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Language Variation in the Writing of African American Students: 6 Factors Predicting Reading Achievement

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Abstract

Purpose: To examine the predictive relation between measures obtained from African American students' written narrative language samples and reading achievement, as measured by standardized academic assessments.

Method: Written language samples were elicited from 207 African American students in grades 1-8. The samples were examined for morphosyntactic variations from standardized written Generalized American English (GAE). These variations were categorized as either (a) specific to African American English (AAE) or (b) neutral across AAE and standardized written GAE (i.e., considered ungrammatical both in AAE and in standardized written GAE). Structural equation modeling was employed to then examine the predictive relation between the density of AAE-specific forms in students' writing and their performance on standardized assessments of literacy and reading vocabulary. This relation was examined while accounting for the density of dialect-neutral morphosyntactic forms, reported family income, age, and written sample length.

Results: The written samples were highly variable in terms of morphosyntax. Younger students and those from lower-income homes tended to use AAE-specific forms at higher rates. However, the density of AAE-specific forms did not significantly predict standardized literacy scores or reading vocabulary after accounting for dialect-neutral variations, income, and sample length.

Conclusions: These results support the ongoing need to better understand the language, literacy, and overall academic development of students from all backgrounds. It may be essential to focus on dialect-neutral language forms (e.g., morphosyntactic forms that are consistent across both AAE and standardized written GAE) in written samples to maximize assessment validity across students who speak varying dialects of English.

45   In 2019, only 18% of African American students met criteria for reading proficiency on

46 the National Assessment of Educational Progress (U.S. Department of Education, 2019).

47 Approximately 11% of African American students met criteria for writing proficiency (National

48 Center for Education Statistics, 2012). The overrepresentation of African American individuals

49 among students performing at below-basic levels has received considerable attention in recent

50 years (Gatlin & Wanzek, 2017; Washington et al., 2019). Numerous factors, such as

51 socioeconomic background and variability in the quality of language and literacy environments,

52 have been explored as contributors to this vulnerability for academic underachievement, but no

53 single factor provides a complete explanation (Terry et al., 2018). For example, although African

54 American students are more likely to come from low-income backgrounds than are Caucasian

55 students (Reardon et al., 2018), gaps in academic performance exist after controlling for

56 socioeconomic status and school composition (Bohrnstedt et al., 2015; Reardon et al., 2019).

57 Given the multifaceted and structural mechanisms (e.g., systemic racism) that underly

58 achievement gaps (Merolla & Jackson, 2019), there is a need to evaluate predictors of

59 achievement in a more comprehensive framework, to gain a fuller picture of students'

60 experiences and environments, and how they might contribute to literacy development.

61   The body of literature examining literacy development among African American students

62 includes relatively few studies that have focused specifically on the development of written

63 language skills (Gatlin & Wanzek, 2015; Ivy & Masterson, 2011; Puranik et al., 2019). Writing

64 is a critical skill not only for general academic learning and annual standardized testing, but also

65 as a metric for evaluating ability related to higher education and suitability for employment.

66 Written performance is commonly used to monitor progress in educational settings and therefore

67 is of particular interest as a key component of overall academic achievement (National Center for

68 Education Statistics, 2019; Wagner et al., 2011).

69   For African American students, nonmainstream dialect use has been suggested as a

70 potential explanatory factor for observed achievement gaps (see Siegel, 1999), given that

71 correlations have been observed between nonmainstream dialect use and the development of

72 literacy-related skills, including writing (Gatlin & Wanzek, 2015). Although all individuals

73 speak a dialect, some American dialects other than Generalized American English (GAE; also

74 called Standardized American English or Mainstream American English) have been

75 discriminatorily stigmatized as "inferior" language systems (Baker-Bell, 2020; Brown, 2019;

76 Dovchin, 2020). It is important to emphasize that all dialects are rule-bound systems with no

77 inherent superiority or inferiority. Although it is common to not recognize GAE as a specific

78 dialect (Hamilton et al., 2018), GAE is neither exceptional nor the default dialect of American

79 English (Charity Hudley et al., 2018; Oetting et al., 2016).

80   Dialects of American English other than GAE have been broadly termed

81 "Nonmainstream American English." African American English (AAE), a dialect most

82 commonly spoken with variable density by African American individuals in the U.S., is one such

83 Nonmainstream American English (NMAE) dialect that has unique morphological, semantic,

84 syntactic, phonological, and pragmatic rules (Baker-Bell, 2020; Stockman, 2010). Some of the

85 morphosyntactic forms of AAE overlap with several other NMAE dialects such as Southern

86 White English (Oetting, 2019) and Gullah/Geechee (Berry & Oetting, 2017). Some of these rules

87 contrast with rules of GAE, whereas other rules of AAE are consistent or neutral to GAE

88 (Charity et al., 2004; Washington & Craig, 2002). In the present paper, we use the term "dialect-

89 neutral" to refer to morphosyntactic and phonological rules that are consistent across AAE and

90 GAE (Terry, 2014). We use the term "AAE-specific" to refer specifically to rules of AAE that

91   are contrastive with GAE, and "dialect-specific" to refer generally to rules of NMAE dialects

92   that are contrastive with GAE (Stockman, 2010).

93   Researchers have observed a negative association between African American students'

94   density of AAE-specific forms and their reading development (Craig, Connor, et al., 2003; Terry

95   et al., 2016). Much of this literature was synthesized in a 2015 meta-analysis Gatlin and Wanzek

96   conducted to quantify the relation between the density of nonmainstream dialect-specific forms

97   and literacy development. Findings revealed an overall moderate negative correlation between

98   the density of dialect-specific forms and literacy performance, unmoderated by socioeconomic

99   status or grade level (Gatlin & Wanzek, 2015). Critically, the authors highlighted the need for

100   caution in interpreting these findings as indicative of linguistic interference (i.e., NMAE

101   negatively impacting literacy development). Dialectal variation provides only a single piece of

102   the complete picture, which must be viewed in context to better understand achievement gaps

103   observed between African American and Caucasian students (Gatlin et al., 2016; Terry et al.,

104   2018).

105   The overall purpose of the present paper was to evaluate the relation between African

106   American students' density of AAE-specific forms in writing and their reading achievement,

107   while accounting for socioeconomic status and dialect-neutral writing skills. In the following

108   literature review, we summarize work that has examined the relations between dialectal variation

109   and achievement, detail the value of focusing on the density of dialect-specific forms, and

110   describe our approach for examining the written language of African American students.

111   **Dialect Use and Academic Achievement**

112   Numerous studies have examined the relations between students' dialectal variation and

113   their literacy skills (Kohler et al., 2007; Terry et al., 2012, 2016). In considering this body of

114   literature, it is essential first to review how dialectal variation has generally been operationalized.

115   Many studies quantify dialectal variation by counting how often dialect-specific forms appear in

116   samples of students' language and then computing a token-based measure of frequency of

117   occurrence, or "dialect density" (Horton-Ikard & Miller, 2004; Washington & Craig, 2002).

118   Three widely used token-based measures of dialect density, which were reviewed by Oetting and

119   McDonald (2002), account for both the number of dialect-specific forms observed and the length

120   of the language sample obtained to reduce the impact of bias contributed by transcript length. For

121   example, one dialect density measure (DDM) is the ratio of utterances that contain one or more

122   dialect-specific forms to the total number of utterances produced. Another DDM is the ratio of

123   the total number of dialect-specific forms in the sample to the total number of words produced

124   (Craig et al., 1998; Craig & Washington, 2000, 2002). Studies that have examined correlations

125   between these DDMs and students' reading performance have found significant negative

126   associations (Gatlin & Wanzek, 2015).

127   Both morphosyntactic and phonological AAE-specific forms have been quantified in

128   research using measures of dialect density (Terry, 2006; Washington et al., 2018). AAE-specific

129   morphosyntactic forms include variable past tense -ed marking (e.g., "He *walk* there yesterday"

130   where "yesterday" indicates that the action is past tense) and multiple negatives to intensify

131   negation (e.g., "He *don't* see *nothin*" ; Thompson et al., 2004; Washington & Craig, 2002).

