactic demands of school discourse of all genres, but advanced cognitive skills may be particularly important for exposition. The findings of Berman and Nir-Sagiv (2007) discussed above lend support to this premise, and additional studies have also identified the significant role played by rapid access to prior knowledge in helping a person to recall information from an expository text but not from narratives (Best, Floyd, & McNamara, 2008; Wolfe, 2005; Wolfe & Mienko, 2007; Wolfe & Woodwyk, 2010). Thus, processes related to working memory and processing speed, which allow a listener or reader to take in new information and integrate it with or update previously learned information, seem particularly important in expository tasks that depend heavily on prior knowledge (McKeown, Beck, Sinatra, & Loxterman, 1992; Miller & Keenan, 2009; Wolfe, 2005; Wolfe & Mienko, 2007; Wolfe & Woodwyk, 2010).

Other cognitive skills demanded of readers or listeners during expository tasks include the abilities to selectively attend to relevant points and inhibit the integration of less relevant information to effectively update prior knowledge (Gillam, Hoffman, Marler, & Wynn-Dancy, 2002). In a seminal text on expository discourse development edited by Nippold and Scott (2010), Snyder and Caccamise (2010) suggested that, to promote comprehension of expository materials, listeners and readers must continuously monitor incoming information to ensure that any inconsistencies in their understanding are quickly resolved. Further supporting the importance of inhibition in expository discourse comprehension, one study (Carretti, Cornoldi, De Beni, & Romanò, 2005) found that students with poor comprehension had difficulty updating previously learned information to prevent the intrusion of "old" information in later recall tasks when compared with students with good comprehension who did not show these same types of intrusions. That is, the ability to inhibit irrelevant information appeared to mediate the relationship between working memory and reading comprehension for these students (Carretti et al., 2005).

Because expository discourse calls upon higher-level cognitive abilities like working memory and inhibition (a component of executive functioning) specifically, assessments of cognitive functioning and the examination of this relationship to overall expository performance may help us understand the specific skills needed for competent production and comprehension of different expository types. Moreover, we need additional information to inform our understanding of how and why various types of exposition might place different demands on students. Why, for example, do students and young adults show greater syntactic complexity when they retell a problem-solution expository passage compared with a spontaneously generated procedural expository task (Nippold et al., 2007)? Is it related to the elicitation method (retelling vs. spontaneous generation), the topic, or the demands of the type of exposition? Importantly, we need to understand more clearly if cognitive demands are consistent across all discourse tasks and across the genre. Whereas

we currently have a basic understanding of how foundational cognitive skills appear necessary across expository types, we lack sufficient evidence to inform a hypothesis about whether one type of exposition depends differentially on specific cognitive skills over others. Researchers, educators, and clinicians are in need of information to determine whether different types of exposition require unique cognitive skills for competent performance. This information is directly relevant to the order in which expository types are introduced in the curriculum and the manner(s) in which we assess and treat students who struggle with the language demands of the classroom.

Elicitation Task Demands Related to Exposition

The cognitive skills required for successful discourse production may also vary based on the specific demands of the elicitation task (Richgels et al., 1987). In studies of narrative production, discourse is typically elicited using retelling or spontaneous generation paradigms (e.g., Merritt & Liles, 1989; Norbury & Bishop, 2003; Schneider & Dubé, 1997). Many past studies of expository discourse have reported use of (a) spontaneous generation of verbal and/or written discourse samples, both with and without scaffolding materials (e.g., written notes, outlines, verbal models; Heilmann & Malone, 2014; Nippold et al., 2005; Nippold & Sun, 2010; Westerveld & Moran, 2011), or (b) retelling paradigms (e.g., Chevront, 2002; Copmann & Griffith, 1994; Nippold et al., 2007; Nippold, Mansfield, Billow, & Tomblin, 2009; Ward-Lonergan et al., 1999; Wolfe, 2005; Wolfe & Mienko, 2007).

The use of summarization as a means of expository discourse elicitation is less common than either retelling or spontaneous generation—and perhaps more cognitively taxing than these other methods (see, e.g., Richgels et al., 1987; Scott & Windsor, 2000; Westby et al., 2010). Summarizing is a cognitively complex task that requires rapid integration of new facts with previously learned information (Leopold, Sumfleth, & Leutner, 2013) and self-initiation of an organizational strategy to explain the relationship(s) between or among these facts (Chevront, 2002). Retelling, on the other hand, allows a speaker or writer to mimic the structural organization of previously presented material as long as he or she is able to retain the model within short- and long-term memory. Because of its reliance on key cognitive functions, summarizing may be a more appropriate way to measure how well a student can initiate use of an appropriate organizational structure, inhibit irrelevant details, and manipulate newly learned information within the working memory system to combine more specific facts under more general categories. Compared with retelling material verbatim, summarizing may also be a more ecologically valid means of elicitation for students who are expected to listen to lectures and read expository text materials (e.g., textbooks, technical journals) to determine the main ideas and key supporting facts for note-taking and later recall (Leopold et al., 2013; Westby et al., 2010). In addition, summarizing may be a better indication of global comprehension, as shown in past studies wherein students who demonstrated better

summarization abilities also showed increased comprehension of expository information specifically (Gajria & Salvia, 1992; Gillam, Fargo, & St. Clair Robertson, 2009; Leopold et al., 2013).

Overview of This Study

In summary, we currently know little about how adolescents become skilled at expository discourse despite this comprising a regular and increasing element in their curriculum in the later grades. Consequently, adding to our knowledge of differences in skilled performance across genres and the relationship of these skills to cognitive and linguistic variables should provide a more solid base on which to determine the ages at which specific genre types are introduced in the curriculum as well as a more solid foundation on which to develop effective strategies for assessing and teaching them. This study seeks to expand our understanding of discourse performance in adolescents by comparing verbal summaries of two different types of exposition with that of a narrative summary. Therefore, this study addressed two questions that may contribute to those goals:

1. Do summarization quality scores differ across compare–contrast (expository), cause–effect (expository), and narrative verbal summaries?
2. If differences are found in summary quality for these three types of discourse, does a composite cognitive score or an expressive syntax score help to predict summary quality?

Method

This protocol was approved by the appropriate institutional review boards before its initiation. Consent forms were signed by parents (or participants who were 18 years old), and assent forms were signed by the participants under 18 years old before their enrollment.

Participants

Adolescents between the ages of 13 and 18 years ($M = 15.49$ years, range = 13.0–18.75 years) who had completed at least seventh grade were invited to participate. Participants were recruited via social media postings, e-mails to employees of the local children's hospital, and flyers posted at locations targeting adolescents (e.g., adolescent primary care clinics, a local science center). Participants enrolled ($N = 50$) were 52% female, and 12% were ethnic or racial minority, drawn from the Central Ohio urban and suburban regions. For all participants, English was the primary language in their household. Adolescents were excluded if parents reported a history of autism, developmental delay, severe language impairment, or neurologic disorder or if they had ever been hospitalized for a traumatic brain injury. Students were not excluded if they reported a history of attention-deficit/hyperactivity disorder. Two students included in this sample did report having active individualized

education plans related to attention-deficit/hyperactivity disorder, but these students reported no formal diagnoses of learning or language disorders. In addition, all students were in regular education classrooms. Participants received a gift card upon completion of all study tasks. Attempts were made to equalize gender and age distributions. See Table 1 for a summary of demographic information.

