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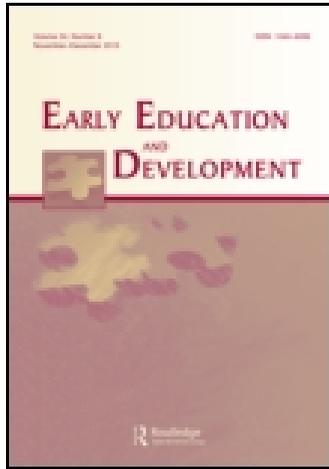
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# Understanding the Active Ingredients in an Effective Preschool Vocabulary Intervention: An Exploratory Study of Teacher and Child Talk During Book Reading

Barbara A. Wasik and Annemarie H. Hindman

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*Research Findings:* In order to identify the active ingredients in an effective professional development intervention focused on enhancing preschool vocabulary instruction, this study examines the frequency with which teachers and children discussed theme-related vocabulary words during shared book reading. Head Start teachers received 1 year of training focused upon early vocabulary development. Children's vocabulary skills were assessed in the fall and spring of the school year. In spring, teachers read a storybook to their classroom, and teachers' and children's remarks about theme-related vocabulary during the reading—including contextualized and decontextualized statements as well as verbatim repetitions of one another's statements—were coded. *Practice or Policy:* Results of multilevel models showed that more frequent references to thematic vocabulary by teachers were linked to stronger child vocabulary development. Although children's vocabulary references were not uniquely predictive of vocabulary learning, teachers' repetition of children's remarks contributed to children's vocabulary gains.

Substantial evidence supports the crucial role of early vocabulary development in children's eventual reading proficiency and school success. In recent decades, a number of interventions have been designed to increase vocabulary in young children. Specifically, many vocabulary-building interventions have been implemented and evaluated under the auspices of programs such as Early Reading First and the Preschool Curriculum Evaluation Report project, and several have been shown to raise key early receptive and/or expressive vocabulary skills. However, many of these programs are quite expansive in their aims, making it difficult to identify the active ingredients that drive children's vocabulary learning. In other words, there is little clarity about exactly which of the numerous teacher practices or classroom learning opportunities that effective vocabulary interventions target ultimately serve as the primary mechanism(s) through which children's vocabulary learning is enhanced. The current study examines this question in the context of one effective preschool vocabulary-building intervention, *Exceptional Coaching for Early Language and Literacy (ExCELL)*. Specifically, we investigate how *ExCELL* teachers' and children's use of focal vocabulary during exchanges around shared book readings might be uniquely predictive of children's vocabulary learning during the preschool year.

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Many theories and paradigms address what it means to truly know a word (Nation, 1990; Richards, 1976) as well as how children come to possess this knowledge (Hirsh-Pasek & Golinkoff, 2012). For a young child who has not yet fully built a complex understanding of grammar, syntax, and pragmatics, knowing a word primarily involves being facile with its basic phonological (i.e., how it sounds), semantic (i.e., what it refers to), and grammatical and contextual (i.e., how the word is used in combination with other words) aspects (see Booth, 2009; Hirsh-Pasek & Golinkoff, 2012; Neuman, Newman, & Dwyer, 2011). Knowing words in this way has many benefits. Children with larger vocabularies are better equipped to make sense of texts that they hear or read (Gough & Tunmer, 1986) and to understand instruction in literacy, mathematics, and the natural and social sciences (Hindman, Skibbe, Miller, & Zimmerman, 2010). Vocabulary also facilitates healthy social interactions with adults and peers by helping children to understand the demands and expectations before them and to express their own perspectives and needs (Arnold, Kupersmidt, Voegler-Lee, & Marshall, 2012; Law, Plunkett, & Stringer, 2012; Monopoli & Kingston, 2012). Consequently, early vocabulary is one of the strongest predictors of short- and long-term school success (Beron & Farkas, 2004; Dickinson, Golinkoff, & Hirsh-Pasek, 2010; Dickinson & Porche, 2011; Duncan, Dowsett, et al., 2007).

### SOCIOECONOMIC DISPARITIES IN VOCABULARY DEVELOPMENT

Around 1 year of age, most children begin to understand a few important words and to use a small selection of words, but trajectories of vocabulary learning diverge quite rapidly thereafter (Byrnes & Wasik, 2009; Huttenlocher, Haight, Bryk, Seltzer, & Lyons, 1991). Children from middle- and high-income backgrounds tend to hear more words—and particularly more rare or sophisticated words—in their home and care environments; some work suggests that children in homes with college-educated parents hear 3 times as many words as those in homes receiving public assistance (Hart & Risley, 1995). Consequently, children from more advantaged backgrounds begin to build vocabulary far more rapidly in the second year of life than do children from less affluent backgrounds (Temple & Reynolds, 2007). Children who know more words also typically find it easier to leverage this knowledge to learn even more vocabulary, rapidly building new information onto their extensive foundation. As a result, over time, small early differences grow into large, meaningful gaps in vocabulary knowledge between higher and lower income children. By kindergarten, the average vocabulary knowledge of children in poverty falls nearly a full standard deviation below that of peers from middle- and higher income households (Lee & Burkam, 2002; U.S. Department of Health and Human Services, 2006). In the absence of targeted intervention, these gaps continue to grow throughout the school years (Kieffer, 2012; Lee & Burkam, 2002; Stanovich, 1986).

