

Original Article

Production of morphologically complex words in the narrative and expository writing of third- and fourth-grade children with and without ADHD

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Purpose Writing draws on morphologically complex words, which children with attention-deficit/hyperactivity disorder (ADHD) may be constrained in producing. Taking words produced in actual compositions as the unit of analysis, the present study aimed to compare how often and how diversely third- and fourth-grade children with and without ADHD used morphologically complex words across two genres.

Methods Thirty-five children (17 with ADHD and 18 typically developing [TD]) whose reading and spelling were within the average range completed a narrative and an expository writing task. Words were classified as single, inflected, derived, or compound. For each word type, the rate of use per T-unit and the number of different words were computed, and four word-level writing errors (morpheme omission, spelling, inappropriate application, and semantic substitution) were counted. Data were analyzed using three-way mixed ANOVAs (group × genre × word type).

Results Only the group main effect was significant for the rate of use, with no interaction involving group. For the number of different words, the group main effect and every interaction involving group were significant, including the three-way interaction. In narrative writing, word-type differentiation was more graded in the TD group, although a direct between-group comparison of the derived-compound contrast was not significant. Spelling errors predominated in both groups, with no significant group difference detected.

Conclusions Children with ADHD allocated morphological resources similarly to TD children but produced fewer different words: because they also produced fewer words overall and this measure was not length-normalized, this may partly reflect lower overall text production and is interpreted cautiously as a potential rather than established reduction in lexical-morphological diversity, descriptively most apparent for derived words in narrative writing. Assessment and intervention should address diversity by genre and word type, not frequency alone.

Keywords ADHD, morphologically complex words, composition, genres, word type

INTRODUCTION

Writing, classified as a higher-order language ability for expressing thought in written form, represents a foundation for academic learning, and its importance has grown across the school years. In their cognitive theory of writing, Hayes and Flower [1] described composition in terms

of three processes: planning ideas, translating them into words, and reviewing them. Berninger and Swanson [2] adapted this model for the early stages of writing development and children with writing difficulties by dividing the translation stage into two steps: transcription and text generation. Because text generation involves retrieving words and realizing them in sentence form, the writer must be able to skillfully manipulate the morphological

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structure of words in line with the communicative intent. As proposed by Berninger and Amtmann [3], writing comprises transcription, text generation, and higher-order executive functions, such as planning, goal setting, and revision. Moving beyond earlier models that merely distinguish the subcomponents of writing, this model specifies a resource-allocation mechanism in which these three components share and compete for limited working memory. Accordingly, as transcription and text generation become more fluent, they reduce processing demands, thereby freeing attention for higher-level goals; as more resources become available for higher-order processes, writing quality improves [4]. The ability to handle morphological structures at the text-generation stage is particularly important because morphological manipulation allows meaning to be refined and context-appropriate syntactic forms to be selected. Combining a known root with a new affix to form a new word allows a writer to express an intended meaning more precisely and concisely [5]. Further, the ability to flexibly convert a verb into a noun, or vice versa, broadens the options for constructing sentences [5,6]. As word retrieval and formation become more fluent, the processing burden of transcription and text generation decreases, and attention can be allocated to higher-order goals [4,7].

A substantial proportion of academic vocabulary consists of complex words containing two or more morphemes. Their frequency in content-area reading materials increases across grades [6,7], which can pose a reading difficulty [8]. According to the lexical quality hypothesis [9], words whose phonological, orthographic, and semantic constituents are represented in the mental lexicon in a strongly integrated form can be accessed more easily. Morphology serves as a binding agent that links meaning, orthography, and phonology, thereby increasing processing efficiency [10]. In the texts of children in the early stages of reading development, which are predominantly composed of single-morpheme words, the role of morphological awareness may be limited [11]; however, as

children progress to reading longer sentences and texts, morphological awareness is increasingly required [12]. Because morphemes consistently recur across different words, they support orthographic decoding and strengthened meaning connections [13]. This awareness of the morphological structure contributing to reading development has been widely documented [9-11]. Because reading and writing share a common basis in the quality of morphological, orthographic, and semantic representations [14], this contribution may extend beyond reading to encompass writing. Indeed, morphological awareness has shown significant explanatory power in sentence-writing tasks that require syntactic manipulation [15], helping children manipulate known words by changing affixes to express their intended meanings more precisely and concisely. However, contributions to reading do not guarantee contributions to writing; whereas reading interprets a given morphological structure, writing requires the writer to select and construct the required morphological structure, which imposes additional retrieval and production demands.

Morphological awareness is defined as the explicit, conscious understanding of word morphology and the ability to manipulate word constituents to analyze words, identify their components, and understand each semantic element [14]. Apel [16] previously proposed an expanded definition encompassing awareness of affix meanings in the syntactic categories formed when affixes attach to base words and roots, as well as of the spoken and written forms of morphemes. This definition indicates that morphological awareness may be relevant to reading and writing at both the text and word levels. Morphological awareness is typically measured using tasks that require children to consciously manipulate morphological structures, such as morpheme segmentation, synthesis, and analogy. Morphological knowledge is a distinct concept that refers to a child's representation of morphemes and morphological rules, regardless of whether they are consciously accessible [17]. Distinct from both is the manner in which morphological resources are realized in actual

production, an aspect referred to as the production of morphologically complex words in the present study. McCutchen and Stull [17] jointly analyzed the accurate use, errors, and invention of morphological structures in children's compositions and reported that morphological knowledge is only partially realized in production. Groves [18] previously categorized morphological errors in third-grade children's writing samples to describe how morphological knowledge is manifested in actual writing.

Korean is an agglutinative language in which morphological resources are organized differently from those of English; therefore, a separate classification system is required. Following Jung's [19] classification, the present study divides the words children produced in compositions into two categories: single words, composed of one morpheme, and complex words, composed of two or more morphemes combined. Complex words were further subdivided into inflected (conjugated forms), derived, and compound words, in which an ending attaches to a stem, an affix attaches to a root, and a root combines with another root, respectively. These three types differ in their time of acquisition and cognitive demand: in writing, children first use inflected and familiar derived structures before gradually moving toward more complex derived structures [6]; in spelling development, they rely on phonological and orthographic strategies around the third grade and increasingly adopt morphological strategies from around the fourth grade [15].

