

Improving the Vocabulary of At-risk Early Childhood African American Boys: A Meta-Analytic Review

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Early childhood African American boys who come from low-income families are likely to have language deficits that manifest as academic and behavior difficulties in later years of schooling; yet, prior meta-analyses seldom addressed the effects of language interventions on the vocabulary acquisition of this population. This meta-analysis summarized the effects of experimental and quasi-experimental design language interventions on the vocabulary acquisition of early childhood African Americans. Fourteen studies yielding 26 effect sizes were examined across participant (i.e., percentage African American, percentage male) and treatment (i.e., implementer type, intervention type, duration) characteristics. Major findings indicated: 1) The overall magnitude of the effect was small ($d = .34$), 2) interventions implemented by the researcher yielded the highest effect size, 3) interventions lasting less than a year yielded a larger effect size than those that were a year or more in duration, 4) the magnitude of the effect did not differ for studies with a higher percentage of males and females.

Key words. Vocabulary, language, African American, males, boys, early childhood

Successive lines of research continue to examine the experiences of Black males across important influences such as Black male sexuality (Strayhorn & Scott, 2012; Strayhorn & Tillman-Kelly, 2013), nontraditional age (Goings, 2016a, 2016b, 2017a, 2017b) and native born versus non-native (Butcher, 1994; Massey, Mooney, Torres, & Charles, 2006). Forty-seven percent of young children in the United States, age six and under, come from low-income families, an indicator of social economic status (SES) (Yang, Ekono, & Skinner, 2014). Of African American children who are age six and under, 69% come from low-income families (Yang et al., 2014). Many African American children who come from low SES are at a disadvantage when entering the school system (McLoyd, 1998). African American children who experience poverty throughout the first five years of their life, as opposed to the middle childhood and adolescent years, are more likely to have difficulty completing schooling in future

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years than young Caucasian children living in poverty (Duncan, Yeung, Brooks-Gunn, & Smith, 1998). While some studies show low-income African American children are likely to lack the overall readiness to transition into the school system (Nelson, Welsh, Trup, & Greenberg, 2011), others demonstrate that they have specific difficulty grasping the academic language in schools (Davis, 2003; Jencks & Phillips, 1998).

Outcomes are particularly troubling for African American boys who are likely to not only experience academic deficits, but also more externalized aggressive behaviors as a result (Davis, 2003). Without proper academic language supports early on, negative outcomes are likely to occur. According to the National Education Association (2011), African American boys are more likely than their peers to be placed in special education classroom settings, making up 20% of all students in the United States identified as having an intellectual disability. In addition, they are more likely to be suspended, and drop out of school in future years of schooling (National Education Association, 2011). African American boys are also 2.5 times less likely to be enrolled in gifted and talented programs than their peers. Such realities point to a need to target African American vocabulary development given the vast contributions that vocabulary development plays (National Education Association, 2011). Thus, promoting academic language and developing vocabulary support during the early childhood years may be essential to the future academic success of African American children, and particularly those who are male.

Academic Language Differences

Discontinuity between African American English (AAE) and the academic language used in schools may only contribute to the child being at a greater risk of academic failure. In fact, AAE-speaking children raised in impoverished environments have difficulties in facets of grammatical morphology that are related to their deficits in vocabulary development (Pruitt, Oetting, & Hegarty, 2011). On average, African American toddlers from families with low-SES perform poorer on receptive and expressive vocabulary assessments than those from middle-SES families (Horton-Ikard & Weismer, 2007). These realities may be as a result of effects of familial influences on academic success during the early childhood years. For instance, low-income mothers have been found to be less likely to engage in vocabulary rich conversations with their children (Hart & Risley, 1995). In addition, the expressive vocabulary of African American preschoolers is lower for those who come from impoverished environments that lack rich language and verbal interactions (Britto, 2001; Britto & Brooks-Gunn, 2001).