### OPPORTUNITIES FOR VOCABULARY LEARNING IN PRESCHOOL

Preschool has the potential to provide the effective word-learning opportunities that young children need in the early years of life (Aikens & Barbarin, 2008; Bowers & Vasilyeva, 2011; Gest, Holland-Coviello, Welsh, Eicher-Catt, & Gill, 2006; Hanson et al., 2011; Reynolds, Englund, Ou, Schweinhart, & Campbell, 2010). Preschool experiences offer children the

opportunity to benefit from vocabulary-building experiences with trained professionals—often in the modest ratio of 1 teacher to just 8 or 10 children—as well as young peers who might be highly knowledgeable about vocabulary in a classroom replete with stimulating materials, including books (Duncan, Ludwig, & Magnuson, 2007; Justice, Petscher, Schatschneider, & Mashburn, 2011). Although these experiences could benefit all children, they might be particularly valuable for those from disadvantaged backgrounds (Bassok, 2010; Hindman et al., 2010; Li, Farkas, Duncan, Burchinal, & Vandell, 2013).

Unfortunately, there is compelling evidence that many preschool settings do not provide optimal learning opportunities, particularly where vocabulary is concerned (Neuman & Dwyer, 2009; Skibbe, Connor, Morrison, & Jewkes, 2011). For example, explicit instruction in vocabulary (e.g., defining and discussing new words and ideas) is often rare, with many early-grade teachers devoting less than 1% of the class day, or about 5 min, to oral language and vocabulary (Al Otaiba et al., 2008; Beck & McKeown, 2007; Biemiller, 2001; Champion, Hyter, McCabe, & Bland-Stewart, 2003; Cunningham, Zibulsky, Stanovich, & Stanovich, 2009; Juel, Biancarosa, Coker, & Deffes, 2003). Moreover, the quality of implicit and explicit vocabulary support in preschool classrooms is in many cases low, especially for children in poverty (Early et al., 2010; Justice, Mashburn, Hamre, & Pianta, 2008; La Paro et al., 2009; LoCasale-Crouch et al., 2007; Stuhlman & Pianta, 2009; Turnbull, Anthony, Justice, & Bowles, 2009; Wasik & Hindman, 2011; Wright & Neuman, 2013). In many cases, the vast majority of talk in preschool classrooms comes from teachers (Dickinson, Darrow, & Tinubu, 2008; Gest et al., 2006). In addition, scores on the Classroom Assessment Scoring System (Pianta, La Paro, & Hamre, 2008) suggest that most teachers provide low- to moderate-quality instruction around vocabulary-focused elements of instruction, such as concept development, language modeling, and feedback to children (Burchinal, Vandergrift, Pianta, & Mashburn, 2010; Howes et al., 2008; Justice et al., 2008; La Paro et al., 2009; Stuhlman & Pianta, 2009).

### IMPROVING PRESCHOOL VOCABULARY INSTRUCTION

A central reason for the generally low quality of vocabulary instruction is that, although very young children are able to begin the earliest elements of word learning quite soon after birth, understanding and remembering the phonological, grammatical, semantic, and contextual aspects of a new word are typically quite challenging. Children rarely learn a new word after just one or two exposures (but see Carey & Bartlett, 1978, for a discussion of fast mapping); instead, children generally need multiple meaningful exposures to new words in order to learn them (Childers & Tomasello, 2002). For example, in order to deeply learn and remember the word *dragonfly*, a child might require several opportunities to see pictures of this insect; hear and discuss a definition of what makes it unique; compare and contrast it to other, more familiar insects; and process new details about this insect through fiction storybooks (e.g., *Eliza and the Dragonfly*; Rinehart, 2004) and nonfiction informational books (e.g., *Are You a Dragonfly?*; Allen & Humphries, 2004; see Beck, McKeown, & Kucan, 2002, for a discussion of this process).

To carry out this complex process and support extensive word learning in the classroom, teachers would need to deliver highly intentional or spiraling curricular experiences that featured repeated, coordinated exposure to vocabulary with a good deal of explicit exposition, at

least initially, around these words (Beck & McKeown, 2007; Wasik & Bond, 2001; Zipoli, Coyne, McCoach, 2011). Put more simply, teachers likely need to talk more about words in meaningful contexts and encourage children to talk about them as well. Unfortunately, there is some evidence from upper grade contexts that preservice teacher education rarely provides both theoretical and practical information about vocabulary instruction (O'Brien, Stewart, & Moje, 1995; Wood, Vintinner, Hill-Miller, Harmon, & Hedrick, 2009), and the same may be true in preservice early childhood teacher training, although more research is needed here (Young, Grant, Montbriand, & Therriault, 2001). It is critical to note, though, that at least half of practicing early childhood teachers do not hold bachelor's degrees and have not experienced any of this structured, state-credentialed preservice training, which implies that this population may have an even greater need for support than other educators (Brandon & Martinez-Beck, 2006). In addition, once early childhood teachers are practicing, resources around vocabulary instruction are sparse, as most early curricula provide little explicit guidance about vocabulary instruction (Neuman & Dwyer, 2009).