While research measuring children's morphological awareness has predominantly focused on whether they can recognize, synthesize, segment, and reason analogically about the morphological structure of words, the key question in composition is how morphological awareness is used in actual production. Therefore, directly identifying the morphological structure of words used in a composition and examining the types of morphological errors can offer considerable insight into how children use morphological knowledge [18]. Morphological awareness is revealed not only in accurate production but also in error patterns. Because children use phonological strategies early

in spelling development and later shift to morphological strategies [20], morphological errors may serve as an index reflecting the developmental stage of morphological awareness. Groves [18] classified morphological errors into morpheme omission, morphological spelling errors, morphological attempts, wrong words, and wrong homophones and examined developmental differences across grades 3 to 5. Significant differences in the total number of morphological errors, morphological attempts, and morpheme omissions were observed. This was interpreted as resulting from exposure to more complex speech structures, the provision of explicit instruction in morphological structures, and increased use of word knowledge gained through reading. Korean studies have previously distinguished spelling errors into phonological, orthographic, and morphological processing errors to examine group patterns, confirming that in grades one to three, both groups showed the most phonological processing errors and the fewest morphological processing errors, indicating that lower-grade children cannot yet make sufficient use of morphological strategies [21]. However, there is a need to examine how the pattern of morphological errors changes around the fourth grade [15], when the use of morphological strategies begins to increase, and to determine whether this pattern differs between groups with writing difficulties. In other words, grades 3 and 4 are transitional periods in which morphological strategies emerge and begin to expand in earnest; therefore, examining individual and group differences in the deployment of morphological resources is meaningful.

However, the manner in which morphological awareness is mobilized in composition may vary with the genre being written, because narrative and expository texts differ in terms of their text structure, syntactic complexity, and cognitive demands. Narrative texts are organized around temporal sequences and familiar structures that children encounter early through everyday oral experiences, while expository texts are organized around logical relations, such as the definition, classification, and com-

parison of concepts, and require decontextualized academic language. Comparing the two genres of texts produced by school-age children, Scott and Windsor [22] reported that expository texts were shorter than narrative texts; had higher syntactic complexity, as measured by words per T-unit; and contained more errors. Moreover, the two genres require different morphological resources. Comparing narrative and expository texts produced by the same participants on the same topic, Berman and Nir-Sagiv [23] reported that the two genres were clearly distinguishable across several morphosyntactic dimensions, including verb types and tense/mood categories, and that this distinction was already evident in the 9–10-year-old group. Ravid [24] previously analyzed all nouns in texts produced by children and adolescents by semantic category, finding that expository texts were, from an early age, the preferred habitat for abstract and categorical nouns, whereas concrete nouns appeared only in narrative texts. In Korean, narrative writing must also express the temporal sequence and causal relations of events and therefore requires inflectional forms such as tense pre-final endings, aspect markers, and connective endings that link events. In contrast, expository writing must name, classify, and compare concepts, and is therefore commonly realized through derived words that combine nominalizing and derivational suffixes and through compound words that combine Sino-Korean roots.

Why children with ADHD? In addition to socio-emotional problems, many children with ADHD show learning problems arising from difficulties with impulse control and attention, the most representative of which is reading difficulty [25,26], although writing difficulties have also been reported. Indeed, one prior study on reading and writing deficits in 326 children with ADHD found that reading and writing deficits occurred at similar rates [27]. In another study that administered picture-description, oral-description, and story-writing tasks to sixth- and seventh-graders and younger children, children with ADHD produced shorter texts than controls, received lower scores

than controls for appropriateness, structure, grammar, and vocabulary, and made more errors [28].

Writing comprises a series of processes, including planning, generating, organizing, and transcribing ideas, as well as reviewing and revising them [1]. Executive function deficits in children with ADHD may be related to their poor performance in these writing processes [29,30]. Children with ADHD often devote less time to planning and reviewing their writing [31]; furthermore, because writing draws on a limited working-memory capacity shared across its components, they may experience a burden in generating ideas and translating them into language [4]. Considering the simple view of writing, under conditions of intensified resource competition, the first elements to be curtailed are likely to be those with high processing costs; retrieving and constructing morphologically complex words is necessarily costlier than using a single word. In addition, children with ADHD have been found to use more ambiguous references and to produce narratives containing more morphosyntactic errors in a narrative-production task, while third- and fourth-grade children with ADHD showed lower performance and a higher error rate than typically developing children on a derived-word morphological awareness task [32]. However, while Jeon [32] verified the level of awareness in a testing situation, how that awareness is realized in an actual composition, and whether its realization varies by genre, have not yet been examined.

Moreover, research on the morphological structure of writing has focused predominantly on spelling and spelling-error analysis; however, because spelling is a word-level transcription skill, it has a limited capacity to explain the text-level construction of meaning, which is the ultimate product of writing. In Korean, in particular, connective endings and particles do not remain within the word but instead participate directly in sentence linkage and textual cohesion; therefore, the contribution of morphological resources is likely not confined to spelling. Studies that use actual composition samples as their units of

analysis have been limited to developmental perspectives or children with learning disabilities. Among them, Jung [19] applied the same word-type classification used in the present study (single, inflected, derived, compound) to the compositions of third- and fifth-grade children to examine the relationship between morphological awareness and composition, reporting that in both grades, single words and inflected complex words were used most commonly, while on the single topic “my dream” compound-word production remained at floor level, and thus indicated the need to expand to writing that is richer in information and more varied in genre. Because morphological awareness is a mechanism that helps secure working-memory resources, it may be vulnerable in ADHD, and this vulnerability may manifest differently in narrative versus expository writing; however, few studies have directly compared this vulnerability across morphological types.

Accordingly, the present study analyzed the morphological structure of words produced by third- and fourth-grade TD children and children with ADHD in both narrative and expository writing to clarify how the production of morphologically complex words varies across groups and genres. In doing so, we distinguish between how often morphological resources are used (rate of use per T-unit) and how diversely they are used (number of different words), and examine patterns of morphological errors by type. The present study differs from prior work in that it considers the words produced in actual composition samples as its unit of analysis. This makes it possible to examine not whether morphological awareness is possessed, but rather how it is deployed in production, and, by further examining how it manifests across genres, to reveal the conditions under which the vulnerability of particular morphological resources becomes apparent.

METHODS

Participants

This study enrolled 17 children with ADHD and 18 TD children in the third and fourth grades of elementary school (35 children in total). The ADHD group comprised children diagnosed with ADHD by a pediatric psychiatrist based on the DSM-5 criteria, confirmed through a caregiver report. The TD group comprised children whose scores on the abbreviated Conners Parent Rating Scale (CAPRS) were below the cutoff of 17 (range 0–13) and for whom no developmental problems, including ADHD, were reported by caregivers.

All children in the ADHD group had received a clinical diagnosis of ADHD from a pediatric psychiatrist; however, detailed clinical characteristics of the ADHD group—such as ADHD presentation/subtype and comorbid conditions—were not systematically collected in the present study. However, caregivers were advised to ensure that, as far as possible, the child had taken their usual medication before attending the assessment session. This is addressed in the Limitations section.