In the past, language and vocabulary instruction has been provided to students who are at-risk of academic failure as a result of identified academic language and vocabulary difficulties. Many of these interventions report findings on the English language learners in their sample, recognizing the need to improve the vocabulary knowledge of this subgroup. Yet, these studies seldom address the effectiveness of language interventions on the vocabulary development of African American children with low SES who also have academic language difficulties.

Prior Meta-Analyses

Seeing the need for understanding the effectiveness of vocabulary interventions on children who come from homes with low SES, Marulis and Neuman (2010) conducted a meta-analysis examining the effects of vocabulary interventions on pre-K and kindergarten children's

oral language development. Their quantitative review of 67 studies that included 216 effect sizes revealed an overall effect size of .88 for word learning interventions on vocabulary development of young children. While this study included at-risk children at all income levels, the authors found that middle and upper-income level children ($g = 1.35, p < .05, CI_{95} = 0.85, 1.85$) were more likely to benefit from vocabulary intervention than at-risk children who were from low-income families ($g = .77, p < .05, CI_{95} = 0.53, 1.01$). However, the analysis gave little insight into the effectiveness of these interventions for African American children.

In their follow-up meta-analysis, Marulis and Neuman (2013) assessed the effectiveness of vocabulary interventions by examining effects based on risk factors such as SES and marginalized racial subgroups. Similar to their 2010 study, findings supported a significant difference in the effectiveness of interventions based on SES. Vocabulary interventions were more likely to improve the vocabulary development of young children with middle to high SES ($g = 1.50, p < .05, CI_{95} = 1.01, 1.98$) than those with low SES ($g = .79, p < .05, CI_{95} = 0.57, 1.01$). In addition, they found that studies where most participants were from non-marginalized subgroups ($g = 1.15, p < .05, CI_{95} = 0.76, 1.53$) benefited more from the vocabulary intervention than marginalized racial subgroups (i.e. African American and Hispanic) ($g = .85, p < .05, CI_{95} = 0.62, 1.09$). Both findings mirrored findings of Manz and his colleagues who found Caucasian children ($d = .64; SE = .07$) benefited more than minority children ($d = .16; SE = .04$), and mid-to high-income children ($d = .39; SE = .12$) benefited more than low-income children ($d = .14; SE = .05$) from language intervention during the early years of schooling (Manz, Hughes, Barnabas, Bracaliello, & Ginsburg-Block, 2010).

While prior meta-analyses provide insight into the effectiveness of interventions on the vocabulary development of low-income children during the preschool to first grade years, findings seldom report the effectiveness of these interventions on African Americans who are considered low SES or low-income. In addition, the extent to which differences in the effectiveness between young male and female African American students is unknown. Exploring this aspect may also give insight into the types of interventions that benefit this subgroup.

Purpose and Research Question

The purpose of the current meta-analysis is to synthesize early childhood studies that report the effects of academic language and literacy interventions on the vocabulary development of African American children and African American boys from low-income and low SES families. The research questions were as follows:

- 1) What is the overall magnitude of the effect of language interventions on vocabulary development of early childhood low-income African Americans?
- 2) Are there differences in the magnitude of the effect of language interventions on vocabulary development of early childhood low-income African Americans based on gender?
- 3) Are there treatment characteristics that moderate the effect of interventions for African American children?

Method

Search Criteria

Studies were included if they met the following criteria:

- Study reported 40% or more African American boy participants and age 0 to 6.0 (approximately birth through kindergarten)
- Study participants did not have any reported developmental or neurological impairments
- Eighty percent or more of the study participants were considered “at-risk” as a result of coming from low-SES or low-income families, and low previous vocabulary or language scores or low academic achievement.
- The study included an intervention, instruction, training, or implementation of a specific strategy that would increase expressive or receptive vocabulary.
- An experimental or quasi-experimental design was employed.
- The study was conducted with words from the English language and pseudowords were not used.
- The outcome variables included a measurement of English language word learning, identified as either expressive or receptive vocabulary development or both. The assessment measure could be standardized (e.g., Peabody Picture Vocabulary Test, Expressive One-Word Picture Vocabulary Test) or researcher-designed.