Consequently, in-service professional development for teachers is a key mechanism for improving vocabulary instruction in preschools (Zaslow & Martinez-Beck, 2006). A wide variety of different interventions aimed at building vocabulary among preschool children have been proposed and implemented throughout the United States and in other nations, such as Israel and The Netherlands. One of the most substantial recent initiatives of this nature was the Early Reading First project, which funded more than 100 interventions targeting early vocabulary and literacy skills (e.g., alphabet knowledge, sound awareness, print awareness). Although nearly all Early Reading First interventions aimed to build vocabulary (Jackson et al., 2007), to date only a few Early Reading First models have been linked to positive changes in teachers' instruction and significant increases in preschoolers' vocabulary knowledge, both of words specifically targeted by the intervention and of more general vocabulary. *ExCELL* (Wasik & Bond, 2001; Wasik, Bond, & Hindman, 2006; Wasik & Hindman, 2011a, 2011b) is one effective professional development model that has increased children's intervention-specific and generalized vocabulary skills; other models such as Center for Improving the Readiness of Children for Learning and Education (CIRCLE; Landry, Swank, Smith, Assel, & Gunnewig, 2006) have also demonstrated similar effects. Certainly, many other programs have shown sizeable impacts on other skills, especially those related to decoding. However, fostering vocabulary remains a particular challenge in preschool, likely because of the need for highly intentional teaching that unfolds in coordinated and structured ways over time.

#### ACTIVE INGREDIENTS IN EFFECTIVE VOCABULARY-FOCUSED PROFESSIONAL DEVELOPMENT INITIATIVES

The unique success of just a few models in improving teachers' vocabulary instruction and children's learning raises questions about exactly what features of these models ultimately promote children's vocabulary development. It is interesting that both CIRCLE and *ExCELL* are comprehensive programs (i.e., targeting various aspects of early language and literacy) with highly intensive, one-on-one coaching. As a result, the specific elements of the programs that promote change in vocabulary are not entirely clear. The purpose of this study is to identify and examine these active ingredients in the *ExCELL* model, in order to eventually be able to deliver an effective yet streamlined version of the intervention.

## Understanding the *ExCELL* Model

The *ExCELL* model, examined in a series of randomized controlled trials from 1997 to 2012, provides teachers with at least one full academic year (October through May) of training cycles (one workshop per month, followed by 3 weeks of in-classroom expert coaching) in oral language, phonological sensitivity, alphabet knowledge, and writing. Overall, *ExCELL* encourages teachers to use shared book readings as the instructional fulcrum of the curriculum. Teachers are trained to highlight new vocabulary words through a variety of thematically organized book readings, related conversations, and follow-up activities, with particular emphasis on encouraging child talk about the words. Consequently, information about selecting, reading, and conversing about books is woven throughout *ExCELL* professional development. *ExCELL* also provides teachers with extensive materials to enrich these book readings, including thematically organized books featuring target vocabulary words, props depicting those same words, and lesson plans outlining activities by which books and vocabulary could be extended throughout the classroom.

Analyses of the *ExCELL* model have reliably found that, relative to their peers in a business-as-usual setting, teachers who undergo the training for 1 year show gains on measures of teacher practice (e.g., classroom language and literacy environment, classroom instructional quality) of up to 1 *SD* (Wasik, Bond, & Hindman, 2006; Wasik & Hindman, 2011c). Children in *ExCELL* settings significantly outpace peers in business-as-usual settings in their knowledge of vocabulary, including both specific understanding of the words targeted by the intervention and general gains on standardized vocabulary measures, with large effect sizes (i.e., from .75 to 1; Wasik & Hindman, 2011a; Marulis & Neuman, 2010).

## Shared Book Reading as a Potential Active Ingredient in *ExCELL*

Yet in light of the focus on vocabulary throughout the classroom day, it is not clear whether some specific experiences in the classroom context have a greater impact on children's vocabulary skills than others. In light of both prior research (Bus, van IJzendoorn, & Pellegrini, 1995; Marulis & Neuman, 2010; Mol, Bus, & deJong, 2009) and the significant focus on book reading as a vehicle for word learning in the *ExCELL* training model, it is likely that shared book reading is an essential context in *ExCELL* classrooms for teaching and conversing about new vocabulary. Specifically, teachers' and children's discussion of target vocabulary words throughout the book reading, accompanied by images and explanations in the story that help children construct an understanding of the meaning of the word, likely play an essential role in building vocabulary. This talk could take several forms, with two particular categories of talk often under examination (Dickinson & Tabors, 2001).

### *Contextualized Talk*

Teachers and children might talk about target words and ideas in a contextualized or immediate context, typically through labeling or describing images as they appear in illustrations. For example, when reading *The Very Hungry Caterpillar* (Carle, 2008) during a theme on insects featuring target vocabulary and concepts such as caterpillar, butterfly, and cocoon, teachers might ask questions about the appearance of the caterpillar (e.g., "What colors do

you see?” or “How many legs does the caterpillar have?”) or its daily activities as depicted on the page (e.g., “What is the caterpillar eating in this picture?”). Similarly, they might make comments that provide information on these topics (e.g., “The caterpillar is eating fruit today”).

### *Decontextualized Talk*

Teachers might also ask or explain decontextualized or nonimmediate content that goes beyond what is apparent on the pages of a book. For example, teachers might request or provide predictions on what will happen next (e.g., “Will this caterpillar turn into something else?”), prompt or offer a review of what happened on previous pages that are no longer visible (e.g., “Let’s think back; what foods has the caterpillar eaten before today?”), offer or solicit relevant background information (e.g., “A cocoon is a special case that the caterpillar makes to protect itself”), draw or request inferences (e.g., “Why is the caterpillar so hungry?”), and make connections to children’s own lives (e.g., “Tell me about a time that you’ve seen a caterpillar” or “What is happening with the caterpillars in our classroom science area right now?”).

In light of the potential value of talk during book reading as a mechanism for vocabulary development, teachers in *ExCELL* were encouraged to talk more, and to encourage children to talk more, about target vocabulary using both contextualized and decontextualized language.