Common inclusion criteria for both groups were as follows: (1) an intelligence quotient of 85 or above on the Korean Comprehensive Test of Nonverbal Intelligence, Second Edition (K-CTONI-2) [33]; (2) a Reading Index 2 (composed of decoding, reading fluency, and reading comprehension) of 85 or above on the Korean Language-based Reading Assessment (KOLRA) [34]; (3) a dictation score at or above the 25th percentile; and (4) a receptive vocabulary score above -1 SD on the Receptive and Expressive Vocabulary Test (REVT) [35]. Children with any accompanying visual, auditory, or neurological disorders were excluded.

Children with ADHD show high comorbidity with reading and writing disorders [25]; as such, when decoding and spelling deficits co-occur, it is impossible to distinguish whether a decline in composition arises from the charac-

Table 1. Overview of the participant characteristics

Characteristic	ADHD (n = 17)	TD (n = 18)	<i>t</i>
Age (months)	111.82 (7.97)	114.50 (7.67)	1.012
Nonverbal intelligence (K-CTONI-2)	100.82 (7.08)	102.94 (10.47)	0.697
Receptive vocabulary (REVT)	112.33 (19.94)	114.83 (12.77)	0.462
Reading index 2 (KOLRA)	100.23 (10.81)	104.89 (11.04)	1.259
Dictation (KOLRA)	28.12 (0.48)	28.50 (0.28)	0.690

Note: Values are presented as the Mean (SD). ADHD, children with attention deficit hyperactivity disorder; K-CTONI-2, Korean Comprehensive Test of Nonverbal Intelligence, Second Edition; KOLRA, Korean Language-based Reading Assessment; REVT, Receptive and Expressive Vocabulary Test; TD, typically developing.

teristics of attention and executive function or from deficits in basic literacy skills. Accordingly, the ADHD group comprised children whose reading and spelling abilities were at the level of their peers. As this study sought to determine whether there is a point at which the production of morphologically complex words is not explained by deficits in basic literacy skills alone, we targeted children with ADHD whose decoding, reading comprehension, and dictation levels were controlled to the peer range. Accordingly, the results of the present study cannot be generalized to all children with ADHD, which is a limitation addressed in the Discussion.

Independent-samples *t*-tests revealed no significant differences between the two groups in terms of chronological age, performance (nonverbal) intelligence, vocabulary, or reading and spelling abilities, confirming between-group homogeneity (Table 1).

Instruments

Participant selection tools

For all children, in addition to differences in ADHD diagnostic status, the following standardized tests were administered to confirm that language, reading ability, and intelligence were at the peer-average level and that there were no differences between the two groups. The K-CTONI-2 [33] measures nonverbal intelligence without a language medium and comprises two scales (pictorial and geometric) and six subtests. The REVT [35] measures receptive and expressive vocabulary from ages 2;6 to adult-

hood; it includes a receptive vocabulary subtest, and percentile ranks were derived from raw scores. The KOLRA [34] is a standardized test that evaluates the reading and reading-related abilities of school-age children, comprising core subtests of decoding, reading fluency, reading comprehension, and listening comprehension, as well as detailed subtests of phonological processing and writing. In the present study, reading ability was indexed by Reading Index 2, which sums decoding, reading fluency, and reading comprehension, and spelling ability was measured by the dictation subtest. Reading tests were administered despite this being a composition study, as noted above, to exclude the confounding effects of reading deficits; dictation was used to control transcription ability, a subskill of composition. The CAPRS [36] is a parent-rated scale comprising 10 items assessing ADHD symptoms, each rated from 0 to 3, for a possible total score of 30. Since the domestic standardization study classified scores of 17 or above, corresponding to +2 SD above the mean, as a suspected ADHD group, the present study applied this criterion and constituted the TD group with children scoring 16 or below.

Writing tasks

To examine children's use of morphological awareness in composition, the present study employed two types of writing tasks (narrative and expository) used by Woo and Jung [37]. To elicit composition and reflecting the prior study by Richgels et al. [38], graphic organizer materials that helped children to distinguish and appropri-

ately connect main and supporting ideas were provided to encourage spontaneous writing. Drawing on prior studies by Ko [30] and Yoo and Chung [39], picture stimuli suited to each writing-task type were presented to enhance the effects of visual cues and promote spontaneous writing. Such support reduces the burden of the planning stage and allows children to allocate resources to the text-generation stage, which aligns with the aim of this study to observe the deployment of morphological resources.

Narrative writing was conducted by providing, before writing, the graphic organizer material that Woo and Jung [37] supplemented based on Kang's [40] "Understanding Story Structure, Stage 1" organizer. This organizer helps children understand the elements of setting, characters, events, attempts, and outcomes, thereby helping them construct a story. Scenes that could prompt writing centered on story-grammar elements were selected from the wordless picture book *The Fence Must Come Down* [41].

Expository writing involved a task of producing a compare–contrast expository text on the topic of "rabbits and tigers." A compare–contrast writing task was adopted in consideration of the prior finding that expository discourse is classified into collection, causation, problem–solution, and compare–contrast structures [42] and because one goal of the third-grade writing curriculum is to write so that similarities and differences are revealed. Reflecting the compare–contrast content of "puppies and cats" from Kim and Yoon [43], the researcher revised and supplemented the material before providing it.

The validity of the two tasks was assessed by three raters who held doctoral degrees in speech-language pathology and level-1 speech-language pathologist certification and had more than 10 years of clinical experience. When rated on a 4-point scale, the results were 3.75 for the narrative organizer, 3.79 for the narrative picture, 4.0 for the expository organizer, and 3.69 for the expository photograph.

Procedures

The procedure for collecting the children's writing data exactly followed that outlined by Woo and Jung [37]. To confirm task comprehensibility and feasibility, a pilot test was conducted on three typically developing third- and fourth-grade children. After the pilot test, an additional instruction sheet was prepared, noting writing cautions and stating that writing should relate to the provided picture or photograph.

The main test was administered after confirming participant eligibility through screening. Each task proceeded in the following order: the graphic organizer was provided first, and the writing method was explained; then, the pre-prepared picture or photograph was provided, and the instructions were read aloud. For the narrative, children were instructed—in both spoken and written modes—that they "should write so that the reader understands the characters and events well and remembers them for a long time." For the expository, they were similarly instructed that they "should write so that the reader understands and remembers the similarities and differences between the two animals well." Each task was limited to 20 min. Narrative and expository writing were counterbalanced to eliminate any order effects.