132   AAE-specific phonological forms include pronunciation of the printed "-ing" as /ɪn/ (e.g.,

133   "running" pronounced /rʌnɪn/) and initial "th-" as /d/ (e.g., "though" pronounced /doʊ/; Craig,

134   Thompson, et al., 2003; Thomas, 2007). These forms may appear both in the spoken and written

135   language of AAE speakers (Ivy & Masterson, 2011; Patton-Terry & Connor, 2010). See Craig

136   and Washington (2004) for a list of AAE-specific morphosyntactic and phonological forms.

137   African American individuals exhibit wide variability in AAE use, indicating first that

138 not all African American students speak AAE and secondarily that dialect-specific forms may be

139 produced differently in different contexts (Jencks, 1998; Terry et al., 2016; Thompson et al.,

140 2004). Among students who do speak AAE, there exists a well-documented ability to dialect

141 shift (i.e., adjust the frequency of use of AAE-specific forms) based on the context. For example,

142 Horton-Ikard and Miller found that students produced AAE-specific forms at differing rates

143 when asked to tell stories about past experiences compared to when they engaged in simple

144 conversation with a Caucasian clinician (2004). Similar results have been observed in

145 comparisons of density of AAE-specific forms in sentence repetition tasks relative to

146 storytelling, with GAE-based sentence repetition yielding lower density of AAE-specific forms

147 than storytelling (Connor & Craig, 2006).

148   The ability to dialect shift fluently based on context and, in particular, to reduce use of

149 AAE-specific forms in school-based contexts has been suggested to be an indicator of

150 metalinguistic skill, which in turn may contribute to literacy development and broader academic

151 achievement (Craig et al., 2009, 2014; Terry et al., 2012). To dialect shift fluently, an individual

152 must not only develop awareness of dialect-specific and dialect-neutral forms, but also of

153 contexts in which certain dialectal forms may be preferred and others stigmatized (Latimer-

154 Hearn, 2020). Individuals generally are expected to develop these skills without explicit

155 instruction or acknowledgement of biases underlying linguistic stigma (Terry et al., 2018),

156 though there are exceptions (e.g., Edwards & Rosin, 2016; Johnson et al., 2017).

157 **AAE-Specific Forms in Writing**

158   Writing may represent a context in which students are more explicitly taught to use fewer

159 AAE-specific forms (Horton-Ikard & Pittman, 2010; Johnson et al., 2017). Overall, children who

160 speak AAE tend to use fewer AAE-specific forms in written contexts compared to oral language

161 (Craig et al., 2009; Patton-Terry & Connor, 2010), a trend that may be attributable to the

162 formality of academic language more commonly expected in written communication relative to

163 spoken communication (Charity Hudley et al., 2018; Puranik et al., 2019). High-achieving

164 speakers of AAE seem to pick up on this trend, often "dialect shifting" or "code switching"

165 without direct instruction, exhibiting fewer AAE-specific forms in their writing (Craig et al.,

166 2009) and generally reducing the density of AAE-specific forms in their language as they get

167 older (Ivy & Masterson, 2011). Highly stigmatized forms such as *ain't*, multiple negation, and

168 habitual *be* are examples of some AAE-specific forms that appear less frequently in writing

169 when compared to spoken communication (Ivy & Masterson, 2011).

170 　　　　Students who struggle academically, however, may not pick up on these implicit

171 expectations (Craig et al., 2009; Hendricks & Diehm, 2020; Terry et al., 2010). Therefore,

172 students with lower overall language skills and academic achievement may exhibit a higher

173 density of AAE-specific forms in their writing.

174 　　　　An increasing number of studies have focused specifically on African American students'

175 writing and the potential influence of AAE-specific forms on writing development. This work

176 suggests that, among African American students who speak AAE, variability in spelling and

177 written morphosyntax may be in part attributable to contrasts between spoken AAE and written

178 academic language expectations (Gatlin & Wanzek, 2017; Patton-Terry & Connor, 2010;

179 Puranik et al., 2019). For example, Horton-Ikard and Pittman (2010) examined the written

180 language samples of 10th-grade African American students and observed some AAE-specific

181 morphosyntactic forms in their writing. The density and diversity of these forms, however, was

182 lower than that observed in their oral language (Horton-Ikard & Pittman, 2010). Ivy and

183 Masterson (2011) compared written and oral language samples of African American students in

184 third and eighth grade. They identified six grammatical forms specific to AAE for coding,

185 including the zero forms of: verbal *–s*; plural *–s*; possessive *–s*; regular past tense *–ed*; *be* copula;

186 and the *be* auxiliary. Among third graders, no statistically significant differences were found in

187 the density of AAE-specific forms between oral and written modalities. However, eighth graders

188 demonstrated a significantly higher density of AAE-specific forms in spoken language compared

189 to written language, suggesting that older students had developed the ability to dialect shift

190 within the written language context (Ivy & Masterson, 2011).

191 **Present Study**

192 　　Underlying, inherent language ability is not determined by mainstream versus

193 nonmainstream dialect use and using a nonmainstream dialect in and of itself does not lead to

194 literacy difficulties (Lee-James & Washington, 2018; Terry et al., 2018). Both children with and

195 without language disorders may use dialect-specific forms with varying densities. Therefore, to

196 examine the specific contribution of nonmainstream dialect density to reading achievement,

197 accounting for both dialect-specific and dialect-neutral forms may be necessary (Oetting et al.,

198 2016, 2019). In the present study, we account for dialect-neutral language ability through two

199 types of measures. First, we computed density measures for dialect-neutral variations from

200 standardized written GAE (Fogel & Ehri, 2000), counting forms that would be considered

201 ungrammatical in both AAE and standardized written GAE. For example, the sentence "They

202 run jump" includes omission of the conjunction *and*. Conjunction omission violates the rules of

203 both AAE and standardized written GAE, and therefore would be considered a dialect-neutral

204 variation. Second, we included measures of written language productivity (e.g., number of

205 different words, total number of t-units) to account for variance reduction due to sample length,

206 which can lead to inaccurate estimations of language ability (Hendricks & Adlof, 2017).

207 Socioeconomic status, another key influencer of academic success (Dietrichson et al.,

208 2017), may be confounded with the density at which individuals use dialect-specific forms

209 (Charity et al., 2004). African American students are more likely to live in impoverished

210 environments and attend under-resourced schools due to systemic racism (Reardon et al., 2018,

211 2019). Consequently, to disentangle the precise relation between nonmainstream dialect density

212 and achievement, socioeconomic status should be considered (Craig et al., 2009).

213 In the present study, we sought to evaluate the predictive relation between African

214 American students' written use of AAE-specific forms and their reading achievement. We

215 included general writing productivity, family income, and dialect-neutral written variations as

216 covariates. As noted above, it is well-established that the three included covariates influence

217 language, literacy, and overall academic performance. Therefore, their inclusion allows for a

218 more precise examination of the unique relation between nonmainstream dialect-specific forms

219 and literacy achievement. We examined written language samples produced by African

220 American students between grades 1-8 in response to a narrative prompt. We addressed the

221 following questions:

222 1. What are the general descriptive characteristics of written, personal narrative

223 language samples produced by African American students in grades 1-8?

224 2. How often do AAE-specific morphosyntactic forms appear in the students' written

225 language samples?

226 3. Does the density at which AAE-specific morphosyntactic forms appear in students'

227 writing samples predict reading achievement when also accounting for dialect-neutral

228 ungrammatical forms, writing productivity, and family income?

	Method
229	

230 **Participants**

231   The current study utilized a sub-sample of school-aged children who participated in the

232 Florida Twin Project on Reading, Behavior and Environment, a large study of twins attending

233 schools throughout Florida (Taylor et al., 2019). Participants were selected from the larger study

234 based on their caregivers' report of their race/ethnicity. All children whose parents reported their

235 race/ethnicity as "African American" were included. This sample included 207 children, with 95

236 complete twin pairs and an additional 17 singleton participants whose twins did not complete the

237 narrative prompt. Participants were in 1st through 8th grade, with an average age of 11.5 years.

238 Demographic information for included children is provided in Table 1 at the child level.

239   [insert Table 1]

240 **Procedure and Measures**

241   Standardized, state-level achievement measures were administered by trained proctors as

242 part of statewide testing required by normal school attendance. Test scores were uploaded into

243 Florida's Progress Monitoring and Reporting Network (PMRN). Schools also reported

244 participants' eligibility for free or reduced-price lunch.