Socioeconomic status (SES) information was extracted for each participant using the Geographical Information System software Alteryx (Version 10.6; Alteryx Designer, 2016). Similar to previous research (e.g., Cohen, Sonderman, Mumma, Signorello, & Blot, 2011), the SES data for each participant were represented by the demographic statistics of the residential block on which each participant lives, an analysis that generates more than 20 unique variables. Principal component analysis with varimax orthogonal rotation identified two primary SES factors for these participants using a threshold eigenvalue of 1. SES factor 1 represented race and income (higher percentage of White residents, higher income) and explained 44% of variance in the data. SES factor 2 represented education and employment (lower levels of education and higher unemployment) and explained an additional 24% of variance in the data. The rotated structure matrix for the component analysis is available as a supplemental material (Supplemental Material S1).

Assessment Procedures

Data collection took place during one assessment session, which lasted between 45 and 60 min per participant. All assessments were facilitated by the first author in a quiet room at a local university. The examiner first read a scripted explanation to each participant that described how to efficiently summarize a passage (i.e., including a main idea and primary details but excluding irrelevant details). The examiner then read an example of a summary of the movie *Spider-Man* (from IMDb.com). To demonstrate their understanding of the task, participants were asked to summarize a favorite or recently seen movie. The examiner provided feedback supporting each participant's effective trial summary and its emphasis on main ideas and relevant details.

Discourse Summary Collection

Three videotaped lectures, each approximately 5 min in duration, were shown to participants on a 19-in. computer

monitor equipped with external speakers. Two lectures were adapted from a prior study (Ward-Lonergan et al., 1999) modeling compare–contrast and cause–effect expository structures. The third lecture was adapted from a narrative passage used as part of English/Language Arts Common Core teaching materials (see Connecticut State Department of Education, n.d.). Order of lecture presentation was randomized to control for order effects. Lectures were read by the same individual, with the lecturer against a neutral background, and presented with normal rate and prosody but without overemphasis of key words signaling discourse type (e.g., “on the other hand” in the compare–contrast lecture).

Each lecture discussed a fictitious country called “Lifeland” to control for prior knowledge, which has been shown to be related to an individual's ability to recall facts, particularly in expository passages as compared with narratives (Best et al., 2008; Wolfe, 2005; Wolfe & Woodwyk, 2010). Controlling for prior information, although dissimilar to learning within the classroom, allowed researchers to ensure that any differences found in summary quality among discourse passages were not related to the novelty (or familiarity) of information presented. The narrative passage was adapted from an essay originally published in *Time* magazine about a hero who saved individuals involved in a plane crash (Rosenblatt, 1982). The essay was reduced in length to more closely match the expository passages, but content was maintained to ensure full narrative story grammar. In addition, the text was modified to refer to the country of Lifeland and remove the names of real cities and states (see Supplemental Material S2 for a summary of discourse passages).

The two expository lectures (compare–contrast and cause–effect) had four key comparative or causative main ideas, respectively. Four critical subordinate details followed each of these main ideas. Expository lectures were closely matched for linguistic and discourse level features such as number of words/sentences/paragraphs and reading level using Coh-Metrix, an online text analysis tool (Graesser, McNamara, Louwerse, & Cai, 2004; McNamara, Graesser, McCarthy, & Cai, 2014). The narrative lecture differed appropriately from the expository lectures on Coh-Metrix measures of narrativity, for example, which we would expect to be higher for a narrative passage than for either of the expository passages. See Table 2 for a comparison of the lectures.

Table 1. Grade, gender, mean age, and testing distribution of sample ($N = 50$) by grade level.

Grade level	% of total sample (n)	% Female (n)	Age in years	Cognitive composite score ^a	Expressive syntax standard score ^b
8th grade	21.8 (12)	50 (6)	13.5 (0.4)	103.1 (14.0)	10.8 (2.3)
9th grade	16.4 (9)	67 (6)	14.2 (0.2)	105.0 (9.2)	9.7 (1.9)
10th grade	16.4 (9)	44 (4)	15.3 (0.3)	111.2 (18.2)	10.8 (3.6)
11th grade	16.4 (9)	44 (4)	16.5 (0.4)	102.8 (15.5)	9.7 (1.1)
12th grade/college	22.0 (11)	55 (6)	18.0 (0.5)	120.0 (17.1)	10.1 (1.6)

Note. Scores are mean (SD) unless otherwise noted.

^a $M = 100$, $SD = 15$. ^b $M = 10$, $SD = 3$.

Table 2. Comparison of expository and narrative discourse samples using Coh-Metrix and more commonly used measures of length and reading level.

Discourse comparison method	Compare–contrast	Cause–effect	Narrative
Coh-Metrix ^a			
Narrativity	25%	34%	68%
Syntactic simplicity	72%	64%	42%
Word concreteness	71%	65%	46%
Referential cohesion	24%	45%	15%
Deep cohesion	53%	60%	84%
Grade level	8.0 (range = 7–9)	7.7 (range = 7–8)	7.3 (range = 7–8)
Number of words	743	731	935
Number of sentences	51	50	57
Words per sentence	14.5	14.6	16.4
Paragraphs	8	8	8
Flesch Reading Ease	61.7	66.0	66.4

^aExplanations for Coh-Metrix variables (see McNamara et al., 2014): narrativity = whether a text tells a story with characters, events, places, and things familiar to readers; syntactic simplicity = the use of simple sentence structures that are easy to understand; word concreteness = the use of words that can be easily imagined; referential cohesion = the presence of overlapping ideas and concepts in a text; deep cohesion = the presence of explicit causal relationships; and grade level = based on Flesch-Kincaid rating.

After viewing each video lecture, participants were asked to give their best summary of the lecture so that, if someone who knew nothing about Lifeland listened to their summary, the unknown listener would learn all the important points without the unnecessary details. The examiner allowed the participants to speak without interruption and only offered nods of encouragement during the verbal summaries. If the participants stopped talking but did not indicate that they were finished with their summary, the examiner confirmed with a simple question (e.g., “Are you finished?”). All discourse summaries were recorded using a digital voice recorder (Olympus model WS-823) and a digital high-definition video camera recorder (Sony model HDR-XR260V).