Data analysis

Word type classification

All words produced in the composition samples were classified as single or complex words (inflected, derived, compound), following Jung's [19] analysis criteria. A word comprising one morpheme, or with only a particle attached, was analyzed as a single word (e.g., 꼬리(가) 'tail (+particle)', 둘 'two'). Among complex words, a conjugated single-morpheme verb or adjective (e.g., 작다 'to be small', 달린다 'runs') or a noun conjugated with the copula "-이다" (e.g., 집이었다 'was a house') was analyzed as inflected. A combination of two roots was analyzed as a compound

(e.g., 줄무늬 'stripe'), while combinations of a root with an affix were analyzed as derived words (e.g., 먹이 'feed'). Cases in which “-하다” was attached to form a derived verb, or in which a passive or causative affix was attached to form a derived verb, were analyzed as different types when the endings differed (e.g., 먹이다 'to feed', 먹이며 'feeding and'). Contracted forms were expanded to their original forms for analysis, and words that were repeated in their entirety were excluded from the count of different words. However, when the root or stem was the same but an ending made the form different, it was analyzed as a different type.

Word-level writing errors

Word-level writing errors in the children's composition samples were analyzed, drawing on Groves's [18] classification and considering the characteristics of Korean, into four types: morpheme omission, spelling error, inappropriate application, and semantic substitution. A morpheme-omission error was defined as omitting a contextually obligatory particle (e.g., omission of the particle “-는” in “호랑이가 더 크고 토끼 아주 짧다” 'the tiger is bigger and the rabbit [is] very short') or omitting part of a root, stem, or ending (e.g., “여우는 깜짝 놀(라) 어쩔 줄 몰랐어요” 'the fox was so startled it did not know what to do'). Spelling errors were defined as cases in which the morphological structure was appropriate but the orthographic representation was incorrect (e.g., writing 다르다 'to be different' as 달르다). Cases in which a morphological structure was attempted but applied inappropriately included cases where a particle or ending was attached to a root or stem in a way not appropriate to the context (e.g., writing 자신의 'one's own' as 자신에). Writing 몸짓 instead of 몸집 'body build' was included in semantic errors.

The diagnostic significance of the four types for morphological processing differed. Morpheme omission and inappropriate application are directly related to the selection and combination of morphemes and thus reflect

morphological processing, whereas spelling and semantic errors are more closely related to orthographic processing and lexical retrieval, respectively. This study analyzed all four types but, rather than collectively terming them “morphological errors,” named them “word-level writing errors,” and limited the interpretation of morphological processing to the former two types.

Reliability

To verify the reliability of this analysis, the compositions of seven children (20% of the total sample) across the two genres (seven expository and seven narrative) were randomly sampled and independently analyzed by a second analyst who held a doctoral degree in speech-language pathology and level-1 speech-language pathologist certification. The second analyst was trained in advance on the analysis criteria and examples and was not provided with any individual group information. Inter-rater reliability was computed by dividing the number of agreements by the sum of agreements and disagreements and multiplying by 100. The resulting agreements were 99.45% for word-type classification and 95% for error-type classification. Percentage agreement was used because each token was assigned to mutually exclusive categories; however, because this index does not correct for chance agreement, it has a limitation. Accordingly, in the Discussion we suggest that future studies additionally report a chance-corrected statistic, such as Cohen's κ .

Statistical analysis

To compare the rate of use, the number of different words, and error characteristics for single and complex words (inflected, derived, compound) between children with ADHD and TD children in composition, analyses were conducted using SPSS 25.0. Two dependent measures were computed for each word type: the rate of use per T-unit, which normalizes production frequency by syntactic output, and the number of different words, an index of lexical-morphological diversity. Because the num-

ber of different words is inherently sensitive to total output, it was interpreted together with the length-normalized rate-of-use measure, and its length sensitivity was taken into account when interpreting group differences (see Discussion). For Research Questions 1 and 2, three-way mixed ANOVAs were conducted with group (ADHD, TD), genre (narrative, expository), and word type (single, inflected, derived, compound) as independent variables, and the rate of use per T-unit and the number of different words per word type as dependent variables. For Research Question 3, two-way mixed ANOVAs were conducted for each genre, with group (between-subjects) and error type (within-subjects) as independent variables and the number of errors as the dependent variable. When the sphericity assumption was not met for effects involving a repeated-measures factor, the Greenhouse–Geisser correction was applied. Significant main effects and interactions were followed up with paired-samples t-tests. For a significant three-way interaction, the Genre $\times$ Word Type interaction was examined separately within each group, followed by simple-effects comparisons of word types within each genre and of genres within each word type. To control the family-wise Type I error rate, the p-values of all follow-up comparisons were adjusted using the Holm–Bonferroni method within each family of comparisons. Effect sizes were reported as partial η^2 and, because categorical benchmarks can be misleading in small samples, were interpreted descriptively rather than against fixed cutoffs.

RESULTS

Use of single and complex words by composition genre

Rate of use per T-unit by word type and genre

The rate of use per T-unit of each word type by composition genre for children with ADHD and TD is presented in Table 2. Children with ADHD showed a lower rate of use per T-unit than TD children across all word types, for each genre. When the rates of the four types across the two genres were combined, the total rate of use for all word types was lower for children with ADHD than for TD children.

To examine whether the rate of use per T-unit by word type differed by group and genre and whether there was an interaction among the three variables, a three-way mixed ANOVA was conducted with group (ADHD/TD), genre (expository/narrative), and word type (single/inflected/derived/compound) as independent variables, and the rate of use per T-unit as the dependent variable. For effects involving word type, the Greenhouse–Geisser correction was applied because the sphericity assumption was not met. Table 3 presents the results of these analyses.

First, the main effect of group was statistically significant, $F(1, 33) = 5.39$, $p = .027$, partial $\eta^2 = .140$; that is, the rate of use per T-unit differed significantly between the two groups. Second, the main effect of genre was significant, $F(1, 33) = 31.95$, $p < .001$, partial $\eta^2 = .492$, with the rate

Table 2. Descriptive statistics of words per T-unit by group, genre, and word type

Word type	ADHD (n = 17)			TD (n = 18)		
	Expository	Narrative	Total	Expository	Narrative	Total
Single	2.167 (0.668)	3.058 (0.918)	5.225	2.482 (0.918)	3.389 (1.062)	5.871
Inflected	1.029 (0.175)	1.654 (0.547)	2.683	1.291 (0.520)	2.024 (0.546)	3.315
Derived	0.278 (0.280)	0.494 (0.230)	0.772	0.403 (0.365)	0.687 (0.224)	1.090
Compound	0.385 (0.244)	0.373 (0.158)	0.758	0.474 (0.281)	0.344 (0.208)	0.818
Total	3.859	5.579	9.438	4.650	6.444	11.094

Note: Values are presented as the Mean (SD), where the total is the sum of the mean rates per T-unit. ADHD, children with attention deficit hyperactivity disorder; TD, typically developing.