## RESEARCH QUESTIONS AND HYPOTHESES

In this examination of active ingredients in *ExCELL*, we posed four specific research questions. First, with what frequency do teachers in *ExCELL* and business-as-usual control classrooms use target vocabulary during book reading, and is that talk contextualized or decontextualized? We anticipated that teachers in both conditions would regularly talk about key theme-related vocabulary during book reading but that teachers in the intervention would more frequently discuss target words using contextualized and decontextualized talk because this was a focus of the intervention training. Second, how often do children in *ExCELL* and business-as-usual classrooms use target vocabulary during book reading, and with what types of talk? Similar to our previous hypothesis, we anticipated that children in both conditions would discuss target vocabulary but that children in the intervention would use target vocabulary more frequently. Third, we examined the extent to which teacher and child use of target vocabulary are correlated. We anticipated moderate correlations in both conditions. Fourth, we investigated whether teacher and/or child use of target vocabulary explains gains in children’s vocabulary skills over the course of the academic year. We expected that more discussion of vocabulary by either teachers or children would result in greater child vocabulary learning.

## METHOD

### Participants

Participants were recruited from three Head Start programs in a major urban school district in the northeast. Two programs were randomly assigned to the intervention condition, whereas the third was assigned to the comparison condition.

### *Teachers*

In total, all lead teachers in two Head Start centers were recruited into the intervention ( $n = 19$ ), and all teachers in one additional center were recruited into a business-as-usual comparison condition ( $n = 11$ ). Because of scheduling difficulties or technological challenges related to book reading observations, the current study included 17 intervention teachers and 8 comparison teachers. The Head Start centers served very similar populations of children and families, and teachers were of similar backgrounds to the families. Across both conditions, all teachers were female, and more than 90% were African American and native speakers of English. In the intervention condition, all but one teacher held at least a bachelor's degree, whereas in the comparison condition, only four of eight teachers had a bachelor's degree; this difference was significant,  $\chi^2(df = 1) = 6.19, p = .013$ . On average, teachers in the intervention condition had 11.56 years of experience ( $SD = 7.04$ ), whereas comparison teachers had 12.12 years of experience ( $SD = 7.16$ ), a nonsignificant difference,  $t(23) = 0.19, p = .851$ .

### *Children*

All children in each classroom were invited to participate in this study. Ultimately, a total of 268 children participated in the intervention centers, whereas 187 participated from the comparison center. More than half (54%) of children were male. Nearly half (42%) of children were in their prekindergarten (or 4-year-old) year. A total of 10% of children had disabilities that could potentially affect their learning (i.e., speech and language issues affected 7% of children and developmental issues affected 3%). More than 90% of children were African American and native English speakers.

The proportion of boys was greater in the comparison condition,  $\chi^2(df = 1) = 4.37, p = .037$ . However, there were no differences across condition in the proportion of prekindergartners or children with disabilities: prekindergartners,  $\chi^2(df = 1) = 3.02, p = .082$ ; children with disabilities,  $\chi^2(df = 1) = 0.33, p = .560$ .

### *Procedures*

#### *Baseline Data Collection*

Children's initial vocabulary skills were individually assessed in the fall (September–October) by trained research staff blind to the assignment of each Head Start center. Baseline data regarding the quality of teachers' classroom instruction were collected during this time as well. Teacher–child interactions around language were measured using the Classroom Assessment Scoring System (Pianta et al., 2008), and the classroom language and literacy environment was assessed using the Early Language and Literacy Classroom Observation checklist (Smith, Dickinson, Sangeorge, & Anastopoulos, 2002).

#### *ExCELL Training*

All lead intervention teachers attended a 3-day summer workshop in late August in which the nature of the intervention and some key principles of teachers' participation were outlined. After fall data collection was completed (mid-October), teachers in the intervention condition

began receiving *ExCELL* training. Over the course of the academic year, teachers were trained on five modules addressing building vocabulary through conversations, advancing vocabulary through shared book reading, enhancing sound awareness, teaching alphabet knowledge, and helping children with emergent writing. Each module was covered in 1–2 monthly cycles. In the first week of the cycle, teachers attended a group workshop with colleagues in their same Head Start center. The workshop involved 2–3 hr of interactive lecture, videotape viewing, and hands-on activities and concluded with an assessment of teachers' learning on the topic. The workshop began by explaining the research base for teaching children about particular content, provided specific guidance on routines and materials that teachers could use in their classrooms to teach that content, and then provided teachers with opportunities to plan how they would use the target routines and materials with their students.

The following week, a coach visited each teacher's classroom and demonstrated key techniques from the workshop during the primary instructional portion of the day (typically the morning) while the teacher observed the coach. The coach returned that afternoon during the teacher's planning time to discuss the observation one on one with her and help her plan how to use the strategies herself. The following week, the coach returned to the classroom to informally observe the teacher using the techniques from the workshop and, that afternoon, to conduct a one-on-one conference to highlight areas of success and provide support in overcoming any challenges. One week later, the coach again returned to conduct a more formal observation and to conference with the teacher to provide additional support and collaborative planning for future use of the target techniques. After this final observation and conference, the next cycle (workshop, modeling, and observations) began again, although any teachers who did not yet demonstrate adequate fidelity to the desired behaviors of the previous cycle received ongoing support on those techniques.

Teachers also received a variety of materials, including books and props, emphasizing target vocabulary words from typical early childhood themes (e.g., friends and family, the season of fall, animals on the farm). Coaches also provided lesson plans with suggested activities organized around these words; it is critical to note that these were not scripted lessons but recommended sequences of book readings and follow-up activities featuring target words, as well as key questions that could be asked about the words during the readings and activities. These tools, and particularly the lesson plans, served as implicit professional development, as they provided suggestions and resources with which teachers could successfully implement the techniques recommended in the *ExCELL* training.