An electronic search of the following databases was used to search terms based on inclusion criteria: PsycINFO, and ERIC. In addition to the electronic search, a manual search, which included reading the references of the relevant studies, was performed. These two searches included peer-reviewed published studies. The following terms were included in the initial search: *early childhood*, *African American* or *black*, *vocabulary intervention* or *vocabulary instruction*, and *low income*. A total of 14 studies yielding 26 effect sizes met inclusion criteria for the analysis. The studies included ranged from 1971 to 2015.

Inclusion Screening

To ensure that coding accuracy of the inclusion of relevant studies, two education and reading researchers with three years of experience with meta-analytic research participated in the inclusion screening. These researchers had experience with design and methodological techniques associated with meta-analyses. Agreement was met between the two researchers for all articles that were included in the meta-analysis.

Study Variable Coding

The studies were coded based on descriptive information and study characteristics. The descriptive information included authors and date of publication. The study characteristics included information on the intervention type, outcome measure, participant information, and effect sizes. Table 1 reports the descriptive and study characteristics of the included studies.

Analysis Plan

The effect sizes were calculated using *Practical Meta-Analysis Effect Size Calculator* (Wilson, n.d.). All studies included reported means and standard deviations for both pre- and post-test of the intervention and control group. This information, along with the number of participants in the study, was used to compute the effect sizes. To compute effect size estimates, the following formulas were used:

$$d = \frac{M_1 - M_2}{S_{pooled}}$$

Where,

M₁= mean of the intervention group

M₂= mean of the control group

$$S_{pooled} = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}$$

Where,

N₁= number of participants in the intervention group

N₂= number of participants in the control group

S₁= variance of the intervention group

S₂= variance of the control group

For studies that reported f-statistics the following formula was used:

$$d = F \sqrt{\frac{(n_1 + n_2)}{(n_1 n_2)} * \frac{(n_1 + n_2)}{(n_1 + n_2 - 2)}}$$

Where,

F=f-statistic

N₁= number of participants in the intervention group

N₂= number of participants in the control group

For studies that reported means with an associated p-value, the following formula was used:

$$d = t \sqrt{\frac{(n_1 + n_2)}{(n_1 n_2)} * \frac{(n_1 + n_2)}{(n_1 + n_2 - 2)}}$$

Where,

t= t-statistic

N₁= number of participants in the intervention group

N₂= number of participants in the control group

A total of 23 effect sizes were calculated using pre- and post-test means and standard deviations of the intervention and control conditions. Two effect sizes were calculated using f-test statistical data provided by the study. Only one study required calculation using means along with the p-value to find first the associated t-statistic and then the effect size.

Results

Descriptive Characteristics

Table 1 displays the main characteristics of studies included in the meta-analysis. The types of intervention children received fell under one of the following categories: dialogic reading, individualized, Excellence in Children's Early Language and Literacy (ExCELL), or multi-component intervention. Interventions that used interactive story book reading were categorized as dialogic reading (Kelley, Goldstein, Spencer, & Sherman, 2015; Lonigan, Purpura, Wilson, Walker, & Clancy-Menchetti, 2013; Whitehurst et al., 1994). In these interventions, strategies used enabled children rather than the adult, to become the storyteller. Interventions that were more individualized, that provided a narrower focus by targeting just vocabulary or specific language and literacy needs, were categorized as individualized (Ammon & Ammon 1971; Fischel et al., 2007; Lonigan et al., 2013; Schacter, 2003).