Table 3. Mixed ANOVA of the words per T-unit by group, genre, and word type

Source	<i>df</i>	<i>F</i>	<i>p</i>	Partial η^2
Group	1.000	5.39	.027	.140
Error: Child(Group)	33.000			
Genre	1.000	31.95	< .001	.492
Group $\times$ Genre	1.000	0.01	.906	.000
Error: Genre $\times$ Child(Group)	33.000			
Word type	1.416	324.58	< .001	.908
Group $\times$ Word type	1.416	1.28	.279	.037
Error: Word type $\times$ Child(Group)	46.733			
Genre $\times$ Word type	1.607	17.48	< .001	.346
Group $\times$ Genre $\times$ Word type	1.607	0.23	.750	.007
Error: Genre $\times$ Word type $\times$ Child(Group)	53.041			

Note: Degrees of freedom and *p*-values for effects involving word type were adjusted using the Greenhouse–Geisser correction. Partial η^2 indicates the effect size.

of use per T-unit higher in narrative than in expository writing. Third, the main effect of word type was significant, $F(1.42, 46.73) = 324.58$, $p < .001$, partial $\eta^2 = .908$; differences in the rate of use by word type were pronounced, with single words used most, followed by inflected, then derived and compound words. This effect's partial η^2 of .908 was the largest in the study. Fourth, the genre $\times$ word type two-way interaction was significant, $F(1.61, 53.04) = 17.48$, $p < .001$, partial $\eta^2 = .346$, indicating that the pattern of use by word type varied with genre. Specifically, the rates of single and inflected words increased markedly in narrative relative to expository writing, while the rate of compound words differed little across genres or even decreased somewhat in narrative writing. The following remaining interactions were all nonsignificant: group $\times$ genre, $F(1, 33) = 0.01$, $p = .906$, partial $\eta^2 = .000$; group $\times$ word type, $F(1.42, 46.73) = 1.28$, $p = .279$, partial $\eta^2 = .037$; and the group $\times$ genre $\times$ word type three-way interaction, $F(1.61, 53.04) = 0.23$, $p = .750$, partial $\eta^2 = .007$. This suggests that the patterns of change in the rate of use by genre and word type were similar between the two groups.

Holm-adjusted pairwise comparisons of the word-type main effect showed that most word types differed significantly, although the derived–compound difference

was nonsignificant when collapsed across genre ($t(34) = 1.93$, adjusted $p = .062$). For the genre $\times$ word type interaction, the narrative–expository difference was significant for single, inflected, and derived words (all adjusted $p \leq .004$) but not for compound words ($t(34) = -1.34$, adjusted $p = .189$). Within expository writing the derived–compound difference was nonsignificant (adjusted $p = .200$), whereas all other word-type differences were significant; within narrative writing all word-type differences were significant (all adjusted $p < .001$).

Number of different words by composition genre for the two groups

The descriptive statistics for the number of different words by composition genre for the two groups are presented in Table 4. Children with ADHD produced fewer total words than TD children and showed lower performance on the number of different words used in both expository and narrative writing. When examined by word type, the ADHD group showed lower performance across all word-type subdomains.

To examine whether the number of different words by word type differed by group and genre, and whether there was an interaction among the three variables, a three-way mixed ANOVA was conducted with group, genre, and

Table 4. Descriptive statistics of the number of different words by group, genre, and word type

Word type	ADHD (n = 17)			TD (n = 18)		
	Expository	Narrative	Total	Expository	Narrative	Total
Single	11.41 (3.37)	25.53 (9.51)	36.94	13.56 (5.24)	35.39 (11.82)	48.95
Inflected	9.00 (3.26)	18.94 (8.42)	27.94	11.39 (4.38)	28.89 (10.33)	40.28
Derived	2.12 (1.36)	4.88 (2.87)	7.00	3.06 (1.73)	7.89 (3.16)	10.95
Compound	3.18 (2.13)	3.76 (2.05)	6.94	4.44 (3.31)	4.83 (3.01)	9.27
Total	25.71	53.11	78.82	32.45	77.00	109.45

Note: Values are presented as the Mean (SD), where the total is the sum of the mean number of different words. ADHD, children with attention deficit hyperactivity disorder; TD, typically developing.

Table 5. Mixed ANOVA of the number of different words by group, genre, and word type

Source	<i>df</i>	<i>F</i>	<i>p</i>	Partial η^2
Group	1.000	11.98	.002	.266
Error: Child(Group)	33.000			
Genre	1.000	89.15	< .001	.730
Group $\times$ Genre	1.000	4.99	.032	.131
Error: Genre $\times$ Child(Group)	33.000			
Word type	1.746	268.31	< .001	.890
Group $\times$ Word type	1.746	5.87	.007	.151
Error: Word type $\times$ Child(Group)	57.621			
Genre $\times$ Word type	1.857	66.08	< .001	.667
Group $\times$ Genre $\times$ Word type	1.857	3.82	.030	.104
Error: Genre $\times$ Word type $\times$ Child(Group)	61.290			

Note: The error terms represent the denominator's degrees of freedom for each effect in separate rows. Degrees of freedom and *p*-values for effects involving word type and their error terms were adjusted using the Greenhouse–Geisser correction.

word type as independent variables and the number of different words as the dependent variable. For effects involving word type, the Greenhouse–Geisser correction was applied because the sphericity assumption was not met. Table 5 presents the results of this analysis.

The three-way mixed ANOVA revealed significant main effects for all three independent variables. The number of different words in the composition differed significantly between the two groups, $F(1, 33) = 11.98$, $p = .002$, partial $\eta^2 = .266$; the main effect of genre was also significant, $F(1, 33) = 89.15$, $p < .001$, partial $\eta^2 = .730$, with more words used in narrative writing; and the main effect of word type was significant, $F(1.75, 57.62) = 268.31$, $p < .001$, partial $\eta^2 = .890$, with the number of different words greatest for single words, followed by inflected, then derived and compound words. The effect size for word type

was the largest.