*Business-as-usual training.* Teachers in the business-as-usual Head Start classrooms had monthly in-service trainings for approximately 2–3 hr with their education coordinator that covered a variety of topics including but not limited to language and literacy. For support between trainings, teachers would consult with their onsite education coordinators when the need arose. Finally, teachers in this comparison condition received all of the books and props that intervention teachers received, as they followed the same set of Creative Curriculum themes throughout the year, although they did not receive the lesson plans.

### *Videotaping of Book Readings*

In addition to the observations embedded in the cycles of coaching, teachers in both conditions were visited in fall and spring and their instruction was videotaped. In May, teachers

were videotaped while teaching a theme on spring addressing seasonal flowers, plants, and insects. Teachers received a copy of *Butterfly, Butterfly* (Horacek, 2008), a simple narrative in which a little girl chases after a butterfly and encounters a variety of insects in her search. The book was distributed by program coaches at least 1 week before the scheduled reading, and teachers were asked to read the book as they normally would. No teachers reported already having the book in their classroom. All teachers chose to read the book to a whole group during their main instructional period.

Coaches visited the classrooms to videotape the readings. Coaches started the videotapes when teachers pulled the children together to start the reading and first made reference to the storybook (i.e., “Today we’re going to read a new story about spring”). Coaches ran the videotapes until teachers stopped talking about the book or related activities. Thus, if a teacher concluded discussion of the story but began discussing follow-up center activities, the coach continued to tape; if the teacher ended the discussion and then announced that children were heading to lunch, the coach stopped the tape.

### *Posttest Data Collection*

In spring, children were once again individually assessed on vocabulary, and classroom quality was observed using the Classroom Assessment Scoring System and Early Language and Literacy Classroom Observation. Trained observers blind to condition conducted all data collection efforts.

## Measures

### *Teacher Background Variables: Education and Experience*

Teachers’ education and experience was collected using a self-report survey administered at the beginning of the school year. Teachers reported on their highest degree earned to date as well as the number of years in which they had worked in the field of education.

### *Child Background Variables: Age and Disability Status*

Children’s gender, age (classified as preschool or prekindergarten), and disability status (i.e., speech-language challenge or developmental issue) were collected from school records. Descriptive data are presented in “Participants.”

### *Child Vocabulary: Peabody Picture Vocabulary Test–III (PPVT-III)*

Child vocabulary was measured using the PPVT-III (Dunn & Dunn, 1997), a well-established standardized measure of receptive vocabulary. The PPVT-III has strong internal consistency, test–retest reliability, and content validity (see Dunn & Dunn, 1997), and the third edition is sensitive to cultural differences. The split-half reliability, interrater reliability, and test–retest reliability all exceed .90. Measures of validity show a high correlation ( $r = .92$ ) with the Wechsler Intelligence Scale for Children (3rd ed.; Wechsler, 1991) and with the Oral and

Written Language Scales (Carrow-Woolfolk, 1995;  $r_s = .63-.83$ ). Descriptive data showed that the average standardized score on the PPVT-III was 80.00 points ( $SD = 13.70$ , range = 40–117) in fall and rose to 88.02 ( $SD = 14.14$ , range = 22–124) in spring. Raw scores were used in analyses because they better capture change over time; specifically, in fall children scored 29.43 items ( $SD = 15.85$ , range = 2–82) and in spring children scored 43.41 items ( $SD = 19.05$ , range = 3–93).

### *Book Reading Talk*

Teachers' and children's remarks about target vocabulary during book reading were coded by the second author and another trained member of the project staff using a coding scheme collaboratively developed for this project by us and staff. Coding began when teachers first mentioned the book (typically at the start of the filmed segment) and ended when teachers concluded discussion about the book (typically at the end of the segment). Teachers' reading of the story was not coded; only extratextual discussion was addressed.

*Target vocabulary words.* In the current study, target vocabulary words were those that emerged in the book or the overarching theme. These included words such as *spring*, *butterfly*, and *slug* (all of which appeared in the book) as well as words such as *caterpillar*, *chrysalis*, or *transformation* (all of which were salient to the theme of spring and relevant for the story, even though the book did not actually refer to caterpillars or their transformation into butterflies). Target words were not provided to teachers; instead, words that would be counted as theme related were identified after reviewing the storybook but before the coding of the readings began. Furthermore, during the coding process, additional theme-related words that teachers chose to highlight were added to the list. We considered the possibility that teachers would highlight words that were not related to the theme but did connect to the book, such as *search* or *seek*; however, this practice was not observed. Instead, book readings generally highlighted the insects and occasionally the plants (e.g., flowers) that the main character encountered as she pursued the butterfly. It is important to note again that all teachers were studying the same theme of spring, with a focus on plants and insects. However, there were variations across the classrooms because the intervention provided only unscripted lesson plans, and only intervention teachers received those.

*Teacher talk.* At the most fundamental level, we distinguished between instances when teachers actually used the target word in a contextualized or immediate way or in a decontextualized or nonimmediate way (Dickinson & Tabors, 2001; van Kleeck, Stahl, & Bauer, 2003). As mentioned previously, contextualized remarks include labeling and describing the images of the book, whereas decontextualized remarks extend beyond the pages of the book to provide or request additional information about the word. Examples include reviewing or summarizing information already presented in the book about the target word; making predictions about the upcoming events of the story using the target word; relating the word to children's own lives; or providing information about a concept, such as a definition.