ExCELL was used in two studies that yielded three effect sizes (Hindman & Wasik, 2012; Wasik & Hindman, 2011). ExCELL was a program that focused on providing literacy learning opportunities at home, school, and in the community. Main components of this intervention type included providing teachers with professional development and coaching, and connecting parents to literacy community (i.e., museums and libraries) and classroom resources (i.e., books that included parent guides and support). Classroom instruction consisted of group instruction, teacher-instructed activities, and child-initiated activities. Lastly, ongoing progress monitoring took place throughout the duration of these interventions that were both formative and summative assessments of students' progress. Studies that employed a similar multi-component intervention, but did not use ExCELL were categorized as multi-component (Gettinger & Stoiber, 2007; Jones, Bub, & Raver, 2013; Martin, Emfinger, Snyder, & O'Neal, 2007; McQueen & Washington, 1988; Xu, Chin, & Reed, 2014).

Effects of Intervention

In the present study, the overall magnitude of the effect of language interventions on the vocabulary development of low SES African Americans in their early childhood years was small, $d = .34$ (Cohen, 1988). Table 2 reports the magnitude of the effect based on the percentage of African American children participating in the study. While studies were only included in the meta-analysis if they had a high percentage of African American representation in their sample, studies were coded as 40-59% African American representation and 60% or more representation to detect any differences that might have existed based on the percentage of representation in the sample. No significant differences were found between studies with 40-59% ($d = .41$, $CI_{95} = 0.15, 0.66$) and studies with 60% or more ($d = .30$, $CI_{95} = 0.08, 0.51$), $p = .48$. This indicated that the magnitude of the effect was similar for studies with 40% or more African Americans. However, it should be noted that studies with the highest percentage of African American children had a lower mean effect size. One study was excluded from this analysis as it reported "mainly African American" rather than reporting a number or percentage (Martin et al., 2007).

Effects for Male Children

Due to the limited number of studies targeting only African American males in the early years of learning, both male and female students were included in the analysis. To determine whether there were differences in the magnitude of the effect of language interventions based on gender, studies were coded as 51% or more male (males were the majority in the study; $n = 14$), 50% or less male (males were the minority in the study; $n = 4$), or gender information not reported in the study ($n = 8$) (See Table 2). Although there were no significant differences between males and females in the magnitude of the effect of the analyzed interventions ($p = .08$), studies where the sample was predominately male ($d = .41$, $CI_{95} = 0.21, 0.62$) yielded a slightly smaller average effect size than those that were predominately female ($d = .57$, $CI_{95} = -0.40, 1.54$). Studies that neglected to report the number or percentage of male and female children included in the study yielded a much smaller effect size ($d = .11$, $CI_{95} = -0.01, 0.22$) than those that were predominately male or female.

Moderator Effects

Moderator effects were examined to determine if any differences in the magnitude of the effect of interventions on vocabulary development differed by treatment characteristics. Table 3 reports the intervention effects based on treatment characteristics. Three treatment characteristics were explored: intervention type, implementer, and duration.

Intervention Type. Studies were categorized by intervention type to explore whether the magnitude of the effect was moderated by the type of intervention children received. Studies fell within the following categories: dialogic reading, individualized, ExCELL, and multicomponent. While no statistically significant differences were found amongst the four categories of interventions ($F(3, 1) = .35, p = .79$), individualized interventions yielded the highest effect size ($d = .48$), followed by interventions categorized as multicomponent ($d = .34$). These findings suggest that dialogic reading, individualized, ExCELL, and multicomponent strategies yielded similar effects for improving the vocabulary development of low-income African Americans in their early childhood years.

Implementer. Differences in the magnitude of the effect based on implementer were also examined. Studies included in this meta-analysis were either implemented by the researcher, teachers and school, or by both the home and school. Statistically significant differences were found based on who implemented the intervention, $F(3, 1) = 4.11, p < .05$. Interventions that were implemented by the researcher ($d = .70$) were more effective than interventions that were implemented by the school and home ($d = .58$) as well as interventions implemented by the teacher and school ($d = .22$). These findings indicate that African American children who come from low-income families benefited most from interventions that were researcher implemented.