Regarding the number of different words, all the interactions among the three variables (group, genre, and word type) were significant. The group $\times$ genre interaction was significant, $F(1, 33) = 4.99$, $p = .032$, partial $\eta^2 = .131$, such that the increase in the number of different words from expository to narrative writing differed between the two groups. The group $\times$ word type interaction was also significant, $F(1.75, 57.62) = 5.87$, $p = .007$, partial $\eta^2 = .151$, with the number of different words by word type differing by group. The genre $\times$ word type interaction was likewise significant, $F(1.86, 61.29) = 66.08$, $p < .001$, partial $\eta^2 = .667$. Further, the group $\times$ genre $\times$ word type three-way interaction was significant, $F(1.86, 61.29) = 3.82$, $p = .030$, partial $\eta^2 = .104$; that is, the pattern of change in the number of different words by word type

across genres differed between the two groups. Because the three-way interaction was significant, the Genre $\times$ Word Type interaction was examined separately within each group, and follow-up paired-samples *t*-tests were Holm-adjusted within each family. For genre, both groups produced significantly more different words in narrative than expository writing for single, inflected, and derived words (all adjusted $p \leq .008$), whereas compound words did not differ between genres in either group (ADHD, $t(16) = 0.76$, adjusted $p = .457$; TD, $t(17) = 0.50$, adjusted $p = .623$). Within narrative writing, TD children differed significantly across all four word types, including a significant derived-compound difference ($t(17) = 3.87$, adjusted $p = .003$)—that is, the full hierarchy single > inflected > derived > compound. In contrast, children with ADHD did not significantly distinguish derived from compound words ($t(16) = 1.83$, adjusted $p = .086$), although all of their other word-type differences were significant (all adjusted $p < .001$). Within expository writing, both groups showed the pattern single, inflected > derived, compound, with the derived-compound difference non-significant in both groups (ADHD, adjusted $p = .132$; TD, adjusted $p = .118$). A focused Group $\times$ Word Type contrast testing whether the derived-compound difference in narrative writing differed between the groups was not significant, $F(1, 33) = 3.70$, $p = .063$, partial $\eta^2 = .101$. Thus, although the derived-compound difference reached significance within the TD group but not within the ADHD group, the groups did not differ significantly on this specific contrast; accordingly, this pattern is described rather

than inferred as the source of the three-way interaction.

Word-level writing errors of the two groups by composition genre

Descriptive statistics for the four error types by composition genre for the two groups are presented in Table 6. Overall, children with ADHD showed somewhat higher error frequencies than TD children in both the expository and narrative writing tasks. In both groups, spelling errors were the most frequent across genres, with the subsequent order differing by genre. For children with ADHD, when the two genres were combined, the order was spelling error > inappropriate application > morpheme omission > semantic error. However, in expository writing, morpheme omission (0.47) exceeded inappropriate application (0.29), while in narrative writing, inappropriate application (1.47) exceeded morpheme omission (1.12). For TD children, the combined order was spelling error > inappropriate application > morpheme omission and semantic error; in expository writing, morpheme omission (0.17) exceeded semantic error (0.00), whereas in narrative writing, semantic error (0.56) exceeded morpheme omission (0.39).

To examine whether group differences in errors by composition genre were statistically significant, a two-way mixed ANOVA was conducted for each genre. The Greenhouse-Geisser correction was applied to the degrees of freedom and *p*-values for effects involving error type. The results are presented in Table 7.

Table 6. Descriptive statistics of error counts by group, genre, and error type

Error type	ADHD (n = 17)			TD (n = 18)		
	Expository	Narrative	Total	Expository	Narrative	Total
Morpheme omission	0.47 (0.72)	1.12 (1.22)	1.59	0.17 (0.38)	0.39 (0.78)	0.56
Spelling error	2.94 (3.09)	5.00 (5.59)	7.94	2.44 (2.53)	3.28 (2.99)	5.72
Inappropriate application	0.29 (0.47)	1.47 (1.42)	1.76	0.39 (0.78)	1.22 (1.22)	1.61
Semantic error	0.18 (0.53)	0.53 (1.23)	0.71	0.00 (0.00)	0.56 (0.70)	0.56
Total	3.88	8.12	12.00	3.00	5.45	8.45

Note: The values are presented as the Mean (SD), where the total is the sum of the mean error counts. ADHD, children with attention deficit hyperactivity disorder; TD, typically developing.

Table 7. Mixed ANOVA of error counts by group and error type for each genre

Genre	Source	df	F	p	Partial η^2
Expository	Group	1.000	0.73	.399	.022
	Error(Group)	33.000			
	Error type (GG)	1.207	24.34	< .001	.424
	Group $\times$ Error type (GG)	1.207	0.25	.665	.008
	Error(Error type)	39.817			
Narrative	Group	1.000	1.66	.207	.048
	Error(Group)	33.000			
	Error type (GG)	1.284	20.39	< .001	.382
	Group $\times$ Error type (GG)	1.284	1.10	.317	.032
	Error(Error type)	42.375			

Note: Group (between-subject) $\times$ error type (within-subject) effects were tested separately for each genre. The degrees of freedom and p-values for marked effects '(GG)' were adjusted using the Greenhouse–Geisser correction.

In expository writing, only the main effect of error type was significant, $F(1.21, 39.82) = 24.34$, $p < .001$, partial $\eta^2 = .424$; error frequency differed significantly by error type, with spelling errors most frequent and the other types (morpheme omission, inappropriate application, semantic) relatively rare. In contrast, the main effect of group, $F(1, 33) = 0.73$, $p = .399$, partial $\eta^2 = .022$, and the group $\times$ error type interaction, $F(1.21, 39.82) = 0.25$, $p = .665$, partial $\eta^2 = .008$, were both nonsignificant. Similarly, in narrative writing, only the main effect of error type was significant, $F(1.28, 42.37) = 20.39$, $p < .001$, partial $\eta^2 = .382$, with spelling errors markedly more common; the main effect of group, $F(1, 33) = 1.66$, $p = .207$, partial $\eta^2 = .048$, and the group $\times$ error type interaction, $F(1.28, 42.37) = 1.10$, $p = .317$, partial $\eta^2 = .032$, were both nonsignificant. In both genres, spelling errors were the most frequent, while morpheme omission, inappropriate application, and semantic errors were relatively rare. However, the mean frequencies of the three errors were very low, ranging from 0 to 1.47, indicating a floor effect; the nonsignificant group effects (partial $\eta^2 = .022$ –.048) should therefore be interpreted as a failure to detect a difference under the present sampling and measurement conditions rather than as evidence of group equivalence.

DISCUSSION

Overall, the present study analyzed the morphological structure of words and the word-level writing errors produced by third- and fourth-grade children with ADHD and TD children, whose reading and spelling abilities were at the peer level, in narrative and expository writing to examine how the production of morphologically complex words varies by group and genre. Rather than describing what children know about morphological structure, this study aimed to describe how they allocate morphological resources and the extent to which they realize them in actual composition.