In addition, we discovered while viewing the tapes that teachers frequently repeated exactly what one or more children said, particularly when the child(ren) used a target word. Because the teacher was not adding new information but instead simply reiterated a word, phrase, or sentence that one or more children provided, we viewed this behavior as a distinct type of talk. Thus, we

coded instances of teachers' repetition of child talk about target vocabulary words to capture these instances in which teachers highlighted the word for children but did not provide unique information about the word beyond what had already been contributed to the conversation.

*Child talk.* Child talk about target vocabulary was coded in a parallel way. Child talk was conceptualized as a classroom-level variable capturing the child's production of target words to which all children had access (i.e., had the opportunity to hear or say). We included instances when (a) all or most children used a target word via a choral remark, typically in response to a teacher question, as well as (b) one child's response to a targeted teacher invitation to talk. Finally, after viewing the videotapes, we elected to include mentions of words in which (c) an individual child interjected without invitation (i.e., called out), because these remarks often drew the attention of peers and sometimes even the teacher, providing another opportunity to hear the target word. In parallel to the teacher codes mentioned previously, we coded for contextualized talk (labeling or describing images) and decontextualized talk (more abstract discussion of the words, including review or summary of book content, connections to real life, definitions or additional factual information, or predictions). Finally, we coded for instances when one or more children repeated something that the teacher or another child said.

*Data reduction to the classroom level.* The coding scheme resulted in a total number of contextualized and decontextualized remarks about target vocabulary made by each of the participating classroom teachers. In addition, because one child's remark could generally be heard by all classroom peers, children's remarks were summed across the classroom. In other words, for each classroom we calculated two teacher variables (i.e., the total number of contextualized and decontextualized teacher remarks about target vocabulary) as well as two child variables (i.e., the total number of contextualized and decontextualized child remarks about the vocabulary)

### Missing Data

There were no missing data on book readings among teachers (as the sample was limited to teachers whose book readings were videotaped). One teacher (intervention) was missing data on education and experience. In fall, no children were missing data regarding disability status (0 = no, 1 = yes), although two children were missing data on gender (0 = male, 1 = female). In contrast, 47 children were missing data on age, and the prevalence of missing data was higher in the comparison group,  $\chi^2(df=1) = 4.15, p = .042$ . Finally, 50 children were missing fall vocabulary data, and 110 children were missing these data in spring. Vocabulary data were missing more frequently in the comparison condition in fall,  $\chi^2(df=1) = 5.16, p = .023$ ; however, no differences between conditions were observed for spring vocabulary data,  $\chi^2(df=1) = 3.00, p = .083$ . Children who were missing one piece of data (e.g., age) were more likely to be missing fall vocabulary but less likely to be missing spring vocabulary: fall vocabulary,  $\chi^2(df=1) = 553.42, p < .001$ ; spring vocabulary,  $\chi^2(df=1) = 11.65, p = .001$ .

Because data appeared to be missing at random (i.e., missingness was related to factors in the data set), listwise deletion had the potential to introduce bias into the data. Consequently, a series of interconnected linear regression equations in SPSS Version 18 were used to impute data, leveraging known information to fill in missing information while still preserving underlying

relations between variables in the data set. Resulting means and standard deviations for all variables were equivalent to those in the original data set.

## RESULTS

Ideally, our research questions would be examined using a single, comprehensive path model in which intervention status predicted the frequency of teacher and child talk during book reading (as in the preceding questions) and talk in turn predicted children's vocabulary learning. However, in light of the sample size in this study, we were not able to construct one comprehensive model and instead strategically analyzed each of our questions (i.e., the effects of the intervention on talk and the effects of talk on vocabulary learning) separately.

### Question 1: Frequency of Teacher Use of Vocabulary

During the whole-group spring book reading, intervention teachers used an average of 40.24 references to target vocabulary ( $SD = 16.76$ , range = 12–68), whereas comparison teachers referred to vocabulary about half as often ( $M = 24.87$ ,  $SD = 15.53$ , range = 3–42). This difference was significant,  $t(23) = 2.19$ ,  $p = .039$ , and of a large magnitude (Cohen's  $d = .95$ ).

More closely examining specific types of teacher talk, we found that teachers in the intervention condition used nearly 3 times as many contextualized references to target vocabulary ( $M = 11.47$ ,  $SD = 6.24$ ) as did teachers in the comparison condition ( $M = 3.75$ ,  $SD = 4.98$ ), a large and statistically significant difference,  $t(23) = 3.10$ ,  $p = .005$ ,  $d = 1.37$ . Teachers in the intervention also used more decontextualized references to vocabulary ( $M = 21.53$ ,  $SD = 11.93$ ) than did comparison teachers ( $M = 16.75$ ,  $SD = 11.07$ ). However, although this difference was of moderate, educationally meaningful size ( $d = .41$ ), it was not statistically significant,  $t(23) = -0.96$ ,  $p = .350$ . Finally, intervention teachers more frequently repeated words after children said them ( $M = 7.18$ ,  $SD = 5.01$ ) compared to teachers in business-as-usual settings ( $M = 4.38$ ,  $SD = 3.70$ ). Although this difference was of moderate and educationally meaningful size ( $d = .63$ ), it was not statistically significant,  $t(23) = -1.40$ ,  $p = .174$ .