Duration. Studies were also assessed based on whether the magnitude of the effect was moderated by the duration of the intervention. Duration was defined as the length of time intervention was provided. Differences were found based on the duration of the intervention, $F(1, 1) = 8.09, p < .01$. Interventions that were implemented in less than a year ($d = .53$) yielded a significantly higher average effect size than interventions that were provided across the course of a year or more ($d = .15$).

Discussion

The author sought to determine the magnitude of the effect of language interventions on the vocabulary development of studies with young African American children who come from low-income families. The present study yielded a small effect of language interventions on the vocabulary development of African American children in their early childhood years who are considered at-risk of future academic failure as a result of growing up in low-income families. While these findings support the overall effectiveness of providing interventions to at-risk populations, these findings differ from those of Marulis and Neuman (2010) who found much larger effects of interventions targeting word learning for low-income children. Yet, the differences in the magnitude of the effect could be as a result of the focus of the current study, which specifically addressed how effective these interventions are for African Americans. Perhaps while vocabulary development improves with intervention, these improvements are not as rapid for African American children with low-income as they are for other ethnic groups with low-income. Prior research suggests African American children do not improve at the same rate as their peers (Manz et al., 2010), especially those who come from low-income families (Davis, 2003).

A second aim was to determine whether the magnitude of the effect of language interventions on vocabulary development differed based on gender. Differences in the effectiveness of interventions did not differ for males and females. This finding is an indication that on average, male and female African Americans in the early childhood years are likely to experience similar benefits to their vocabulary development when after receiving language intervention. Although not specifically addressed in this study, it is possible that benefits in vocabulary development could improve the negative outcomes associated with African American males who are at-risk of failure.

The third aim of the study was to determine whether participant and treatment characteristics moderate the magnitude of the effect of language interventions on the vocabulary development of young African American children. The present study indicates that these children experience similar benefits regardless of the intervention type they received. This could be due to the nature of language interventions provided to children during the early childhood years. While strategies and programs differ, most (including those not categorized as multicomponent) apply strategies that incorporate elements intended to improve more than just vocabulary development. This may also serve to explain why a more individualized approach to improving the development of these children's vocabulary yielded the highest effect size. When choosing between strategies, it may be most beneficial to identify specific language and vocabulary needs and work to improve those, rather than implementing program based strategies that may not meet those specific vocabulary needs.

Moreover, it was found that the implementer of the intervention mattered in terms of how effective the intervention was. This finding is of no surprise given that other meta-analyses that explore the effects of interventions on vocabulary development have had similar findings (Manz et al., 2010; Marulis & Neuman, 2010; Marulis & Neuman, 2013). As was the case with the present study, prior meta-analysis found researcher implemented interventions were most effective. However, it might explain why the individualized approach yielded a slightly higher effect size. More individualized interventions, catering to specific student needs, were mostly implemented by the researcher and not by teachers or schools. Since researcher-led interventions are designed to inform educators on the best instructional practices to use when working with

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children, the decision for educators lies between interventions implemented by both the family and school or by the school alone. Based on this meta-analysis, interventions provided by both family members and educators were found to be more beneficial than those provided solely by educators. This finding is consistent with Manz et al. (2010) who found active parent involvement in intervention implementation played a crucial role in enhancing language development during the early years of schooling. However, while Manz et al. (2010) explored the effectiveness of family implemented interventions provided in varying contexts, the current meta-analysis included interventions implemented by family members, researchers, and both family and school personnel.

In this study, shorter interventions (interventions lasting less than a year) appear to be more effective than longer interventions (intervention lasting one year or more) in improving the vocabulary acquisition of young African American children that come from low-income families. Similarly, prior research has shown shorter intervention durations are more effective in improving the vocabulary development of low-income children in the early childhood years, than longer intervention durations (Marulis & Neuman, 2010). This finding seems to hold true for African American children who come from low income families as well. In contrast, Marulis and Neuman's (2013) more comprehensive review found no difference between longer and shorter intervention durations.