245   During the 2012-2013 school year, questionnaires and testing packets were mailed to the

246 homes of participants enrolled in the larger project (Taylor et al., 2019). Parents completed self-

247 report measures concerning their children's race and family SES. Parent education was reported

248 on a 1-8 scale, with "1" indicating Grade 6 or less and "8" indicating graduate or professional

249 school. Parents also reported yearly household income on a 1-12 scale at $19,000 intervals. The

250 value "1" specified an income below $10,000 and "12" indicated $210,000 or more per year.

251   Parents were also asked to administer a battery of achievement tests, including subtests

252 from the Gates-MacGinitie Reading Test- 4th Edition (MacGinitie & MacGinitie, 2006) and the

253 narrative writing prompt, to their twins using a scripted elicitation guide. Neither task requires

254 special qualifications or training, and both may be group-administered. Written instructions

255 included "We would like for you to 'play teacher' and read the directions as if you were

256 speaking to a classroom and monitor the twins so that you can ensure they do their work

257 individually..." (also see Daucourt et al., 2020). Parents were asked to report any testing that did

258 not occur as instructed, and the investigators made case-by-case decisions on data quality for any

259 inconsistencies described. All parents provided informed consent and children provided assent to

260 participate as approved by the Florida State University Institutional Review Board.

261 **Written language samples**. Language samples provide snapshots of children's

262 expressive language use and can reveal variations in language that predict later achievement

263 (Horton-Ikard, 2010; Moyle et al., 2007; Rojas & Iglesias, 2013). Written narratives were

264 elicited using the prompt, "One day when I got home from school….." in the child's natural

265 setting (e.g., home) similar to written prompts used in other studies to examine school-age

266 children's written language skills (Bahr et al., 2012; Dockrell et al., 2014). Children used pencils

267 and were instructed to write on lined paper provided to the parents by the researchers. The

268 writing task was untimed and not constrained in length; however, caregivers were told the

269 activity should take 10-15 minutes. This elicitation strategy was selected because it is

270 naturalistic, simple for caregivers to administer, and appropriate for a wide age range.

271 *Transcription of samples*. Undergraduate students enrolled in the speech-language

272 pathology major typed the written samples into electronic transcript files. Transcripts were then

273 formatted using Systematic Analysis of Language Transcripts (SALT) software and conventions

274 (Miller & Iglesias, 2017), and segmented into t-units by undergraduate research assistants

275   following conventions of segmenting writing samples (Price & Jackson, 2015). All research

276   assistants received training in SALT transcription and segmentation and demonstrated at least

277   90% reliability with the first author on word-by-word transcription, t-unit segmentation, and

278   SALT conventions on practice transcripts. Practice reliability was established on each of these

279   components of transcription before research assistants began transcribing the research samples.

280   ***Measures of written language productivity***. Several standard measures of language

281   sampling were obtained from the formatted transcripts (Miller & Iglesias, 2017). Number of total

282   words (NTW), a measure of transcript length and broad semantics, was obtained by counting the

283   number of words written in the sample. The number of different words (NDW), which is a

284   measure of lexical diversity, was computed by summing the total number of different root words

285   included in the sample. Mean length of t-unit (MLTU), a measure analogous to MLU that

286   quantifies morphosyntactic complexity, was computed by dividing the number of total

287   morphemes in a sample by the total number of completed t-units in the sample. Total number of

288   t-units (TNU), another measure of transcript length, was obtained by summing the number of t-

289   units. (Price & Jackson, 2015).

290   ***Coding written language forms***. Two research assistants first independently coded each

291   of the written narratives for grammatical, spelling, and punctuation forms that would be

292   considered variations relative to standardized written GAE (Fogel & Ehri, 2000; Horton-Ikard &

293   Pittman, 2010). The identified grammatical forms were then categorized as either (a) specific to

294   African American English (S-AAE), or (b) dialect neutral forms that would be considered

295   ungrammatical relative both to African American English and standardized written GAE (M-

296   Neutral). A list of AAE-specific morphosyntax was used to categorize the forms (Craig &

297   Washington, 2004; Washington & Craig, 2002). Variations from standardized written GAE that

298 were consistent with AAE were identified as S-AAE. Those that were not consistent with AAE

299 were identified as M-Neutral. For example, the sentence "she walk to store earlier" includes two

300 grammatical variations relative to standardized written GAE: "she walk...earlier" includes a zero-

301 form past tense *-ed*, and "to store" includes an article omission. Zero-form past tense *-ed* would

302 be categorized as S-AAE because it is consistent with the morphosyntactic rules of AAE,

303 whereas article omission would be categorized as M-Neutral because it is not consistent with the

304 morphosyntactic rules of AAE or standardized written GAE.

305   We focused on grammar because African American students have been observed to

306 incorporate more forms consistent with the morphosyntax of AAE than those consistent with the

307 phonology of AAE in their writing (Thompson et al., 2004). The procedures used were aligned

308 with prior work examining general writing variations conducted by Scott and Windsor (2000)

309 and work examining AAE-specific forms in writing conducted by Horton-Ikard and Pittman

310 (2010).

311   Both the research assistants who coded the written samples completed transcription and

312 coding training protocols directed by the first author. Training included: (a) explicit instruction

313 of definitions and contextual examples of AAE-specific forms (Craig & Washington, 2004), (b)

314 guided practice on ten written samples, (c) independent practice on fifteen samples with specific

315 feedback and line-by-line fidelity scoring provided for each sample, (d) reliability testing

316 requiring 90% coding fidelity for individual forms on ten samples.

317   ***Density measures.*** Token-based measures of density were calculated based on the written

318 samples both for S-AAE and for M-Neutral (Oetting & Mcdonald, 2002). The measures were

319 based on the three dialect density measures (DDMs, density by total words, density by t-units,

320 and density by t-units containing a target form) that have been used to examine dialect use in

321   written samples and that are considered more robust measures than raw number of form

322   occurrences (Ivy & Masterson, 2011; Schachter & Craig, 2013).

323   For the AAE-specific forms (S-AAE), density by total words (DDM_w) was obtained by

324   summing the total forms identified as S-AAE in the analysis set, and then dividing by the words

325   in the sample. Density by t-units (DDM_t) was calculated by again summing the total number of

326   S-AAE forms, but then dividing by the number of t-units in the sample. Finally, density by t-

327   units containing a target form (DDM_d) was computed by counting the number of t-units in each

328   sample that included one or more S-AAE form and dividing by the total number of t-units in the

329   sample.

330   For the dialect-neutral ungrammatical forms (M-Neutral), three values were also

331   computed to provide comparable density measures. Density by total words ($Neutral_w$) was

332   computed by summing the M-Neutral forms identified in the sample, and then dividing by the

333   total words in the sample. Density by t-units ($Neutral_t$) was calculated by again summing the M-

334   Neutral forms identified, and then dividing by the number of t-units in the sample. $Neutral_d$ was

335   computed summing the number of t-units in each sample that included one or more M-Neutral

336   form and then dividing by the number of total t-units in the sample.

337   *Reliability*. Reliability for the written samples was established between the two trained

338   research assistants. Research assistants double coded all 207 of the transcripts. Reliabilities were

339   computed by dividing the total agreements by the sum of agreements plus disagreements. Coding

340   reliability was good, measured at 97.4% for S-AAE, 95.9% for M-Neutral, 99.6% for t-unit

341   segmentation, and 99.5% for morpheme segmentation. Discrepancies were resolved by the first

342   author after obtaining reliability values.

343   **Outcome measures.** Three measures of language and literacy were included to profile

344 reading achievement for participating students. These included a state-level high-stakes test

345 (FCAT), a norm-referenced assessment designed for progress monitoring (FAIR), and a reading

346 vocabulary assessment administered at home (GMRT). These three measures were selected to

347 represent a range of skills important to longitudinal academic achievement.