### Question 2: Frequency of Child Use of Vocabulary

Children in the intervention referred to vocabulary 40.06 times ( $SD = 21.37$ , range = 14–88), whereas those in the control condition made 33.50 references ( $SD = 16.39$ , range = 9–54), a difference of moderate, educationally meaningful size ( $d = .34$ ) although it was not statistically significant,  $t(23) = 0.76$ ,  $p = .45$ . When we looked more closely, however, a nuance emerged. Specifically, children in the intervention condition made more contextualized references to vocabulary ( $M = 23.05$ ,  $SD = 17.05$ ) than comparison children ( $M = 11.75$ ,  $SD = 10.36$ ), a large difference ( $d = .80$ ) of marginal significance  $t(25) = 1.73$ ,  $p = .095$ . Intervention children made fewer decontextualized references to vocabulary ( $M = 15.23$ ,  $SD = 11.48$ ) than control children ( $M = 21.25$ ,  $SD = 15.44$ ), a moderate difference ( $d = .44$ ) that was not significant,  $t(23) = 1.10$ ,  $p = .285$ .

Finally, children rarely repeated target words after their teachers: Those in the intervention repeated target words after teachers slightly less often ( $M = 0.47$ ,  $SD = 1.07$ ) than did comparison peers ( $M = 0.50$ ,  $SD = 1.41$ ), a nearly negligible ( $d = .02$ ) and nonsignificant difference,  $t(23) = 0.06$ ,  $p = .954$ .

### Summary

In sum, intervention teachers talked more about target vocabulary words during the shared reading. This disparity was largely driven by their greater use of contextualized talk about the target words; intervention teachers also made more decontextualized and repeat remarks, but these differences were not significant. Although children in the intervention condition did not talk about vocabulary more than peers in the comparison classrooms, they did use marginally more contextualized talk to discuss target words.

### Question 3: Correlations Between Teacher and Child Talk

Complete information about correlations in the sample as a whole (i.e., aggregated across both the intervention and comparison conditions) is presented in Table 1. All variables were included in correlation analyses with the exception of child repetition of teacher remarks, which was very rare. In addition, within the text we include information about correlations between variables within the intervention or control condition to provide a detailed, exploratory portrait of the interconnections between teacher and child talk in *ExCELL* as compared to business-as-usual settings.

#### Overall Teacher and Child Talk

Across the sample of participants, teachers who talked more about target vocabulary had children in their classrooms who talked more about vocabulary, and the correlation was strong ( $r = .75$ ,  $p < .001$ ). This correlation was similar in magnitude and significant in each condition.

TABLE 1  
Correlations Between Teacher and Child Talk

Variable	1	2	3	4	5	6	7	8
1. Total teacher target words	—							
2. Total child target words	.75***	—						
3. Teacher words: contextualized	.64**	.48*	—					
4. Child words: contextualized	.54**	.77***	.60**	—				
5. Teacher words: decontextualized	.86***	.74***	.22	.38†	—			
6. Child words: decontextualized	.47*	.55**	-.03	-.11	.66***	—		
7. Teacher words: repeat	.66***	.25	.33	.16	.39†	.18	—	
8. Child words: repeat	-.11	.05	.10	.09	-.09	-.13	-.02	—

† $p < .10$ . \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

### *Subtypes of Teacher Talk*

Teachers' use of contextualized talk was not linked to their decontextualized talk or repetition of children's use of target words. Similarly, decontextualized talk and repetition of children's use of target words were unrelated. These correlations were similar in magnitude and significant in each condition.

### *Subtypes of Child Talk*

In the sample as a whole, children's contextualized talk was not linked to their decontextualized talk, and this correlation was similar in magnitude and significant across conditions.

### *Subtypes of Teacher and Child Talk*

Contextualized talk by teachers was linked to contextualized talk by children ( $r = .60$ ,  $p = .001$ ), although only in the intervention ( $r = .59$ ,  $p = .012$ ) and not in the comparison ( $r = .18$ ,  $p = .668$ ) condition. Decontextualized talk by teachers was linked to children's decontextualized talk ( $r = .66$ ,  $p < .001$ ), and the magnitude and significance of this correlation were similar in both conditions. Teachers' contextualized talk was not linked to children's decontextualized talk across the sample as a whole or in either condition.

### *Summary*

In sum, there was a strong correlation between overall teacher and child talk about vocabulary words. Among subtypes of talk, few correlations emerged; however, children used more contextualized talk when teachers did, particularly in the intervention. Children used more decontextualized talk when teachers used more of this talk, and this correlation was apparent in both conditions. Findings imply a high degree of interconnection between teacher and child talk, with selective evidence of greater interdependence of talk in the intervention.

## Question 4: Talk About Target Words and Child Vocabulary Learning

### *Analytic Strategy*

A preliminary analysis showed that approximately 35% ( $p < .001$ ) of the variance in children's spring vocabulary knowledge was shared within classrooms, necessitating a multilevel model. To examine whether differences in teacher and child talk might account, at least partly, for previous evidence of stronger vocabulary learning in the intervention condition, we constructed a hierarchical linear model in which children (at Level 1) were clustered within teachers (at Level 2). A maximum likelihood estimation method was used.

All variables were centered at the sample mean. In initial models, variables at Level 1 included fall vocabulary, child age (4 years old = 1, 3 years old = 0), child disability status (disability = 1, no disability = 0), and child gender (female = 1, male = 0). Variables at Level 2 included the teacher and child talk variables of interest as well as teacher years of experience and teacher

education (bachelor's degree = 1, no bachelor's = 0). However, teacher education and experience were consistently found to be unrelated to the outcome or to affect other coefficients in the model and were trimmed to preserve power, in light of the small sample of teachers.