Rate of word use by genre and word type

In the rate of use per T-unit, the main effect of word type showed the largest effect size (partial $\eta^2 = .908$), yielding a clear hierarchy in which single words were used most, followed by inflected, then derived and compound words. This is consistent with the developmental order of morphology, in which children first use inflected and familiar derived structures before gradually progressing to more complex derived structures [6,15,44]. This is similar to Jung's [19] finding, from an analysis of third- and fifth-grade compositions using the same word-type classi-

fication, that single words and inflected complex words were used most frequently in both grades. As such, this hierarchy of use by morphological type can be regarded as a relatively stable production characteristic across grades and groups.

The main effect of genre was also significant, with a higher rate of use in narrative than in expository writing (partial $\eta^2 = .492$), and the genre $\times$ word type interaction was significant. Specifically, the rates of single and inflected words increased markedly in narrative relative to expository writing, while compound words differed little across genres. This may reflect the fact that narrative writing requires inflectional forms—tense prefinal endings, aspect markers, and connective endings—to express the temporal sequence and causal relations of events, whereas in expository writing, which names, classifies, and compares concepts, the relative proportions of compound and derived words combining Sino-Korean roots are maintained [22-24]. Although the main effect of group was significant (ADHD < TD), no interaction involving group was significant. This suggests that the two groups maintained a similar relative structure in allocating morphological resources across genres and word types, while children with ADHD showed a lower overall intensity of production.

Dissociation between the rate of use and diversity

The most notable result of the present study is that the pattern of group effects clearly diverged between the two dependent measures. For the rate of use per T-unit, only the main effect of group was significant, and no interaction involving group was significant, whereas for the number of different words, the main effect of group and all interactions involving group (group $\times$ genre, group $\times$ word type, and the three-way interaction) were significant. The effect size of the group main effect was also larger for diversity than for the rate of use. In other words, the two groups showed a similar response struc-

ture in how often they used morphologically complex words but showed different patterns—by genre and word type—in how diversely they realized them.

This suggests that children with ADHD maintained a relative structure of allocating morphological resources similar to that of TD children, while showing more pronounced constraints in the range of distinct vocabulary through which they realized each morphological type. In other words, these children used derived words where derived words were called for, but the number of derived words they could mobilize was narrow. This dissociation cannot be captured by prior approaches that reported the rate of use and diversity together as a single “ability to use morphologically complex words,” and it demonstrates the value of a design that observes the two measures separately.

This pattern is consistent with the lexical quality hypothesis [9], according to which words whose phonological, orthographic, and semantic constituents are strongly integrated can be more easily retrieved, and with the view that morphology functions as a binding agent linking meaning, orthography, and phonology [10]. The more elaborate and integrated the morphological representation, the easier it may be to retrieve diverse derived forms from a single root; as such, when representational quality is lower, the breadth of retrieval may narrow before the rate of use does. This also points in the same direction as Jeon's [33] finding that third- and fourth-grade children with ADHD showed lower performance and higher error frequency on a derived-word morphological-awareness task; however, because the present study did not directly measure morphological awareness, the convergence of the two findings should be interpreted only as agreement in direction. More broadly, because morphological awareness and working memory were not directly assessed, these mechanistic accounts are advanced as hypotheses rather than as established explanations.

It should also be noted that the number of different words is sensitive to total output. Because the ADHD

group produced somewhat fewer words overall, the group difference in diversity may partly reflect a difference in overall lexical productivity rather than lexical-morphological diversity per se. Because the diversity measure is not length-normalized, future studies should employ length-robust diversity indices (e.g., MATTR, MTLT, or D), or fixed-length measures such as NDW computed over an equal number of words, to disentangle reduced lexical productivity from reduced lexical diversity.

Selectivity of group differences by genre and word type

Descriptively, the clearest divergence in the three-way interaction appeared in the derived-compound differentiation in narrative writing; a direct between-group contrast of this difference, however, was not significant ($F(1, 33) = 3.70, p = .063$), so it is described rather than inferred as an established group difference. TD children produced significantly more different derived than compound words, expanding the more complex derived category well beyond compounding, whereas children with ADHD did not significantly distinguish the two (derived $\approx$ compound). Descriptively, the divergence appeared concentrated in the derived category rather than distributed uniformly across morphologically complex words, with children with ADHD not showing the derived-compound separation observed in TD children.

Why derived words, rather than inflected or compound words, showed the clearest group difference may be understood in terms of their linguistic and cognitive demands. Producing a derived word requires selecting among competing derivational affixes and integrating the resulting change in the word's syntactic category and meaning, and Korean derivational forms tend to be lower in frequency and in semantic-orthographic transparency than inflected forms. Derivation may therefore place greater demands on lexical retrieval, morphological analysis, and semantic integration—and, under the resource competition described

by the simple view of writing, on executive control—than inflection, whose paradigms are highly regular, or compounding, which in Korean (particularly with Sino-Korean roots) is often comparatively lexicalized and formulaic. This account is consistent with the developmental finding that complex derived structures emerge later than inflected and familiar derived forms [6,15,44] and with Jeon's [33] report of derived-word difficulties in children with ADHD; however, because the present study did not directly measure these component processes, it should be regarded as a hypothesis for future investigation.

The group difference was also larger in narrative than in expository writing. Although expository writing, which requires decontextualized academic language, is cognitively more demanding, in the present study it yielded a smaller amount of production overall in both groups and was supported by an organizer that required a fixed compare-contrast structure, so the room for lexical expansion was structurally limited. In contrast, narrative writing involved greater production and greater lexical freedom, leaving more room for the individual breadth of morphological resources to be revealed. The enlargement of group differences in narrative writing may therefore arise from the breadth of lexical expansion the genre permitted rather than from the genre's inherent cognitive difficulty. This interpretation should be made cautiously, however, because the two tasks differed not only in genre but also in topic, discourse structure, elicitation materials, and the lexical affordances they provided: the expository task followed a constrained compare-contrast structure ("rabbits and tigers"), whereas the narrative task permitted broader lexical production. Some of the observed narrative-expository differences may therefore reflect task-specific lexical opportunities rather than genre per se. Bearing this caveat in mind, the present result is nonetheless in line with the follow-up task suggested by Jung [19], who proposed expanding to information-rich writing because compound-word use remained at floor level on a single topic ("my dream"). When genre was

expanded, group and genre interacted in the diversity of derived and compound words, indicating that when evaluating the production characteristics of morphologically complex words, genre should be treated as an independent variable rather than a control variable.