Cognitive and Expressive Syntax Testing

Previous research found that expository discourse requires an increased use of higher-level cognitive skills (e.g., Wolfe & Woodwyk, 2010) and expressive syntax (Scott & Windsor, 2000). To explore the predictive value of cognitive and expressive syntax abilities on summary performance across these discourse types, participants completed cognitive and expressive syntax testing in two blocks. Testing blocks followed the viewing and summarizing of each lecture. Block 1 included the three initial measures contributing to the composite cognitive score, and Block 2 included the remaining two cognitive measures and the expressive syntax measure, although the order of these blocks between participants was randomized and predetermined.

Cognitive Testing. Five subtests from the National Institutes of Health Toolbox Cognition Battery (NIH Toolbox CB; see Bauer & Zelazo, 2013; Weintraub et al., 2013) were used as measures of five cognitive subdomains (i.e., attention, executive function, episodic memory, processing speed, and working memory; see Supplemental Material S3 for descriptions of each subtest). These tests were the Flanker task, dimensional change card sort test,

picture sequence memory test, pattern comparison processing speed test, and list sorting working memory test, respectively. In this study, the NIH Toolbox CB was chosen because it offers a quick, reliable, valid assessment of the specific cognitive skills that are arguably relevant to an expository summarization task. All subtests and composite scores have been shown to have excellent test–retest reliability, strong correlations with established cognitive measures, and sensitivity to age-related changes across the lifespan (Akshoomoff et al., 2013; Bauer & Zelazo, 2013).

Tests were administered per NIH Toolbox CB guidelines, and participants viewed test stimuli on a 19-in. computer monitor (participant display) attached to a laptop (administrator display). They responded to questions either verbally, with the mouse, or using the left and right arrow keys on the keyboard, as specified in the individual tests. Total testing took approximately 25 min. In addition to individual scores for each cognitive domain, a fluid cognition composite score (which includes the five subtests discussed above) was generated through the NIH Toolbox Assessment Center (<http://www.assessmentcenter.net/>). The age-adjusted fluid cognition composite score was used as the measure of cognitive ability in this study. This composite score was used rather than a raw score to account for age differences as identified in the norming sample.

Expressive Syntax Testing. Previous studies have found that expository discourse is characterized by greater syntactic complexity than narrative productions (e.g., Berman & Nir-Sagiv, 2007; Scott & Windsor, 2000). Therefore, we chose to assess the expressive syntax skills of our participants to determine if syntactic abilities appeared to play a differentiating role in summary quality productions across these three types of discourse. A standardized measure of syntactic abilities, Recalling Sentences from the Clinical Evaluation of Language Fundamentals–Fifth Edition (Wiig, Semel, & Secord, 2013a), was chosen as a measure of expressive syntax for these participants. This subtest was selected

to measure expressive syntax because it was brief and because it has been shown to be correlated with sentence level (microstructural) variables in expository discourse production (Nippold et al., 2009). It has also been shown to have robust age-related changes and strong test–retest reliability (Wiig, Semel, & Secord, 2013b). This test was administered in approximately 5 min, per standard guidelines. Each participant’s standard score was recorded as the measure of expressive syntax.

Commonly Used Measures of Syntactic Complexity.

This study also examined possible differences among summaries using common microstructural measures of syntactic complexity: mean length of utterance (MLU; the average number of words per C-unit) and subordination index (SI; the average number of clauses per C-unit). With this additional analysis, we could compare the findings from the scoring rubric—subjective measure of overall summary quality that incorporates both macrostructural and microstructural components—with these more commonly used objective measures of syntactic complexity.

Summary Transcription and Analysis

Each recorded summary was transcribed using the Systematic Analysis of Language Transcripts (SALT; Miller & Iglesias, 2010). Three undergraduate Speech and Hearing Science students completed online SALT training and established reliability with several test transcripts before listening to and transcribing summaries. The research volunteers had training materials and written instructions available to them to assist them in their transcription. The first author was also available to answer questions as they arose. The summaries were segmented into C-units, which are an independent clause and any accompanying dependent (subordinate) clauses (Hunt, 1965). After the initial transcription, each typed transcript was reviewed once more, and any necessary corrections were made.

Reliability

Thirty-three randomly selected discourse summaries (22% of total samples; 11 each of narrative, compare–contrast, and cause–effect) were transcribed by a second individual to ensure accurate transcription of summaries via specific reliability comparisons. Point-to-point comparison was conducted to determine agreement on SALT transcription conventions (e.g., C-unit segmentation, presence of a word). For narrative, compare–contrast, and cause–effect transcripts, respectively, agreement was 96%, 96%, and 100% for occurrences of C-units; 96%, 96%, and 100% for coding number of clauses within each C-unit; and 99.7%, 99.6%, and 99.7% for perceptual agreement on presence of a word (e.g., *in* vs. *on*).

Summary Quality Scoring

Many past studies of expository and narrative discourse have examined outcome variables that were either macrostructural (text level; e.g., Heilmann & Malone, 2014; Wolfe,

2005; Wolfe & Woodwyk, 2010) or microstructural (lexical, syntactic; e.g., Nippold et al., 2009; Nippold & Sun, 2010; Scott & Windsor, 2000; Westerveld & Moran, 2011). Holistic scoring schemas that incorporate both of these components have been used in only a few studies (e.g., Koutsoftas & Gray, 2012; Westby et al., 2010) to analyze the discourse performance of school-age students. To allow a broader view of performance for other types of expository discourse and to mimic the types of schemas commonly used to evaluate student discourse in schools (Koutsoftas & Gray, 2012; Westby et al., 2010), this study utilized a scoring rubric that included both macrostructural and microstructural discourse features.

To evaluate the verbal expository summaries produced by participants, a six-trait scoring rubric used in a prior study to evaluate written expository summaries (Westby et al., 2010) was adapted for this study. Westby et al.’s (2010) original six-trait rubric included a trait analyzing students’ ability to use a graphic organizer, which was not relevant for this study. The revised rubric for this study thus had only five traits, each scored on a scale of 0–4, for 20 potential points per summary (see Table 3). Using this rubric, Westby et al. found statistically significant differences in students’ expository writing between groups of fourth and fifth grade students and between students who received an intervention focused on teaching macrostructural organization using short compare–contrast and cause–effect passages and a control group. Further adaptations of the rubric were made based on recommendations from the Westby et al. study, including the addition of improved clarifying descriptors for each point level of the traits. Per Westby et al.’s divisions, two of the five traits included in this scoring rubric were dedicated to text level macrostructure and three traits were dedicated to microstructure: (a) gist, topic/key sentence, and main idea and (b) text structure, and (c) content (amount, accuracy, and relevance), (d) signal words to indicate type (e.g., *because*), and (e) sentence structure, respectively. Although the five traits were the same across discourse types, one rubric was created to score the compare–contrast and cause–effect expository summaries and one rubric was created to score the narrative summaries; the descriptors for scoring were modified to match the appropriate discourse sample (see Table 3).

After participants’ summaries were transcribed, two graduate students in speech-language pathology, blinded to overall study hypotheses, were trained in scoring summary quality using test transcripts. Discussion between the two raters and the first author clarified any unclear instructions before the raters scoring the 150 transcripts analyzed for this study. Raters were blinded to speaker demographics, and transcript order was randomized within discourse type.