348   *Florida's Comprehensive Assessment Test 2.0* (FCAT; Florida Department of Education,

349 2013) is a state-wide high-stakes assessment administered annually near the end of the academic

350 year. The FCAT is designed for grades 3-12 and covers content areas including reading, writing,

351 math, and science. Students' developmental scaled scores from the FCAT reading assessment

352 were used in the present study. Internal consistency reliability (Cronbach's alpha) is reported to

353 be 0.88-0.92 for FCAT Reading.

354   The *Florida Assessments and Instruction in Reading* (FAIR; Foorman et al., 2009) was

355 designed to assess students' global literacy skills as a progress-monitoring indicator and

356 predictor of FCAT Reading performance. Administered in the fall, winter, and spring of the

357 academic year, the FAIR is a norm-referenced computer-adaptive screening and diagnostic

358 measure. It is aligned with state language arts standards and scaled for grades K-12. The FAIR

359 Reading Comprehension, Maze (reading fluency), and Word Analysis (spelling) subtests were

360 administered to all students across grades 3-7 in 2012-2013 and therefore were selected for the

361 present analyses. Standard scores from all three testing occasions of the school year were

362 included. Internal consistency reliability ranged from .86 to .92 for the included subtests.

363   Subtests of the *Gates-MacGinitie Reading Test- 4th Edition* (GMRT-4, MacGinitie &

364 MacGinitie, 2006) were also administered by participants' caregivers following a scripted

365 elicitation guide sent via mail (see Daucourt et al., 2020). The GMRT-4 is a paper-pencil test

366 designed for individuals in kindergarten through adulthood. The full assessment is often

367   employed as a diagnostic tool to provide information about students' strengths and weaknesses

368   in reading. Different subtests are administered for reading vocabulary by grade level. Students in

369   grades 1-2 complete the Word Decoding subtest, for which the student views a picture (e.g.,

370   practice item: pig) and a list of four orthographically similar written words (e.g., *big*, *fig*, *pig*,

371   *dig*). The child is directed to select the word that corresponds with the picture. Students in grades

372   3 and up complete the Vocabulary subtest, for which the student views a sentence with a word

373   underlined (e.g., practice item: *She felt <u>happy</u>*.) and a list of four written words (e.g., *sleepy*, *hot*,

374   *ready*, *glad*). The student is directed to select the word that is a synonym or definition of the

375   underlined word. The test manual reports construct validity estimates of .79 to .81; test-retest

376   reliability between .85 and .90; and internal reliability of .96 (MacGinitie & MacGinitie, 2006).

377   **Analyses**

378   To address the first research question, data was first examined descriptively to provide an

379   overall picture of students' writing. Descriptive data was obtained across the entire sample for

380   background characteristics, standard measures of language sampling, and measures of academic

381   achievement. In response to the second research question, samples were evaluated for frequency

382   of occurrence of each AAE-specific form (S-AAE).

383   To evaluate the relation between written density of AAE-specific forms and academic

384   achievement as indicated by the third research question, structural equation modeling was used.

385   Data normality and multivariate linearity were evaluated through the psych (Revelle, 2019) and

386   ggplot2 (Wickham, 2016) packages in R (R Core Team, 2020). Age was regressed out of the

387   standard measures of language sampling, S-AAE, M-Neutral, and GMRT-4 and FCAT scores to

388   obtain values comparable across all ages included in the sample (FAIR data already accounted

389   for age). Values were then z-scored to provide a consistent metric for interpretation across the

390   model. To address the nesting of twins within families, twin pairs were initially randomly

391   divided into two samples and examined for substantive differences. As no differences were

392   observed between the groups, the sample was re-combined and family nesting was accounted for

393   in subsequent modeling. This decision was made based on the body of work that suggests that

394   research findings from twin samples are generalizable to broader populations (e.g., Christensen

395   et al., 2006; Walker, Petrill, Spinath, & Plomin, 2004).

396   Next, confirmatory factor models were evaluated for each of the latent constructs of

397   interest using Mplus 8.4 (Muthén & Muthén, 2019). A latent construct of writing productivity

398   was measured through number of total words (NTW), total number of t-units (TNU), and number

399   of different words (NDW). M-Neutral density was constructed from the three M-Neutral density

400   measures ($Neutral_w$, $Neutral_t$, $Neutral_d$). Similarity, S-AAE density included the three dialect

401   density measures (DDM_w, DDM_w, DDM_d). Finally, the multiple measures available from the

402   FAIR (i.e., three time points for Word Analysis, Mazes, and Reading Comprehension) were

403   examined as contributors to a single latent factor. Each structure was examined individually to

404   confirm goodness-of-fit before being included in the larger model.

405   After the latent factor structures were established, the hypothesized structural model was

406   analyzed in Mplus 8.4 (Muthén & Muthén, 2019). Model fit was assessed following descriptions

407   by Kline (2011) and Chen et al. (2008). Generally, a root-mean-square error of approximation

408   (RMSEA) below .10, a comparative fit index (CFI) and Tucker Lewis index (TLI) above .90,

409   and the standardized root mean square residual (SRMR) below .08, were considered indicators of

410   reasonable global fit, although values were evaluated collectively and with preference for more

411   stringent values. Individual parameter estimates were also examined for evidence of misfit (e.g.,

412   negative residual variance; Kline, 2011).

Results

413

414   Descriptives for background characteristics, standard measures of language sampling,

415 and reading achievement scores are provided in Table 2. Within the present participant sample,

416 150 students included at least one instance of an S-AAE form in their written narratives. All but

417 7 of the participants had at least one instance of an M-Neutral form in their writing. Descriptive

418 information for the language sampling measures is provided by grade in Table 3. Descriptive

419 information for all measures is disaggregated by presence of S-AAE forms in Table S1.

420   [insert Table 2 and Table 3 here]

421   Sample length and lexical diversity was associated with age. Older students produced

422 longer samples with more words: TNU $r = .23$, $p = .005$; NTW $r = .32$, $p < .001$; NDW $r = .39$, p

423 $< .001$. Students' ages were negatively associated with DDM_w ($r = -.21$, $p = .009$), but not with

424 DDM_t or DDM_d: $r = -.06$, $p = .494$, and $r = -.04$, $p = .640$, respectively. Student age also was

425 negatively associated with all measures of M-Neutral density: $Neutral_w$ $r = -.37$, $p < .001$;

426 $Neutral_t$ $r = -.22$, $p = .001$; $Neutral_d$ $r = -.22$, $p = .002$. Correlations among z-scored variables are

427 presented in Figure 1.

428   [insert Figure 1]

429   Unsurprisingly, given the past tense formulation of the narrative prompt, zero form past

430 tense *-ed* appeared the most frequently ($M = 1.07$ per sample, $SD = 1.75$), followed by zero form

431 plural *-s* ($M = 0.43$ per sample, $SD = 1.05$), then subject-verb shifts ($M = 0.34$ per sample, $SD =$

432 0.85). Six AAE-specific morphosyntactic forms were not produced in any of the samples. These

433 included remote past *been*, regularized reflexive pronouns, invariant *be*, double

434 copula/auxiliary/modal, use of *ain't*, and completive *done*. Average occurrences of each coded

435 form is provided in Table 4 (AAE-specific) and Table 5 (M-Neutral).

436   [insert Table 4 and Table 5 here]

Factor Analyses

437   Confirmatory factor models constructed for each of the latent constructs of interest all fit

438

439   the data well, with global fit statistics well within preferred ranges (Kline, 2011) and no evidence

440   of misfit observed in the parameter estimates or residuals. The FAIR factor was best represented

441   by a three-dimensional structure with a second-order latent factor for overall literacy (see

442   "FAIR" in Figure 2). The standardized factor loadings obtained for these in the structural model

443   framework are available in Table S2 in the supplementary material for this paper.

Structural Equation Modeling (SEM)

445   The hypothesized structural model fit the data reasonably, with global fit statistics within

446   the preferred ranges. The RMSEA was 0.069 (90% CI = 0.058 – 0.080). The model yielded a

447   CFI of 0.957, a TLI of 0.946, and a standardized root mean square residual (SRMR) of 0.068.

448   The model accounted for 25.5 % of the variance in students' FCAT scores, 16.9% of the

449   variance in GMRT scores, and 51.5% of the variance in FAIR. See Figure 2.