Implications and Future Research

Although the aim of the current study was to examine the overall magnitude of interventions for young African American male children, few studies reported sufficient information on this population. This issue points to the need for researchers assessing the effectiveness of interventions for at-risk populations to report demographic information on all at-risk subgroups, such as African American males from low-income families. Consistent reporting of both demographic information, as well as analysis that reports statistical findings (i.e., means standard deviations, F-statistics, t-statistics, and p-values) for this subgroup would help to better understand which interventions are most effective and what components of these interventions make them more effective than others.

In addition, the limited number of studies that targeted African American males indicates a need to conduct interventions that specifically seek to address the vocabulary needs of this low-income population. Given the fact that this subgroup is likely to experience deficits in language and vocabulary development that later manifest as academic and social difficulties in school, efforts placed on improving the outcomes of these students appear to be a good investment.

A concerted effort should be made to provide interventions that can be implemented by both the child's home and school. Research implemented interventions designed to gradually release intervention responsibilities to schools and families are recommended. This is particularly important for African American children who come from homes with low SES. These children are more likely to come from less print-rich home environments where AAE is the predominate mode of communication (Pruitt et al., 2011).

Limitations

There were a few limitations to the current study. One limitation was that all studies included in the meta-analytic review were published studies, which introduces publication bias.

This could have made the magnitude of the effect larger than it would otherwise be if unpublished studies were included. Published studies tend to report higher intervention effects than studies that are unpublished (Marulis & Neuman, 2013). In Marulis and Neuman's (2013) meta-analysis that examined the effectiveness of language interventions on the word learning of at-risk populations, differences between the effectiveness of intervention existed based on whether studies were published or unpublished. While the inclusion of unpublished studies would have controlled for publication bias in the current study, most of the unpublished studies that implemented language and literacy interventions with high African American low-income populations were excluded from the current study because they were not experimental or quasi-experimental studies.

In addition, many of the articles reviewed were socially dependent. Studies included had some of the same authors. These researchers are likely to share the same pool of knowledge because they have read and are familiar with the similar prior research, theories, and intervention practices. Synthesizing a collection of studies with different research teams, published in a wider variety of journal articles might strengthen the confidence in the validity of the results.

Conclusion

This meta-analysis provides insight into the extent to which language interventions are effective for young African American children who come from low-income families. Without proper intervention, low-income African American children are at a greater risk of academic failure than their peers. African American males may benefit most from early language intervention, not because they are likely to make the greatest gains, but because young males who do not develop such language skills are likely to encounter more profound negative academic outcomes in future years of schooling than their female counterparts (Davis, 2003; National Education Association, 2011). By providing language intervention, these children can improve vocabulary development, which may help prepare them for future years of schooling. Equally as important to providing intervention to this at-risk population, is monitoring of the effectiveness of these interventions.

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An asterisk indicates the reference was included in the meta-analysis.