Reliability

After the two raters evaluated discourse summary quality for all 150 transcripts, 95.6% of all individual scores matched or differed by only 1 point. Perfect agreement was achieved on 52% of scores, and of the scores that differed,

Table 3. The five traits comprising the holistic scoring rubric and descriptors for each illustrating the lowest and highest possible point values for expository and narrative passages.

Discourse trait	Expository rubric scoring		Narrative rubric scoring	
	Score 0 (None)	Score 4 (Best)	Score 0 (None)	Score 4 (Best)
A. Gist, topic/key sentence, main idea	Statements do not link to a central topic.	Introductory sentence (topic/key) provides an accurate overview of how the passage is organized (e.g., <i>Lifeland was very advanced, and its developments in inventions, ship building, written language & architecture helped to change other parts of the world.</i>).	Statements do not link to a central topic.	Introductory sentence (topic/key) provides an accurate overview of how the passage is organized (e.g., <i>In the midst of a disaster, people were reminded of the good of man from the kindness and selflessness of one man who died after helping others.</i>).
B. Text structure	Ideas are randomly presented and do not link to each other.	Passage is organized using more complex language to represent relationships within and between ideas/main points.	Ideas are randomly presented and do not link to each other.	Passage is organized using more complex language to represent relationships within and between ideas/main points.
C. Content (quantity, accuracy, and relevance)	Statements are not related to the passage or do not communicate information from the passage.	All relevant/key ideas from the passage are clearly and accurately represented and appropriately elaborated.	Statements are not related to the passage or do not communicate information from the passage.	All relevant/key ideas from the passage are clearly and accurately represented and appropriately elaborated.
D. Conjunctions and signal words to indicate subtype (expository) or chronology (narrative)	Uses no conjunctions or signal words.	Uses a variety (> 1) of more advanced signal words, different from those stated in the passage (e.g., <i>similarly, whereas, however</i>).	Uses no signal words.	Uses a variety (> 1) of more advanced signal words, different from those stated in the passage (e.g., <i>initially, following</i>).
E. Sentence structure	No complete sentences are included; includes only random phrases.	Uses complete, complex sentences with dependent clauses that appropriately express relationships.	No complete sentences are included; includes only random phrases.	Uses complete, complex sentences with dependent clauses that appropriately express relationships.

90% of them differed only by 1 point. All disagreements were resolved through a discussion between the two raters so that 100% agreement was attained for trait-specific and composite discourse quality scores.

Analysis

To address our first research question related to quality differences across discourse types, a one-way repeated measures analysis of variance (ANOVA) was conducted to determine if there was a statistically significant mean difference in the total summary quality scores among the three discourse types. Discourse type was the within-subject factor, and total summary quality was the dependent variable. Looking at summary quality scores for cause-effect, compare-contrast, and narrative discourse summaries, four summary scores were identified as outliers (> 1.5 SDs from the mean): One participant had lower summary quality for both compare-contrast and narrative, another had a lower score for cause-effect, and one participant had a higher score for cause-effect. To analyze the potential effect of these outliers, data from these three participants were removed from the analysis, with no change to the significance of the ANOVA. Therefore, data from these three participants were included in the final analysis set. Data were normally distributed as indicated by a Shapiro-Wilk test ($p > .05$) for cause-effect only, but further visual inspection of normal Q-Q plots revealed an approximately normal distribution of both compare-contrast and narrative variables as well. Mauchly's test of sphericity indicated that the assumption of sphericity had not been violated, $\chi^2(2) = 1.5, p = .473$.

To address our second research question regarding predictors of summary quality, three stepwise linear regression analyses were conducted to determine if a composite cognitive score or an expressive syntax score predicted total summary quality score for narrative, compare-contrast, or cause-effect summaries, while also accounting for the possible contribution of age and SES factors. Because this study was a preliminary investigation exploring possible contributions of various predictors, stepwise linear regression allowed us to examine which predictors provided a good fit for these models. Stepwise regression enters variables automatically based on the t statistic of their estimated coefficients. Data were screened for missing values and violations of assumptions before analysis. There were two participants who had missing data points for composite cognitive score due to examiner error (i.e., incorrect closing of the NIH Cognitive TB program after the last test), which resulted in incomplete analysis and scoring. These participants were removed from the analysis, leaving a total sample size of 48 participants for the linear regression analyses. Preliminary analyses were conducted, and all assumptions were satisfactorily met. For each discourse sample, one stepwise linear regression analysis was conducted that included cognitive score, expressive syntax score, age, SES factor 1 (income and race), and SES factor 2 (education and employment).

Results

Differences in Summary Quality Between Narrative, Compare-Contrast, and Cause-Effect Summaries

Table 4 shows the average length of summaries (number of C-units), MLU, SI, and total summary quality scores for the compare-contrast, cause-effect, and narrative summaries by grade group. Descriptive statistics showed that the total summary quality scores for these 50 participants were, on average, highest for verbal summaries of the cause-effect lecture ($M = 12.4, SD = 2.8$) and lowest for the compare-contrast lecture ($M = 11.1, SD = 3.0$). On average, summary quality scores for narrative summaries fell between the two expository summaries ($M = 11.9, SD = 1.8$).

Results of a one-way repeated measures ANOVA revealed that total summary quality scores were significantly different across discourse types, $F(2, 98) = 6.1, p = .003$, with a medium effect size ($\eta_p^2 = .11$; see Figure 1). Post hoc analysis with a Bonferroni adjustment revealed that total summary quality scores were significantly higher for cause-effect summaries compared with compare-contrast summaries (1.34 points, 95% CI [0.32, 2.4], $p = .006$). No other significant differences were found between summary quality scores of the remaining discourse pairs.

There were no significant differences in overall summary quality scores between male and female participants for compare-contrast, $t(24) = -1.48, p = .15$; cause-effect, $t(24) = 0.69, p = .50$; or narrative, $t(24) = 0.64, p = .53$, summaries.

This study also examined possible differences among summaries using common microstructural measures of syntactic complexity: MLU and SI. Descriptive statistics are shown in Table 4. MLU was highest, on average, for cause-effect summaries ($M = 14.6, SD = 4.7$) and lowest for compare-contrast summaries ($M = 11.7, SD = 3.2$). MLU for narratives fell between the two expository summaries ($M = 12.8, SD = 3.8$). SI, on the other hand, was highest for narrative summaries ($M = 1.7, SD = 0.4$) and lowest for compare-contrast summaries ($M = 1.4, SD = 0.3$). SI for cause-effect summaries fell between the other two discourse samples ($M = 1.6, SD = 0.4$).