450   [insert Figure 2]

451   The density at which S-AAE forms appeared in the writing samples did not significantly

452   predict FAIR or GMRT scores above and beyond the other predictors: FAIR (-0.07, $SE = 0.10$, p

453   = .522) and GMRT (-0.07, $SE = 0.07$, $p = .294$). S-AAE did meet $p < .05$ criteria for significantly

454   predicting students' FCAT scores (-0.17, $SE = 0.10$, $p = .038$). Conversely, the density at which

455   dialect-neutral forms (M-Neutral) appeared did predict all three outcome measures significantly:

456   FAIR (-0.16, $SE = 0.08$, $p = .033$), FCAT (-0.16, $SE = 0.07$, $p = .024$), and GMRT (-0.34, $SE =$

457   0.08, $p < .001$). Narrative productivity only significantly contributed to predicting FAIR (0.20,

458    $SE = 0.09$, $p = .021$). Household income did not significantly predict GMRT scores, but it did

459   predict FAIR (0.59, *SE* = 0.09, *p* < .001) and FCAT (0.34, *SE* = 0.08, *p* < .001).

460   To assess the robustness of the results, the hypothesized model was compared against one

461   nested model using Satorra-Bentler chi-square difference testing with a correction factor for

462   MLR (Satorra & Bentler, 2010). The comparison model included constraints for all of the path

463   coefficients between S-AAE and the outcome measures set to zero (see Figure S1). Global model

464   fit for the nested model was good: RMSEA = 0.069 (90% CI = 0.058 – 0.079), CFI = 0.956, TLI

465   = 0.947, SRMR = 0.073. The constrained model was not a significantly worse fit to the data

466   ($\chi^2(3) = 4.08$ with 0.96 correction, *p* = .253), suggesting S-AAE was not a key predictor of

467   students' test scores after accounting for the other values in the model.

468   Generally, .80 power is acceptable to be confident in non-significant results for the

469   overall model in SEM. For a model with over 100 degrees of freedom, such as the present model,

470   a minimum of 178 participants are needed for the test of not-close fit, which is desired when the

471   RMSEA is greater than 0.05 (MacCallum et al., 1996). This study had approximately 0.87

472   power, given the sample size was greater than 200 and the degrees of freedom were above 100,

473   indicated that the model was adequately powered.

474   **Discussion**

475   The primary purpose of this paper was to examine the predictive relation between

476   African American students' density of use of African American English (AAE)-specific

477   morphosyntactic forms in writing and their reading achievement. We sought to evaluate this

478   relation in the context of including income, writing productivity, and density of dialect-neutral

479   ungrammatical forms as covariates. We examined measures of literacy and reading vocabulary

480   as outcomes. This work was conducted to contribute to researchers' and practitioners'

481   understanding of nonmainstream dialect use in academic contexts to inform the continued

482   development of increasingly effective approaches for supporting the education of African

483   American students.

484   In the context of these written samples, we found that the density at which S-AAE forms

485   appeared did not substantially contribute to predicting students' performance on the measures of

486   academic achievement when accounting for household income, writing productivity, and dialect-

487   neutral forms. Rather, the density of forms considered to be ungrammatical both in AAE and

488   standardized written GAE (i.e., M-Neutral) emerged as the most consistent significant predictor

489   of students' scores on standardized achievement measures. This central finding that dialect-

490   neutral ungrammatical forms, rather than AAE-specific forms, predicted test performance

491   underscores the importance of general language skills in students' overall reading, writing, and

492   academic development. Critically, the ability to acquire language skills is not contingent on use

493   of any particular dialect (Lee-James & Washington, 2018; Terry et al., 2018). Regardless of

494   spoken dialect, students demonstrate varying levels of underlying language ability (Johnson &

495   Gatlin-Nash, 2020).

496   In the present work, findings suggest that written language productivity (Price & Jackson,

497   2015) and dialect-neutral ungrammatical forms are reflective of general underlying language

498   ability. Production of longer written narratives suggests more fluent and less effortful writing,

499   which in turn reflects stronger underlying expressive language skills. Similarly, use of few or no

500   forms that are ungrammatical both in AAE and standardized written GAE indicates strong

501   morphosyntactic knowledge, which also reflects higher underlying language ability. These

502   dialect-neutral measures emerged as the key drivers of students' achievement, with the density of

503   AAE-specific morphosyntactic forms serving as correlates of, but not unique contributors to,

504   literacy performance. This may indicate that a reduced focus on AAE-specific form variation in

505   students' writing is warranted. Rather, pending further empirical study, practitioners and

506   researchers may find that African American students' writing development may be more

507   effectively supported through an emphasis on dialect-neutral forms that explicitly teach children

508   more nuanced rules, such as verb agreement in complex sentences, to encourage general

509   language development (Johnson & Gatlin-Nash, 2020).

510   **Secondary Findings**

511   Descriptively, the students produced highly variable written samples in terms of length

512   (i.e., total number of t-units and number of total words) and lexical diversity (number of different

513   words). Some of this variability may be attributable to the wide age range of the sample, as age

514   was positively correlated with the language sampling measures. However, the samples were

515   diverse not only in length and lexical diversity, but also in the rate at which AAE-specific and

516   dialect-neutral forms occurred.

517   Examination of the rate at which AAE-specific (S-AAE) forms appeared in the written

518   samples revealed that the students in the present study used overall lower rates of S-AAE

519   compared to those observed in studies of spoken language (e.g., Gatlin & Wanzek, 2015). This

520   finding is aligned with previous work indicating that African American individuals use S-AAE at

521   variable rates in different contexts (Charity et al., 2004), and that students typically use fewer

522   AAE-specific forms in writing compared to oral language (Ivy & Masterson, 2011). We also

523   observed that density of S-AAE forms was negatively associated with income (all DDMs, Figure

524   1) and with age (at least for DDM_w). This finding is consistent with prior work indicating that

525   students from higher income homes generally use S-AAE forms at lower densities than students

526   from lower income homes (Charity et al., 2004) and that older students tend to incorporate fewer

527   S-AAE forms in their writing compared to younger students (Ivy & Masterson, 2011).

528   Several S-AAE forms commonly observed in spoken language (e.g., use of *ain't* and

529   invariant *be*) were absent from the participants' written responses in the current study. This

530   potential discrepancy between samples of spoken and written language corroborates previous

531   findings regarding context-dependency of S-AAE forms. Specifically, previous research purports

532   that students use AAE-specific forms differentially in their writing compared to their spoken

533   language (Cronnell, 2001; Ivy & Masterson, 2011). The AAE-specific forms observed to occur

534   at high rates, such as zero form past tense *-ed*, reflected the past tense context of the prompt.

535   In considering prediction of academic achievement, the finding that household income

536   predicted achievement scores is consistent with a large body of literature suggesting children

537   from low socioeconomic backgrounds are at risk for disproportionately low academic

538   performance (Dietrichson et al., 2017) due to structural and systemic biases. Further, the finding

539   that language sample length and lexical diversity significantly predicted literacy scores is

540   consistent with research indicating that narrative language is important to reading development

541   (Gardner-Neblett & Iruka, 2015).

542   **Limitations**

543   To consider the results from the present work as accurately as possible, it is essential to

544   recognize that the complexity of language (and language variation) cannot be fully captured by

545   coding approaches such as those used in the present work. We aimed to build upon prior work

546   that has examined dialect-specific grammatical forms in students' expressive language, and to

547   highlight the fact that both dialect-specific and dialect-neutral language ability have not often

548   been accounted for in models of reading development. Token-based coding by dialect is not an

549   easy task, however, because of the wide variation in individual dialectal exposure and use.

550   Further, we cannot know the exact reason for any given grammatical error or linguistic variation

551 observed in students' writing samples. In the present study, for example, it is possible that some

552 forms that were coded as "dialect-neutral" were in fact consistent with individual students'

553 language experiences. It is simultaneously possible that some forms that were coded as "AAE-

554 specific" were not consistent with students' specific dialectal backgrounds.

555   Contextually, the present findings were obtained from a sample of African American

556 student participants who lived in the southern region of the United States, specifically in Florida.