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Appendix A

Table 1. *Descriptive Data and Characteristics of Included Studies*

Author(s) Name	Year	Intervention	Implementer	Assessment	ES
Ammon & Ammon	1971	Vocabulary training (I)	researcher	PPVT	1.35
Ammon & Ammon	1971	Vocabulary training (I)	researcher	PI	0.67
Fischel et al.	2007	Motivation, child-centered (I)	school	PPVT	0.02
Fischel et al.	2007	Individualized (I)	school	PPVT	0.06
Gettinger & Stoiber	2007	EMERGE (DR)	teacher	PPVT	0.22
Hindman et al.	2012	ExCELL cohort 1 (E)	school	PPVT	0.41
Hindman et al.	2012	ExCELL cohort 2 (E)	teacher	PPVT	0.29
Jones et al.	2013	Multi-component (M)	school	PPVT-III	0.00
Kelley et al.	2015	Dialogic (DR)	teacher	PPVT	0.27
Lonigan et al.	2013	Dialogic PA only (DR)	teacher	PPVT-R	0.25
Lonigan et al.	2013	Dialogic LK only (DR)	teacher	PPVT-R	0.38
Lonigan et al.	2013	Dialogic PA & LK (DR)	teacher	PPVT-R	-0.03
Lonigan et al.	2013	Standard PA & LK (I)	teacher	PPVT-R	-0.07
Martin et al.	2007	Early reading first (M)	school	PPVT-III	0.39
McQueen & Washington	1988	Parent education (M)	family/community	PPVT	1.38
McQueen & Washington	1988	dialogic (DR)	family	PPVT	0.00
Neuman et al.	2015	child-directed language support (I)	school	PPVT	0.04
Schacter	2003	Individualized (I)	teacher	Gates-MacGinitie	0.86

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Wasik & Hindman	2011	ExCELL (E)	researcher to teacher	PPVT-III	0.08
Whitehurst et al.	1994	emergent literacy (DR)	teacher	One Word	0.30
Whitehurst et al.	1994	emergent literacy (DR)	teacher	PPVT-R	0.18
Whitehurst et al.	1994	emergent literacy (DR)	teacher	Our Word	0.31
Whitehurst et al.	1994	emergent literacy (DR)	school & family	One Word	0.49
Whitehurst et al.	1994	emergent literacy (DR)	school & family	PPVT-R	0.43
Whitehurst et al.	1994	emergent literacy (DR)	school & family	Our Word	0.61
Xu et al.	2014	multi-component (M)	school	PPVT-IV	0.01
<hr/> <u>Mean Effect Size</u>					<u>0.34</u>

Note. PPVT= Peabody Picture Vocabulary Test. Intervention codes: (DR) = dialogic reading, (I) = individualized intervention, (E) = ExCELL program, (M) = multicomponent.

Appendix B

Table 2. *Effect Sizes of Vocabulary Development by Percent African American and Male*

Characteristic	<i>k</i>	<i>d</i>	<i>SD</i>	<i>95%CI</i>	<i>F</i> -value
African American					
60% or more	14	0.30	0.38	0.08, 0.51	0.48 (<i>ns</i>)
40%-59%	11	0.41	0.39	0.15, 0.66	
Male					
51% or more	14	0.41	0.36	0.21, 0.62	0.08 (<i>ns</i>)
50% or less	4	0.57	0.61	-0.40, 1.54	
Not Reported	5	0.11	0.14	-0.01, 0.22	

Note. *K* = number of effect sizes from studies, *d* = mean effect size, *SD* = standard deviation of the effect sizes, *ns* = not significant. * = $p < .05$, ** = $p < .01$.

Appendix CTable 3. *Effect Sizes for Vocabulary Development by Treatment Moderators*

Characteristic	<i>k</i>	<i>d</i>	<i>SD</i>	<i>95%CI</i>	<i>F</i> -value
Intervention Type					
Dialogic	11	0.29	0.18	0.16, 0.42	0.35 (<i>ns</i>)
Individualized	6	0.48	0.57	-0.12, 1.08	
ExCELL	3	0.26	0.17	-0.15, 0.67	
Multicomponent	6	0.34	0.37	0.22, 0.90	
Implementer					
Researcher	3	0.70	0.64	-0.88, 2.28	4.11*
Teacher/school	18	0.22	0.23	0.10, 0.33	
Home & school	5	0.58	0.50	-0.04, 1.21	
Duration					
Less than 1 year	13	0.53	0.44	0.26, 0.80	8.09**
1 year or more	13	0.15	0.17	0.05, 0.26	

Note. *K*= number of effect sizes from studies, *d*=mean effect size, *SD*= standard deviation of the effect sizes, *ns*= not significant. *=significant at $p<.05$, **= significant at $p<.01$.