Two one-way repeated measures ANOVAs were conducted to determine if there was a statistically significant mean difference in syntactic complexity among the three discourse types. For the first analysis, MLU was the dependent variable with discourse type as the within-subject factor. The assumption of sphericity was violated, as assessed by Mauchly's test of sphericity, $\chi^2(2) = 9.5, p = .009$. Therefore, a Greenhouse-Geisser correction was applied ($\epsilon = .85$). MLU was significantly different across discourse types, $F(1.7, 83.1) = 13.6, p < .001$, with a medium effect size ($\eta_p^2 = .22$). Post hoc analysis with a Bonferroni correction (adjusted $p = .017$) revealed that MLU was significantly higher for cause-effect summaries compared with compare-contrast summaries (2.9 points, 95% CI [1.6, 4.3], $p < .001$). After the correction, there were no other significant pairwise comparisons.

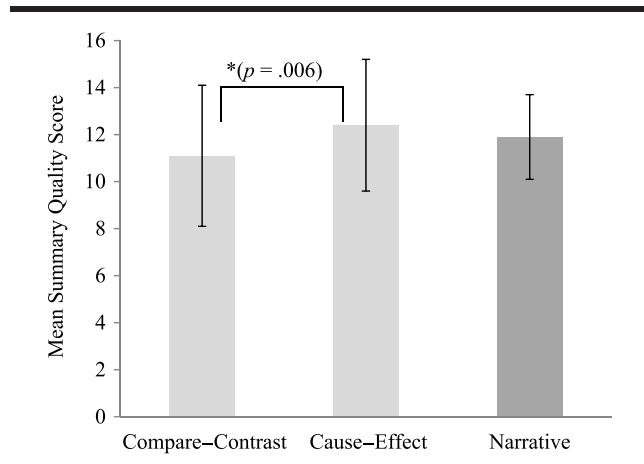
For the second analysis examining differences in syntactic complexity using SI, the assumption of sphericity

Table 4. Average length of summaries, syntactic complexity (in mean length of utterance [MLU] and subordination index [SI]), and total summary quality (of 20) by grade level for compare–contrast, cause–effect, and narrative lectures.

Grade level	Compare–contrast				Cause–effect				Narratives			
	Length of summaries (number of C-units)	MLU	Clause density (SI)	Total summary quality	Length of summaries (number of C-units)	MLU	Clause density (SI)	Total summary quality	Length of summaries (number of C-units)	MLU	Clause density (SI)	Total summary quality
Eighth grade	10.6 (4.2)	12.5 (4.3)	1.4 (0.2)	10.9 (2.5)	9.1 (4.8)	16.4 (6.5)	1.5 (0.3)	11.9 (2.2)	8.3 (3.8)	13.7 (5.0)	1.8 (0.4)	11.9 (1.8)
Ninth grade	9.8 (4.8)	11.1 (2.3)	1.3 (0.3)	9.6 (3.7)	6.9 (2.0)	12.6 (2.4)	1.6 (0.4)	11.4 (2.6)	8.6 (2.4)	12.2 (3.3)	1.6 (0.4)	10.7 (2.2)
10th grade	13.8 (5.7)	11.6 (3.0)	1.4 (0.4)	11.2 (3.4)	10.8 (33.5)	13.3 (3.8)	1.5 (0.4)	12.3 (2.8)	11.6 (3.3)	12.1 (2.3)	1.8 (0.3)	12.3 (1.5)
11th grade	13.4 (4.4)	10.0 (2.0)	1.3 (0.2)	10.4 (2.6)	9.0 (4.1)	14.1 (3.9)	1.6 (0.4)	12.0 (3.1)	11.2 (4.2)	12.2 (2.7)	1.7 (0.3)	11.7 (1.6)
12th grade+	15.5 (7.9)	12.7 (3.0)	1.5 (0.2)	12.9 (2.7)	11.7 (9.1)	15.7 (4.8)	1.6 (0.4)	14.2 (3.0)	11.2 (5.6)	13.6 (4.7)	1.7 (0.4)	12.6 (1.5)
Total	12.6 (5.8)	11.7 (3.2)	1.4 (0.3)	11.1 (3.0)	9.6 (5.5)	14.6 (4.7)	1.6 (0.4)	12.4 (2.8)	10.1 (4.2)	12.8 (3.8)	1.7 (0.4)	11.9 (1.8)

Note. Scores are mean (*SD*). C-unit = an independent clause and any accompanying dependent (i.e., subordinate) clauses (Hunt, 1965).

Figure 1. Differences in mean summary quality scores (with error bars representing SD) between the three discourse types ($N = 50$).



was met. A significant difference was found across discourse types, $F(2, 98) = 18.9, p < .001$, with a large effect size ($\eta_p^2 = .28$). Post hoc analysis with a Bonferroni adjustment (adjusted $p = .017$) revealed that SI was significantly higher for narrative summaries compared with compare-contrast summaries (0.3 point, 95% CI [0.2, 0.5], $p < .001$) and cause-effect summaries (0.2 point, 95% CI [0.03, 0.3], $p = .015$). SI was also significantly higher for cause-effect summaries when compared with compare-contrast summaries (0.2 point, 95% CI [0.04, 0.3], $p = .004$). See Supplemental Material S4 for Pearson correlations for expressive syntax scores, MLU, and SI for the three discourse summaries.

The Role of Cognition and Expressive Syntax in Summary Quality

A stepwise linear regression analysis was conducted for each of the two expository lectures and the narrative lecture to determine the best combination of predictor variables (composite cognitive score, expressive syntax score, age, SES factors 1 and 2) in predicting summary quality. In other words, this analysis determined whether a score representing composite cognitive abilities or expressive syntax abilities, in addition to other demographic variables like age and SES, contributed to summary quality. Regression coefficients and standard errors for these analyses can be found in Table 5. Pearson correlations for summary quality scores and all predictor variables can be found in Supplemental Material S5.

Compare-Contrast

At Step 1 of the analysis, for the compare-contrast lecture, SES factor 1 (race and income) entered into the model and accounted for approximately 14.1% of the variance in total summary quality scores ($r = .38, R^2 = .141$). Composite cognitive score entered at Step 2 of the analysis and accounted for an additional 22.7% of the variance of total summary quality scores ($r = .48, R^2 = .227$). Both models

Table 5. Summary of stepwise regression analyses examining the role of cognition composite and expressive syntax scores, age, and SES on total summary quality scores by discourse type.

Variable	B	SE_B	β
Compare-contrast quality total			
Intercept	11.22	0.37	
SES factor 1	1.15	0.42	0.38**
Intercept	5.90	2.41	
SES factor 1	1.13	0.40	0.37**
Cognitive composite score	0.05	0.02	0.29**
Cause-effect quality total			
Intercept	12.49	0.38	
SES factor 1	1.19	0.43	0.38**
Intercept	5.64	2.38	
SES factor 1	1.17	0.40	0.37**
Cognitive composite score	0.63	0.02	0.37**
Narrative quality total			
Intercept	8.40	1.03	
Expressive syntax score	0.35	0.10	0.47**
Intercept	4.46	2.18	
Expressive syntax score	0.36	0.10	3.75**
Age at testing	0.25	0.12	2.04*

Note. B = unstandardized regression coefficient; SE_B = standard error of the coefficient; β = standardized coefficient; SES = socioeconomic status.