557 We operationalized AAE-specific morphosyntactic forms based on prior work (Thompson et al.,

558 2004; Washington & Craig, 2002), but no dialect is uniform across all speakers (e.g., Berry &

559 Oetting, 2017). Variable external factors can influence individual use of specific linguistic forms,

560 within and outside those specified in the present study. Future work would benefit from more

561 precise consideration of both within-dialect linguistic variation and written variation consistent

562 with AAE-specific phonological forms (Kohler et al., 2007; Patton-Terry & Connor, 2010). We

563 also recommend specific examination of dialect-neutral forms, based in a priori identification of

564 dialect-neutral forms that are ungrammatical. In the present work, we used a reverse-

565 identification approach, first identifying all instances of variations from standardized written

566 GAE and then categorizing forms based on their consistency with AAE. This may explain the

567 lower reliability observed for M-Neutral coding (95.9%) compared to S-AAE coding (97.4%).

568 Coders may have been more likely to categorize forms they were uncertain of as "other

569 grammatical variations" (a category only available for M-Neutral).

570   It is important to interpret the findings considering the statistical limitations of this work.

571 First, an inherent limitation of SEM is the inability to statistically compare equivalent models

572 (Kline, 2005). A different structure of the same variables (e.g., a mediation model) would

573 produce an equivalent fit to the data. Although additional structures were considered, at present

574   we believe that the tested model represented the closest fit with current theory. However, we

575   recognize that, as theory develops over time, alternative structures may more accurately

576   represents the relations among the included variables.

577   Missing data also may have influenced the results. It is reasonable to infer that the

578   primary results are relatively stable, given that the central finding replicated across all three

579   outcome measures. However, missing data particularly in students' FCAT, as a single indicator

580   in the model, reduced the statistical power to discern which predictors contributed significantly

581   to FCAT (high-stakes reading achievement) performance. Missing data for FAIR (progress

582   monitoring for reading) may be less concerning given the latent factor structure, which grants

583   some robustness to missing data.

584   The results are also limited by the available assessment data, including some measures

585   that were administered by parents (such as the Gates-MacGinitie Reading Tests). It should be

586   noted that the available measures assessed selected aspects that are among a constellation of

587   skills purported to contribute to literacy and academic achievement. It would be interesting in

588   future studies to also consider the relation between other performance measures (such as

589   morphological knowledge). Further, it should be noted that a multitude of unmeasured factors

590   (e.g., approach to writing instruction, teacher-student dialect match) may have also contributed to

591   variability or served a moderating role.

592   Finally, we encourage continued examination of dialect-neutral forms across

593   nonmainstream dialects. Although not within the scope of this paper, specification of which

594   linguistic forms maximally predict students' long-term language and reading abilities may be a

595   key area for future work. Different forms may be important to emphasize within different

596   instructional modalities (i.e., spoken versus written). This remains an area of need in the

597   literature to focus on maximizing educational outcomes for students from all backgrounds. A

598   holistic approach to the assessment of students' writing, considering both broad dialect-neutral

599   skills and dialect-specific forms together, may be essential to predicting students' academic

600   outcomes (Johnson & Gatlin-Nash, 2020; Puranik et al., 2019).

601   **Implications for Practice**

602   Our findings indicate that AAE, in and of itself, is not a barrier to written language

603   development. Rather, general underlying language ability, as evidenced by the frequency of

604   occurrence of dialect-neutral ungrammatical forms, is a key indicator of how students will

605   perform on tasks such as those measured in this study. Therefore, it is important for SLPs and

606   educators to leverage what we do know about dialectal variation to support speakers of AAE.

607   This work must be conducted using culturally sustaining pedagogies that acknowledge the social

608   context of systemic racism, both to support individual students' identities and to reduce linguistic

609   stigmatization (Baker-Bell et al., 2017; Wynter-Hoyte et al., 2019).

610   The relationship between general language skills, reading, and writing ability has been

611   well documented over time (LARRC, 2015). While determining whether a student has a

612   language difference or a delay may be challenging, it is important to keep in mind that overlaps

613   can and do exist in students who are nonmainstream dialect speakers, those who have language

614   delays, those from disadvantaged backgrounds, and those who have true language disorders.

615   Laing and Kamhi (2003) suggest our assessment practices for students from culturally and

616   linguistically marginalized populations should involve alternate measures, such as dynamic

617   assessment, language sampling (as used in this study) and processing-based tasks (e.g, working

618   memory, nonword repetition; Stockman, 2010). Measures such as these provide a wealth of

619   knowledge above and beyond what can be gleaned from standardized assessments alone. From

620 this assessment information, practitioners can then intervene by explicitly supporting students'

621 meta-awareness of morphosyntax through incorporating contrasts of AAE-specific and neutral

622 forms in different contexts, such as writing. This will help AAE speakers who also have

623 language deficits to increase their foundational language skills (Johnson & Gatlin-Nash, 2020).

624 **Conclusions**

625   Although several of the background variables included in this work did significantly

626 predict students' reading achievement, a substantial amount of variance in scores remained

627 unexplained in the final model. Less than 30% of the variance in reading vocabulary and high-

628 stakes reading scores and approximately 50% of the variance in FAIR reading was accounted for

629 in the structural model. These results support the ongoing need to better understand the language,

630 literacy, and overall academic development of students from all backgrounds. As practitioners

631 focus explicitly on strengthening students' general underlying language skills through an

632 emphasis on high-level, complex grammatical concepts (such as the dialect-neutral forms

633 mentioned in this study) and evidence-based reading instruction, we hope to see a rise in the

634 reading performance of African American students.

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918

919 Table 1

920 *Participant Demographics by Child*

Characteristic	%	*n*	Characteristic	%	*n*
Child Grade (*n* = 207)			**Household Income** (*n* = 194)		
1st Grade	7.7	16	Less than $10,000/yr	15.5	30
2nd Grade	10.6	22	$10,000 – 29,000/yr	26.3	51
3rd Grade	9.2	19	$30,000 – 49,000/yr	16.5	32
4th Grade	9.7	20	$50,000 – 69,000/yr	16.5	32
5th Grade	11.1	23	$70,000 – 89,000/yr	6.2	12
6th Grade	15.0	31	More than $90,000/yr	19.1	37
7th Grade	22.7	47	**Child Lunch Status** (*n* = 149)		
8th Grade	14.0	29	Free or Reduced	71.1	106
Child Gender (*n* = 207)			No Free/Reduced	28.9	43
Female	51.2	106			
Male	48.8	101			

921

Table 2

Sample Descriptives

Characteristic	Full Sample				
	n	*M*	*SD*	*Min*	*Max*
S-AAE Forms	207	2.38	3.31	0	22
M-Neutral Forms	207	10.85	9.25	0	55
Age (years)	207	11.49	2.39	6.75	15.33
Language Sample Microstructure Measures					
TNU	207	17.41	13.52	1	104
MLTU (morphemes)	207	9.35	2.99	4.2	30
NDW	207	75.57	43.78	10	267
NTW	207	144.37	104.23	12	753
Achievement Measures					
GMRT-4	199	517.71	51.04	350	653
FCAT	104	222.13	23.46	153	272
FAIR1 Reading Comprehension	95	94.52	12.36	72	131
FAIR1 Maze	94	94.26	13.46	71	131
FAIR1 Word Analysis	93	96.63	14.77	60	127
FAIR2 Reading Comprehension	92	95.89	12.90	69	144
FAIR2 Maze	89	99.83	14.86	74	140
FAIR2 Word Analysis	88	95.57	15.60)	63	133
FAIR3 Reading Comprehension	87	100.05	14.49	73	155
FAIR3 Maze	87	101.56	15.36	77	140
FAIR3 Word Analysis	84	96.40	14.88	60	138

Note. S-AAE = African American English-specific morphosyntactic forms; M-Neutral = dialect neutral forms; TNU = Total number t-units; MLTU = mean length of t-unit in morphemes; NDW = number different words; NTW = number total words; GMRT = Gates-MacGinitie Reading Tests (reading vocabulary), 4th Edition; FCAT = Florida's Comprehensive Assessment Test; FAIR1 = Florida Assessments for Instruction in Reading fall 2012; FAIR2 = FAIR winter 2012; FAIR3 = FAIR spring 2013; Maze = reading fluency; WA = word analysis