Word-level writing errors

In the error analysis, only the main effect of error type was significant for both expository and narrative writing; the main effect of group and the group $\times$ error type interaction were not significant, while spelling errors predominated in both genres. This predominance of spelling errors is consistent with prior research suggesting that children still rely heavily on phonological and orthographic strategies and that the use of morphological strategies is still developing at this stage [15,20], as well as with a domestic report that phonological processing errors were the most frequent and morphological processing errors were the least frequent in the lower elementary grades [21].

Two factors likely contributed to the absence of a detectable group difference. The first is a design factor. The failure to detect a group difference may be partly related to restricting both groups to children whose dictation performance was within the peer range; however, the nonsignificant result does not establish equivalence in composition-level spelling performance. The second is a measurement factor. Because the mean frequencies of morpheme omission, inappropriate application, and semantic errors remained between 0 and 1.47, a floor effect was present; thus, rather than interpreting the absence of a group difference as substantive equivalence, it is more reasonable to regard the difference as not detected at the present sample length.

Furthermore, of the four error types analyzed herein, those that directly reflect morphological processing are morpheme omission and inappropriate application, whereas spelling and semantic errors are more closely tied to or-

thographic processing and lexical retrieval, respectively. Future studies will require a design that targets only morphological-level errors while increasing the sample length to secure a sufficient error frequency. In short, what distinguished the two groups in the present study was not the “amount” of errors but the “breadth” of expanding morphologically complex words.

The results of this study can be directly compared with those of Woo and Jung [37], who analyzed text-level cohesive markers in the same composition samples produced by the same children. In that study, children with ADHD used significantly fewer cohesive markers with lower accuracy, indicating particular difficulty with lexical cohesion. Combined with the reduced diversity of morphologically complex words confirmed in the present study, these children's writing vulnerabilities were consistently revealed at the levels of expanding vocabulary and binding text, rather than in the frequency of word-level errors.

That word-level morphological resources and text-level cohesion are constrained in the same direction in the same children suggests that the writing profile of children with ADHD may be understood not as a deficit confined to a particular level, but rather along a common axis: the breadth of production resources linking vocabulary, morphology, and cohesion.

Clinical implications

These results suggest that writing instruction for children with ADHD might focus not only on correcting errors but also on helping them produce more diverse morphologically complex words, particularly derived words. In light of reports that explicit instruction in morphological structure has positive effects on children's writing [45], strategy instruction that guides children in forming multiple derived forms from a single root and in analyzing the morphological structure and semantic relations of derived words in context may be useful. Because the

present study was observational and did not evaluate an intervention, however, these suggestions should be regarded as hypotheses for future intervention research rather than as intervention effects established by the present data.

In addition, the group difference was, descriptively, most apparent for derived words in narrative writing (the direct between-group contrast was not significant), which has implications for the choice of intervention context. Because discourse contexts that involve extensive production and high lexical freedom, such as narrative tasks, provide ample room for lexical expansion, they may be well suited to supporting the broadening of the diversity of morphologically complex words. For diagnosis and assessment, because relying solely on the frequency of use of morphologically complex words may underestimate these children's vulnerability, we additionally propose computing diversity indices such as the number of different words, interpreted together with a length-normalized index.

Limitations and suggestions for future research

This study has several limitations. First, morphological awareness was not measured directly. As such, our results describe not what children know about morphological structure but what they realized in production, and the observed group differences cannot be attributed to differences in morphological awareness. Future research should include morphological-awareness tests, such as morpheme segmentation, synthesis, and analogy tasks, alongside production data to examine the relationship between morphological awareness and its deployment in production. In addition, working memory was not directly assessed; interpretations that attribute the reduced diversity in the ADHD group to working-memory or other executive constraints are therefore advanced as hypotheses rather than conclusions, and future studies should administer component measures of working memory

(e.g., verbal and visuospatial storage and updating).

Second, the target children were limited to those with ADHD who did not have reading or spelling difficulties. This design was intended to exclude the confounding effect of basic literacy skills but simultaneously limits the generalizability of the results. Different patterns may appear in children with ADHD who have accompanying reading and writing deficits, and subgroup comparisons according to comorbidity status are needed.

Third, grades 3 and 4 are transitional periods in which morphological strategies emerge and expand; as such, they encompass an age range with potentially large individual- and grade-level differences. Because of sample-size constraints, this study could not include grade as an independent variable. Future research should include grades 5 and 6, in which morphological strategies stabilize, to examine developmental change.

Fourth, the sample was small ($N = 35$), which limits statistical power, particularly for higher-order effects. The group $\times$ genre $\times$ word type interaction ($p = .030$) should therefore be interpreted with caution and replicated in larger samples; where feasible, future studies should also report an a priori power analysis.

Fifth, detailed clinical characteristics of the ADHD group—including ADHD presentation/subtype; medication status and the type, duration, and day-of-assessment use of medication; age at symptom onset; age at diagnosis; symptom severity; and comorbid developmental or psychiatric conditions—were not systematically documented or verified. Although caregivers were advised to have the child take their usual medication on the assessment day, actual medication status was not recorded. Consequently, the observed group differences cannot be attributed to specific ADHD clinical features, and future studies should document these characteristics to support interpretation and reproducibility.

CONCLUSION

Overall, the present study found that third- and fourth-grade children with ADHD, whose reading and spelling abilities were at the peer level, were similar to TD children in the relative structure of allocating morphological resources in composition, but produced fewer different words. Because the ADHD group also produced fewer words overall and the number of different words was not length-normalized, this difference may partly reflect lower overall text production and is therefore interpreted cautiously as a potential—rather than an established—reduction in lexical-morphological diversity, one that was descriptively most apparent for derived words in narrative writing. In contrast, no group difference was detected in the frequency of word-level writing errors under the present sampling and measurement conditions. This suggests that, at this stage, the writing vulnerability of children with ADHD is revealed in the breadth of their expanding use of morphologically complex words rather than in the number of morphological errors, and that this pattern appears selectively by genre and word type.

By describing the production characteristics of morphologically complex words along two separate axes (rate of use and diversity), the present study identified the locus of a group difference that could not be captured by a single index. However, because the underlying mechanisms of the observed differences—morphological knowledge, lexical retrieval, and executive function including working memory—were not distinguished in the present design, and because the diversity measure was not length-normalized, future research that combines production data with direct measurement of each subskill and with length-controlled diversity indices is required. Clinically, a genre-sensitive approach that expands the diversity of morphologically complex words, particularly derived words, may be worth prioritizing in writing instruction for children with ADHD, pending confirmation in intervention studies.

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