* $p < .05$. ** $p < .01$.

at Steps 1 and 2 were statistically significant, $F(1, 46) = 7.6, p = .008$, and $F(2, 45) = 6.6, p = .003$, respectively. At Step 3 of the analysis, neither age at testing ($t = 1.3, p = .2$), SES factor 2 (education and employment; $t = -0.6, p = .5$), nor expressive syntax score ($t = 0.01, p = .99$) contributed significantly to the model. In addition, the relationship between composite cognitive scores and summary quality scores was positive (see Supplemental Material S5), indicating that higher cognitive composite scores predicted higher summary quality scores.

Cause-Effect

At Step 1 of the analysis, for the cause-effect lecture, SES factor 1 (race and income) entered into the model and accounted for approximately 14.4% of the variance in total summary quality scores ($r = .38, R^2 = .144$). The composite cognitive score entered at Step 2 of the analysis and accounted for an additional 28.0% of the variance of total summary quality scores ($r = .53, R^2 = .28$). Both models at Steps 1 and 2 were statistically significant, $F(1, 46) = 7.8, p = .008$, and $F(2, 45) = 8.7, p = .001$, respectively. At Step 3 of the analysis, neither age at testing ($t = 1.1, p = .3$), SES factor 2 (education and employment; $t = 0.11, p = .9$), nor expressive syntax score ($t = 1.4, p = .2$) contributed significantly to the model. In addition, the relationship between composite cognitive scores and summary quality scores was positive (see Supplemental Material S5), indicating that higher cognitive composite scores predicted higher summary quality scores.

Narrative

At Step 1 of the analysis, for the narrative lecture, expressive syntax score entered into the model and accounted

for approximately 21.6% of the variance in total summary quality scores ($r = .47$, $R^2 = .216$). Age at testing entered at Step 2 of the analysis and accounted for an additional 28.2% of the variance of total summary quality scores ($r = .53$, $R^2 = .282$). Both models at Steps 1 and 2 were statistically significant, $F(1, 46) = 12.7$, $p = .001$, and $F(2, 45) = 8.9$, $p = .001$, respectively. At Step 3 of the analysis, neither SES factor 1 ($t = 1.7$, $p = .09$), SES factor 2 (education and employment; $t = 0.95$, $p = .35$), nor composite cognitive score ($t = -0.13$, $p = .9$) contributed significantly to the model. In addition, the relationship between expressive syntax scores and summary quality scores was positive (see Supplemental Material S5), indicating that higher expressive syntax scores predicted higher summary quality scores.

Discussion

This study examined the performance of middle- and high-school-aged students with typical development who were asked to verbally summarize a narrative and two types of expository discourse passages. A scoring rubric that included both macrostructural and microstructural aspects of discourse was used to compare overall summary quality of all three presented lectures. In addition, as a preliminary exploration of how cognition and expressive syntax might contribute to summary performance on these different discourse types, a cognitive composite score—which examined component skills related to executive function, attention, processing speed, and episodic and working memory—and an expressive syntax score were examined as possible predictors for summary quality.

Differences in Summary Quality Between Compare-Contrast, Cause-Effect, and Narrative Summaries

In regard to the first research question, our results showed that summary quality differed significantly as a function of discourse type. On average, compare-contrast summaries had the lowest quality scores, and cause-effect summaries had the highest quality scores (see Table 4 and Figure 1). This difference was noted despite the linguistic and discourse level similarities between the two expository lectures (see Table 2).

Narrative summary quality fell between the two expository samples examined in this study. Past studies that have identified differences between these two discourse genres have compared only one type of exposition with a narrative (Berman & Nir-Sagiv, 2007; Scott & Windsor, 2000). In one study that also examined the text level differences between narrative and expository genres (Berman & Nir-Sagiv, 2007), individuals demonstrated earlier mastery of narrative macrostructure productions than of expository (problem-solution) productions. In that study, students did not show mastery of problem-solution expository productions until late high school or early adulthood. We are aware of only one past study (Wolfe & Mienko, 2007) that used a retelling paradigm to compare memory of text recalled from a narrative passage and two types of expository passages (sequential and

descriptive). Although Wolfe and Mienko (2007) found no statistically significant difference in the amount of learning (determined via pretests and posttests) and no difference in the amount of recall as a function of text genre, the authors found that the structure of a text and a student's prior knowledge interacted to impact learning. College-age students with higher amounts of prior knowledge about the presented topic learned best from the sequential expository text. Students with the least amount of prior knowledge demonstrated the greatest learning from the narrative text. The current study controlled for prior knowledge across all three discourse samples and provides additional evidence that different types of expository discourse may lead to variations in student performance. Thus, rather than relying on broad comparisons of narrative and expository discourse, researchers and clinicians would be better served to consider the various types of exposition and how these may impact performance. Results of the current study indicate that general intergenre contrasts (i.e., narrative vs. expository) may not capture the subtle differences that exist across types of expository discourse.

Findings of statistically significant differences between expository passages are consistent with past studies that also found variable student performance for distinct types of expository discourse (e.g., Chevront, 2002; Englert & Thomas, 1987; Richgels et al., 1987), although this study is the first to compare overall summary quality between these two different types of expository discourse. Summary quality scores were based on a rubric that included both macrostructural and microstructural variables, thus taking into account a richer representation of the entire summary compared with some past studies that have examined only microstructural variables (e.g., Nippold et al., 2007; Ward-Lonergan, 2010) or text level organizational awareness (e.g., Chevront, 2002; Richgels et al., 1987). This idea that a holistic evaluation is necessary for more robust assessment of discourse abilities is similar to past work using spontaneously generated expository samples by Berman and Nir-Sagiv (2007; problem-solution exposition) and Heilmann and Malone (2014; procedural exposition). The expository discourse examined in this current study, however, used a summarization task instead of spontaneous generation or retelling, because summarizing may be more relevant to student classroom performance (Leopold et al., 2013). Our results present novel evidence of adolescents' varied expository discourse performance using measures that may represent more comprehensive and academically valid forms of assessment.

As previously discussed, many past studies have used specific microstructural comparisons to evaluate discourse samples, and although a comprehensive assessment that includes text level judgments seems pertinent to assess discourse quality, there are various challenges related to the use of a scoring rubric. For example, is a holistic scoring rubric able to capture important differences that may (or may not) exist within the microstructural components of a discourse sample? When the additional microstructural comparisons for syntactic complexity (MLU and SI) were

analyzed, the analysis of MLU stratified syntactic complexity of the summaries in the same order as the overall rubric scoring for summary quality scores (cause–effect > narrative > compare–contrast). In the case of SI, however, contrary to findings from the scoring rubric on which participants had the highest scores for cause–effect summaries, narrative summaries had a significantly higher clause density than both types of expository summaries. Similar to overall rubric analyses, SI in cause–effect summaries was also significantly higher than in compare–contrast summaries. These findings are similar to those of Scott and Windsor (2000), who found MLU to be higher in descriptive expository summaries compared with narrative summaries but SI to be higher in narratives. Importantly, however, these findings demonstrate that important differences may exist within the expository genre itself. Using specific microstructural comparisons, these summaries show that both MLU and SI were lowest in compare–contrast expository summaries, compared with cause–effect expository and narrative summaries.