Table 3

Writing Sample Descriptive Statistics by Grade

Grade	*n*	S-AAE		M-Neutral		TNU		MLTU-m		NDW		NTW	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
1	16	1.62	1.89	9.38	5.43	8.12	3.16	7.13	2.51	31.94	12.28	53.00	25.64
2	22	1.55	2.26	11.27	10.48	13.36	10.08	7.59	1.58	50.41	34.37	98.36	80.80
3	19	1.89	1.66	8.89	7.29	10.63	5.04	8.63	1.77	47.63	17.76	86.21	44.25
4	20	2.70	4.61	11.55	8.65	19.95	9.82	8.69	2.40	80.20	27.30	153.55	67.28
5	23	2.35	1.85	11.13	6.66	20.43	11.33	9.37	2.04	87.96	36.41	174.04	91.60
6	31	2.68	3.53	11.52	10.67	21.23	16.68	10.04	4.42	87.87	47.75	169.97	117.41
7	47	3.40	4.71	12.47	11.77	19.47	16.32	10.00	2.93	87.36	44.08	169.49	121.49
8	29	1.55	1.57	8.59	6.92	18.48	14.69	11.00	2.50	91.72	53.12	169.86	112.99

Note. S-AAE = African American English-specific morphosyntactic forms; M-Neutral = dialect neutral forms; TNU = Total number t-units; MLTU = mean length of t-unit in morphemes; NDW = number different words; NTW = number total words.

Table 4

AAE-Specific Morphosyntactic Forms Appearing in the Written Samples

Form	Occurrences Per Sample M (SD)	Form	Occurrences Per Sample M (SD)
Zero form past tense -ed	1.07 (1.75)	Zero form present progressive -ing	0.04 (0.23)
Zero form plural -s	0.43 (1.05)	Double marking	0.03 (0.20)
Subject-verb shifts	0.34 (0.85)	Existential *it*	0.03 (0.20)
Preterite *had*	0.29 (0.64)	Multiple negation	0.03 (0.16)
Zero form articles	0.27 (0.59)	Undifferentiated pronoun case	0.01 (0.12)
Zero form copula	0.21 (0.65)	Fitna/sposeta/bouta	0.01 (0.08)
Zero form possessive -s	0.19 (0.65)	Remote past *been*	0
Zero form infinitive *to*	0.11 (0.33)	Regularized reflexive pronoun	0
Indefinite article *a*	0.07 (0.33)	Invariant *be*	0
Zero form prepositions	0.06 (0.24)	Double copula / auxiliary / modal	0
Zero form auxiliary	0.05 (0.23)	Use of *ain't*	0
Appositive pronouns	0.05 (0.24)	Completive *done*	0

Table 5

M-Neutral Morphosyntactic Forms Coded in the Written Samples

Form	Example(s)	Occurrences Per Sample		
		M	*SD*	Range
Homophone substitution	She took **there|their** books away.	2.67	2.73	0 – 17
Non-seriation run-on sentences	(2+ clauses not connected with a conjunction)	1.88	2.19	0 - 14
Whole-word omission	My brothers __ against each other.	1.24	2.00	0 – 14
Tense change (not contextually indicated)	Everyone **says** hello, then she **gave** me a gift.	0.70	1.21	0 – 6
Seriation "then… and then…"	(3+ independent clauses in a row beginning with a conjunction)	0.52	0.98	0 – 4
Whole-word addition	The wings were **the** tipped with brown.	0.46	0.85	0 – 4
Regularization of past tense -*ed*[1]	I **lefted** my keys there.	0.03	0.19	0 - 2
Other grammatical variations	I wish cats **can** fly. I saw **she** yesterday. **An** geese chase the cat.	3.36	4.28	0 – 23

[1]Although not included in all lists of grammatical forms specific to AAE, regularization of past tense -*ed* may be considered an AAE-specific form (e.g., Pruitt & Oetting, 2009; Wolfram, 2004). We conducted sensitivity analyses with and without -*ed* regularization included in the statistical models. Findings did not differ based on the classification of this specific form.

Figure 1 *Correlations Among Z-Scored Variables*

	Neutral-d	Neutral-t	Neutral-w	DDMd	DDMt	DDMw	NTW	NDW	TNU	GRMT-4 Vocab	FCAT	FAIR WA 1	FAIR MA 1	FAIR RC 1	Income
Income	-0.254***	-0.243***	-0.191**	-0.163*	-0.173*	-0.177*	0.102	0.136	0.075	0.153*	0.443***	0.486***	0.608***	0.432***	
FAIR RC 1	-0.303**	-0.295**	-0.337***	-0.211*	-0.215*	-0.253*	0.248*	0.313**	0.211*	0.407***	0.622***	0.426***	0.498***		
FAIR MA 1	-0.360***	-0.375***	-0.387***	-0.240*	-0.261*	-0.310**	0.247*	0.302**	0.216*	0.296**	0.635***	0.590***			
FAIR WA 1	-0.389***	-0.389***	-0.441***	-0.279**	-0.269**	-0.301**	0.163	0.219*	0.098	0.337**	0.520***				
FCAT	-0.368***	-0.365***	-0.381***	-0.312***	-0.330***	-0.389***	0.146	0.224*	0.102	0.530***					
GRMT-4 Vocab	-0.391***	-0.386***	-0.395***	-0.207**	-0.202**	-0.228**	0.147*	0.207**	0.131						
TNU	-0.225**	-0.227**	-0.142*	-0.095	-0.092	-0.042	0.946***	0.903***							
NDW	-0.278***	-0.275***	-0.264***	-0.108	-0.103	-0.100	0.969***								
NTW	-0.232***	-0.231***	-0.219**	-0.087	-0.083	-0.072									
DDMw	0.335***	0.336***	0.283***	0.944***	0.955***										
DDMt	0.368***	0.373***	0.242***	0.990***											
DDMd	0.372***	0.377***	0.246***												
Neutral-w	0.865***	0.870***													
Neutral-t	0.992***														
Neutral-d															

*p <.05, **p<.01, ***p <.001

Note. FCAT = Florida's Comprehensive Assessment Test (Reading); GMRT-4 = Gates-MacGinitie Reading Tests, 4th Ed.; RC1 = Reading comprehension on Florida Assessment for Instruction in Reading (FAIR) in fall 2012; M1 = Maze (reading fluency) on FAIR in fall 2012; WA1 = word analysis (spelling) on FAIR in fall 2012; TNU = total number of t-units; MLUm = mean length of t-unit; NDW = number of different words; NTW = number of total words; DDM values are density measures for AAE-specific morphosyntactic forms (S-AAE); Neutral values are density measures for dialect-neutral forms (M-Neutral)

Figure 2 *Full Model Including All Outcome Measures with Standardized Path Coefficients*
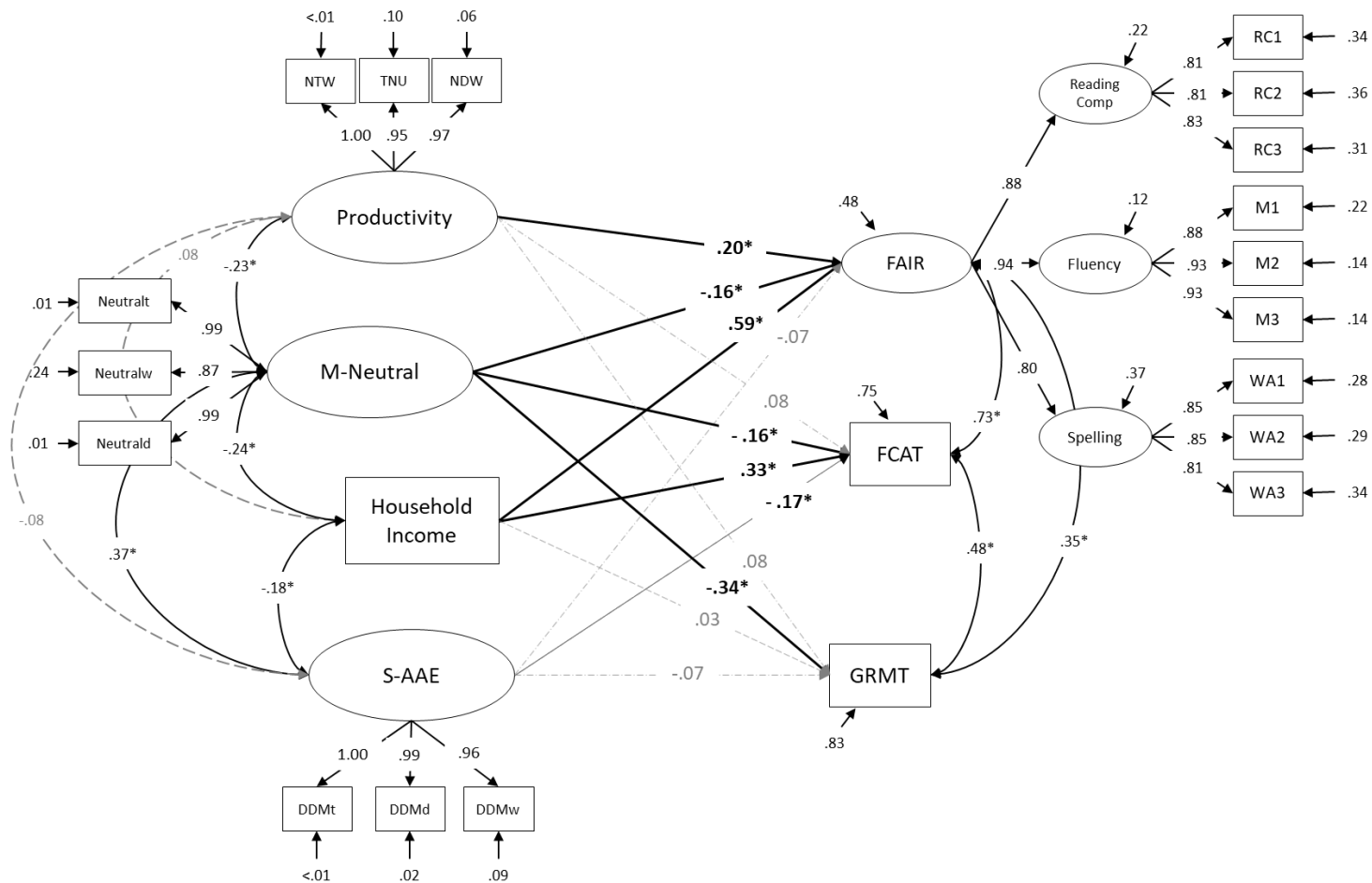
Note. Solid lines indicate significant paths (p < .05). NTW = number of total words; TNU = total number of t-units; NDW = number of different words; DDM values are density measures for AAE-specific morphosyntactic forms (S-AAE); NM values are density measures for dialect-neutral forms (M-Neutral); RC = reading comprehension; Maze = reading fluency; WA = word analysis; 1 = score in fall 2012; 2 = score in winter 2013; 3 = score in spring 2013; FCAT = Florida's Comprehensive Assessment Test (Reading); GMRT = Gates-MacGinitie Reading Tests-4th Edition.

Table S1 *Sample Descriptives by Group*

Characteristic	Students with at least one S-AAE Form in Writing			Students with no S-AAE Forms in Writing			Full Sample		
	n	*M (SD)*	*Min - Max*	*n*	*M (SD)*	*Min - Max*	*n*	*M (SD)*	*Min - Max*
M-Neutral Forms	150	12.44 (9.91)	0 - 55	57	6.67 (5.42)	0 - 27	207	10.85 (9.25)	0 - 55
Age (years)	150	11.65 (2.30)	6.75 – 15.00	57	11.10 (2.58)	6.75 – 15.33	207	11.49 (2.39)	6.75 – 15.33
Income[1]	139	3.53 (2.16)	1 – 9	55	3.40 (1.94)	1 – 8	194	3.49 (2.09)	1 – 9
Language Sampling Measures									
TNU	150	19.61 (14.60)	1 – 104	57	11.63 (7.64)	1 – 36	207	17.41 (13.52)	1 – 104
MLTU (morphemes)	150	9.27 (2.54)	4.33 – 22	57	9.54 (3.96)	4.2 – 30	207	9.35 (2.99)	4.2 – 30
NDW	150	83.51 (45.60)	10 – 267	57	54.67 (30.09)	11 – 120	207	75.57 (43.78)	10 – 267
NTW	150	162.39 (111.17)	13 – 753	57	96.96 (62.66)	12 – 273	207	144.37 (104.23)	12 – 753
Achievement Measures									
GMRT-4	143	517.27 (50.96)	350 – 653	56	518.84 (51.68)	387 - 653	199	517.71 (51.04)	350 – 653
FCAT	81	221.38 (24.42)	153 – 272	23	224.74 (19.94)	177 – 252	104	222.13 (23.46)	153 – 272
FAIR1 Reading Comp	73	93.92 (12.83)	72 – 131	22	96.50 (10.67)	78 – 117	95	94.52 (12.36)	72 – 131
FAIR1 Maze	72	94.28 (13.72)	71 - 131	22	94.18 (12.89)	71 – 122	94	94.26 (13.46)	71 - 131
FAIR1 Word Analysis	72	96.69 (15.86)	60 – 127	21	96.43 (10.51)	81 – 118	93	96.63 (14.77)	60 – 127
FAIR2 Reading Comp	70	96.33 (13.24)	69 – 144	22	94.50 (11.95)	72 – 112	92	95.89 (12.90)	69 – 144
FAIR2 Maze	68	99.72 (15.28)	74 – 140	21	100.19 (13.78)	77 – 131	89	99.83 (14.86)	74 – 140
FAIR2 Word Analysis	68	95.82 (15.81)	63 – 133	20	94.70 (15.25)	66 – 129	88	95.57 (15.60)	63 – 133
FAIR3 Reading Comp	66	99.86 (15.67)	73 – 155	21	100.62 (10.21)	82 – 116	87	100.05 (14.49)	73 – 155
FAIR3 Maze	66	101.53 (15.46)	77 – 140	21	101.67 (15.43)	81 – 131	87	101.56 (15.36)	77 – 140
FAIR3 Word Analysis	64	97.36 (15.92)	60 – 138	20	93.35 (10.67)	76 – 114	84	96.40 (14.88)	60 – 138

[1]On a 1-12 scale, with 1 = *less than $10,000/year* and each 1-unit increase representing $19,000. S-AAE = African American English-specific morphosyntactic forms; M-Neutral = dialect neutral forms relative to standard written English; TNU = Total number t-units; MLTU = mean length of t-unit in morphemes; NDW = number different words; NTW = number total words; GMRT = Gates-MacGinitie Reading Tests (reading vocabulary), 4th Edition; FCAT = Florida's Comprehensive Assessment Test; FAIR1 = Florida Assessments for Instruction in Reading fall 2012; FAIR2 = FAIR winter 2012; FAIR3 = FAIR spring 2013; RC = reading comprehension; Maze = reading fluency; WA = word analysis

Table S2

Standardized Factor Loadings from Factor Models

Factor	Variables	Factor Loadings	*SE*	*p*	R^2
AAE-Specific Forms (S-AAE)	DDMt	1.00	--	--	1.00
	DDMd	0.99	0.01	<.001	0.98
	DDMw	0.96	0.01	<.001	0.91
Dialect Neutral Forms (M-Neutral)	Neutral$_t$	1.00	0.01	--	1.00
	Neutral$_w$	0.87	0.02	<.001	0.76
	Neutral$_d$	0.99	0.01	<.001	0.99
Writing Productivity	NTW	1.00	--	--	1.00
	TNU	0.95	0.02	<.001	0.90
	NDW	0.97	0.01	<.001	0.94
Spelling	WA1	0.85	0.05	<.001	0.72
	WA2	0.85	0.04	<.001	0.72
	WA3	0.81	0.06	<.001	0.66
Fluency	M1	0.88	0.03	<.001	0.78
	M2	0.93	0.02	<.001	0.86
	M3	0.93	0.02	<.001	0.86
Reading Comprehension	RC1	0.81	0.05	<.001	0.66
	RC2	0.81	0.04	<.001	0.65
	RC3	0.83	0.04	<.001	0.69
FAIR	Fluency	0.94	0.04	<.001	0.87
	Spelling	0.80	0.06	<.001	0.63
	Reading	0.88	0.05	<.001	0.78