Currently, it remains unclear why students show performance differences on various expository tasks, as there are many contributing factors to consider. A student must have the language and cognitive abilities to comprehend a passage initially and then to produce an organized summary of that discourse passage. However, the specific demands of the task will also facilitate or impede a student's level of success. Factors such as the macrolinguistic and microlinguistic structure of the initial discourse model, prior knowledge of the material, and complexity of the information presented can impact performance. Future research should work to explore participant- and task-related factors specifically related to differences in intra-genre expository performance, because these questions have important curricular and clinical relevance.

The Role of Cognition and Expressive Syntax in Expository and Narrative Summary Quality

In regard to our second research question, results showed that a composite cognitive score contributed significantly as a predictor variable for both cause–effect and compare–contrast expository summary quality scores, supporting past research that identified the importance of cognitive skills in expository discourse comprehension and production (e.g., Carretti et al., 2005; Wolfe & Woodwyk, 2010). Despite past suggestions that summarization is dependent on the cognitive abilities assessed using the NIH Toolbox CB (i.e., episodic and working memory, processing speed, attention, and executive function; Chapman et al., 2006; Richgels et al., 1987), the composite cognitive score was not found to be a significant predictor for narrative summary production. Thus, these cognitive abilities appear to play a particularly important role in an expository summarization task, over and above that of a narrative summarization task. These findings are consistent with work by Wolfe (2005) and colleagues (Wolfe & Mienko, 2007; Wolfe & Woodwyk, 2010), whose studies examined some component

cognitive processes involved in recall of narrative versus expository texts (e.g., prior knowledge, memory).

Previous scholars have suggested that individuals must have advanced lexical and syntactic abilities to comprehend and produce the language required for expository discourse (Ehren, Murza, & Malani, 2012; Nippold, 2014). The utility of the relatively narrow expressive syntax score used in this study was supported by its correlation with the MLU microstructural analysis from all discourse samples (expository and narrative). On the other hand, the expressive syntax score was only significantly correlated with the SI microstructural measurement for the narrative summary, but not for either expository summary (see Supplemental Material S4). Similarly, regression analyses found that the expressive syntax score was a predictor of summary quality for the narrative passage but not for either expository passage. It is important to acknowledge that the expressive syntax measure used in this study is limited in its scope due to its related dependence on working memory abilities (e.g., Alloway & Gathercole, 2005; Poll et al., 2013). Thus, we cannot make broad conclusions about the relationship between expressive syntax abilities and these different discourse summaries. What is interesting, for the purposes of this study, however, is the finding that the predictive value of this expressive syntax score differed between narrative and expository summaries. Again, we see evidence that expository and narrative summaries appear to rely differentially on foundational syntax and/or working memory abilities.

Another possible explanation for the findings of different predictors between genres may relate to the syntactic structure of the original discourse lectures. As shown in Table 2, according to Coh-Metrix, both expository lectures had a greater percentage of syntactically simple sentences, when compared with the narrative lecture. The fact that the narrative model was more syntactically complex than the two expository models might have forced students to rely more heavily on their expressive syntax abilities when attempting to summarize the narrative lecture. In the microstructural analysis, the comparison of SI among summaries reinforces this explanation (wherein SI for narratives was significantly higher than both expository summaries), but the comparison of MLU (where cause–effect was higher than narrative and compare–contrast) does not. Prior studies have examined the syntactic complexity of discourse produced by students, without reporting on the syntactic complexity of the initial models provided to students (e.g., Berman & Nir-Sagiv, 2007; Scott & Windsor, 2000; Ward-Lonergan et al., 1999). To our knowledge, the current study is the first that has used Coh-Metrix to help describe the discourse models used to elicit narrative and expository summary productions. Future studies should report additional details about original discourse models so that we can establish a better understanding about how these variables might relate to a student's summary production. In this study, the syntactic complexity of the narrative model may help to explain the greater SI produced in narrative summaries compared with expository summaries, but it does

not explain the significant differences that were found between expository summaries. In these cases, the percentage of syntactically simple sentences in the models was very similar (cause–effect = 64% vs. compare–contrast = 72%), yet on all measures (overall summary quality, MLU, and SI), cause–effect summaries were found to be higher than compare–contrast, at levels of statistical significance.

The current study's summarization tasks were designed to be representative of lectures encountered within the middle school classroom. With further research, tasks such as these may be helpful in identifying children who exhibit learning challenges but perform within average limits on standardized tests of language. In addition, it would be important to know whether more comprehensive standardized language scores might predict expository discourse performance for those students who demonstrate below-average performance on standardized tests of language. Although this study expands our understanding of expository discourse, future work should include additional measures of receptive and expressive language to examine more thoroughly the contribution of specific language skills to expository discourse summarization tasks.

The Role of Age and SES in Expository and Narrative Summary Quality

Age and SES proved to be interesting explanatory variables that deserve attention in future studies. Past research has shown that lexical and syntactic abilities continue to develop into adulthood not only for narratives but also for expository passages (Berman & Verhoeven, 2002; Berman & Nir-Sagiv, 2007; Eason et al., 2012; Nippold et al., 2005). It is also well established that cognitive abilities integral to expository discourse processing, specifically executive functions, continue to develop during adolescence (Best & Miller, 2010; Best et al., 2011; Huizinga, Dolan, & van der Molen, 2006). This study, however, found that age was only a significant predictor of narrative summarization performance. Age at testing was not a significant predictor of summary quality for compare–contrast or cause–effect expository lectures, at least as assessed by a scoring rubric for these two types of exposition during the 5-year span of adolescence from 13 to 18 years old. An examination of individual participants' total summary quality scores revealed that even older students did not perform at ceiling (20 points) for these summaries. Thus, although the three lectures were rated at the Flesch-Kincaid seventh and eighth grade levels (see Table 2), they appeared to be challenging to summarize even for some participants who were entering 12th grade or had just graduated from high school. Age may play a role, however, in the specific skills needed to produce more complex language in the expository genre as a whole (e.g., as shown in studies by Berman & Nir-Sagiv, 2007, and Nippold et al., 2005). In addition, because the current study incorporated other variables (e.g., cognition, SES), it may be that the influence of these other variables minimized the predictive value of age on the expository summary tasks. Future research should investigate expository

discourse of younger children and older adults to examine development of both macrostructural and microstructural variables over a longer time span and in different expository activities to see if the contribution of age appears task dependent (e.g., related to topic or modality) versus expository type dependent.

Whereas age of participant did not contribute to the regression models for either expository lecture summary, race and income (SES factor 1) were found to be significant predictors of summary quality for both expository lectures but not the narrative lecture. In contrast, education and employment (SES factor 2) were not significant explanatory variables in any of the three models. These results support more recent findings that, contrary to methods used in some research, maternal education may not be the most appropriate proxy for SES (Cheng, Goodman, & Committee on Pediatric Research, 2015; Shavers, 2007). In addition, these findings extend the idea that SES variables can reflect important social and educational factors that may impact children's performance on academic tasks (Cheng et al., 2015), especially for racial minorities and those residing in low-income communities. As one example, Duke (2000) found that expository texts were significantly more scarce compared with narrative texts in classrooms from low-SES communities compared with those in high-SES communities in one metropolitan U.S. city. Yet, the goal of the Common Core State Standards is to make all students college- and career-ready (Common Core State Standards Initiative, 2015b), in part by introducing expository texts as early as kindergarten to increase student competency with this type of discourse. Because potential educational disparities related to race, ethnicity, and SES could have long-term impacts on students who are less able to access the language of the curriculum, this finding warrants additional study. Alternatively, it is possible that the findings in this study are specifically related to the sample of participants involved, and thus, future studies should continue to investigate the link between SES and performance on expository discourse tasks to see if these findings are replicated.

Limitations and Future Directions

Because the study of expository discourse is complicated by many factors, such as its division into a variety of types and the various methods for presentation and elicitation, the results of this study bring to light additional questions. The conclusions drawn from this study are limited to interpretation for compare–contrast and cause–effect summaries of social studies lectures and a narrative lecture wherein participants were not expected to have prior knowledge that required integration of old and new facts. These factors helped to control for the effects of prior knowledge on performance; however, in the case of school activities, and expository passages specifically, prior knowledge is expected, and students must be able to integrate newly learned facts with previously learned ideas. On the basis of previous studies (e.g., Best et al., 2008; Wolfe, 2005; Wolfe & Mienko, 2007), we would have expected to have

seen variability in performance as a function of prior knowledge had we not controlled for this by using passages about a fictional country. It is likely that the ability to integrate prior knowledge with newly learned information interacts with other factors, such as cognition and language. Future research may build on the present results by investigating expository summarization abilities in adolescents who are typically developing using pretests to assess prior knowledge and posttests to assess learning and comprehension (as in the study by Wolfe & Mienko, 2007). In addition, other types of exposition need to be researched so that educators and clinicians can develop a better understanding of the requirements of each type of discourse and how students who may struggle with language or learning might be affected by these differing demands. Furthermore, we must have a clearer understanding of whether any differences found are a result of the type of exposition or more dependent on task or topic. This information could also contribute to evidence-based curriculum development and clarify when certain types of discourse would be most appropriately introduced.

As discussed previously, both the model presented (Westerveld & Moran, 2013) and the way in which a discourse sample is collected can influence a student's performance on a discourse task (e.g., Berman & Verhoeven, 2002; Hiebert, Englert, & Brennan, 1983; Scott & Windsor, 2000; Westerveld & Moran, 2013). In future studies, careful consideration should be paid to the model of discourse given to students and how it might impact their performance. Studies that closely examine and describe the characteristics of the stimuli presented to participants will help to further our understanding of expository discourse in particular, especially as it relates to academically relevant material. Summarization from written materials and with written responses would provide additional ecologically valid information about how students comprehend and produce expository texts specifically, as this study examined verbal summary production only.

In addition, a five-trait scoring rubric was used as a means to assess overall summary quality for this study. The use of a scoring rubric aimed to improve on past work that focused only on component variables, but scoring rubrics can be subjective, making it a challenge to establish reliable scores (Koutsoftas & Gray, 2012). A scoring rubric like the one used in this study offers some advantages to speech-language pathologists whose job is to determine whether students struggle in discourse writing tasks, because it does not require transcription of discourse, division into clauses or utterances, and analysis with specialized software. On the basis of the additional analyses examining MLU and SI among these three types of discourse summaries, this study identified some similarities (MLU) and some discrepancies (SI) in performance quality, but the scoring rubric used in this study, incorporating both macrostructural and microstructural variables, did identify differences in overall quality and microstructural performance (syntactic complexity specifically). Further work is needed to improve on the rubric used in this study to create

a scoring system that would be easy, reliable, and valid for use by speech-language pathologists and educators.

Extending the sampling of students across grades, SES categories, and diagnostic categories is necessary to draw broader conclusions that could be relevant to more students. Because expository activities (writing, reading, presenting) are being taught earlier in elementary school, research is needed at all grade levels. Investigation of exposition in earlier grades would help to confirm that the established guidelines in the Common Core State Standards (2015a) are, in fact, appropriate for students' developmental abilities and allow identification of children who may be struggling with this complex activity to ensure that they are receiving the appropriate support services.

To extend the findings from this study, additional work is needed to clarify which components of cognition and/or language might best explain a student's performance on a narrative or an expository discourse task. Follow-up studies should consider a closer examination of different (or specific) components of cognition (e.g., episodic and working memory, processing speed, attention, executive function) to determine the relative contributions made by each component, depending on the type of exposition or the discourse task (e.g., reading, writing). For instance, does the contribution of a particular cognitive skill vary by expository type? Or is it consistent across the genre? Until we have additional research to clarify why various types of exposition might yield performance differences, we are unable to generate well-founded hypotheses. Differences were found in the correlations between expressive syntax score and specific microstructural variables (MLU and SI) between genres. Future studies should incorporate a more comprehensive measure of language performance as an additional predictor. An examination of the unique roles cognitive and linguistic variables might play when listening, speaking, reading, and writing in the various types of exposition would clarify which skills might be most essential for expository production or comprehension. In addition, these types of analyses will help to explain any performance differences we might find between the various types of exposition.

Conclusions

This study examined adolescents' ability to summarize one narrative and two types of expository discourse with similar linguistic demands. The tasks were designed to be academically relevant and to control for prior knowledge. Findings from this study confirm past work that has identified differences between expository and narrative productions and extends that by pointing to differences within expository subgenres. In addition, this study offers new information about the differences between narrative and expository productions and the impact that expository discourse type may have on middle and high school student performance in a summarization task. In addition, by exploring possible predictors of summary quality, this study shows that a composite cognitive score was predictive of performance on both expository tasks, whereas an expressive syntax score was

predictive of performance on the narrative task. Further work is needed to replicate these findings as they relate to the component skills needed for competence among expository types and/or discourse tasks. These findings have implications for educators and clinicians who must determine if students who struggle in the classroom are in need of support services focusing on the language of the curriculum. Further work to explore expository discourse will inform curriculum development and provide paths to innovative assessment and intervention methods supporting the success of children and adolescents in the classroom and beyond.

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