### *Overall Talk*

In the first model, total teacher and total child talk about vocabulary (including contextualized and decontextualized references) were entered as the variables of interest at Level 2. Results showed that children whose teachers made more references to vocabulary had stronger spring vocabulary skills ( $B = 0.11, p = .025$ ). In contrast, child references to target vocabulary were not uniquely predictive of spring vocabulary skills ( $B = -0.08, p = .160$ ). Among covariates, spring skills were equivalent for girls and boys ( $B = 0.27, p = .771$ ), whereas spring skills were stronger among 4-year-olds ( $B = 8.13, p < .001$ ), children without disabilities ( $B = -5.27, p = .026$ ), and children with stronger fall vocabulary ( $B = 0.77, p < .001$ ).

In one final model, we examined which, if any, of the subtypes of talk might explain this relation between teachers' use of vocabulary and children's word learning. The Level 1 portion of the model described previously was recreated. At Level 2, instead of total teacher and child talk about target vocabulary, we included three types of teacher talk: contextualized, decontextualized, and repeating. We also included the three parallel types of child talk: contextualized, decontextualized, and repeating. As before, all teacher and child talk variables were grand centered. Results revealed that, aside from the Level 1 covariates described previously, only teachers' use of target words when repeating child remarks was predictive of children's vocabulary learning ( $B = 0.43, p = .048$ ). In light of the large number of predictors relative to units (i.e., classrooms) at Level 2, we ran a pared-down version of the model including the Level 1 variables and only the significant Level 2 predictor, repetition, and were able to confirm the significant association ( $B = 0.36, p = .017$ ).

## DISCUSSION

The primary findings from this study shed important light on the active ingredients in the *ExCELL* intervention. Specifically, results suggest that the *ExCELL* intervention raised the frequency with which teachers and children used target vocabulary words during book reading, particularly where contextualized talk was concerned. Moreover, when teachers talked more about vocabulary during readings, children built stronger skills over the course of the year. Although there were no unique effects of children's vocabulary-related remarks on word learning during the year, teachers' repetition of children's remarks was predictive of vocabulary learning. Therefore, teacher talk and, implicitly, child talk during book reading emerged as an active ingredient in this intervention's effect on children's knowledge of vocabulary, including but not limited to words targeted in the intervention.

### Teacher Talk

The data suggest that teachers who were trained in *ExCELL* used more target theme-related vocabulary during book reading than teachers who did not receive the intervention. One of

the goals of the intervention was to scaffold teachers in talking about book vocabulary. The findings suggest that the training was effective in producing a desired change in teacher behaviors. In addition, when teachers produced more target words in the context of book reading, children had greater opportunity to hear those vocabulary words.

Another key finding in this study is that intervention teachers used significantly more contextualized talk than control teachers, although differences between conditions in other kinds of talk were smaller. The greater focus on contextualized talk in intervention classrooms is likely a positive finding. Indeed, perhaps as young children begin to learn a new word, they benefit from considerable exposure to the labeling and describing of illustrations of that word. However, there may be room for the *ExCELL* intervention to also call greater attention to the benefits of more abstract, decontextualized talk. As new words become more deeply embedded in children's lexicons and can be more swiftly and automatically retrieved, children might benefit from more decontextualized discussion of those words. The lower frequency of decontextualized talk and nonsignificant differences across conditions may indicate that teachers have more difficulty with this type of talk, perhaps because children find it more challenging and teachers are concerned about losing children's attention or only being able to hear from a few members of the class. Teachers may require more specific guidance on how to use this talk.

### Child Talk

Children in the intervention condition did not talk about vocabulary more than peers in the comparison classrooms. Children in the intervention did, however, use marginally more contextualized talk to discuss target words. These are interesting findings in light of the fact that children in the intervention condition made significant gains in standardized measures of vocabulary at the end of the year of intervention. One possibility is that children used the book reading experience as time to listen and comprehend the vocabulary words. Hearing teachers frequently use vocabulary during book reading also may draw their interest and attention to the vocabulary. However, it is also plausible, in light of research showing benefits of children's talk (see Beck et al., 2002) that gains could be augmented if teachers provided additional opportunities for children to talk.

### Relationship Between Teacher and Child Talk

Regardless of condition, teachers who talked more about target vocabulary had children in their classrooms who talked more about vocabulary. This is a positive finding from an instructional perspective, as it reinforces the high degree of influence that teachers wield over the amount (and nature—see Zucker et al., 2009) of classroom dialog. Indeed, other research in the area of language development suggests that when adults provide more exposures to target language, children produce that language (Huttenlocher, Vasilyeva, Cymmerman, & Levine, 2002; Huttenlocher, Waterfall, Vasilyeva, Vevea, & Hedges, 2010; Landry, Anthony, Swank, & Monseque-Bailey, 2009). Perhaps if we asked teachers to increase the number of target vocabulary words that they used during book reading (and even other activities), children might use more of those words as well. Having children increase their use of vocabulary words could engender further benefits for children's word learning.

## Predictors of Vocabulary Learning

Overall, more teacher talk about the target vocabulary was linked to greater child learning. This finding is resonant with basic research suggesting that multiple exposures to new words are critical for learning (e.g., Childers & Tomasello, 2002). This result also has implications for teacher training, in that teachers could be guided to be highly explicit about their presentation and description of new words. Child talk was not predictive of vocabulary learning beyond the other factors in the model. Perhaps teachers' use of vocabulary was more related to children's word learning because children pay more attention to, or can better hear, the teacher's talk than the utterances of their peers.

It is interesting that neither contextualized nor decontextualized talk among teachers or children specifically explained gains in children's standardized vocabulary over the preschool year. Instead, children learned more new words in classrooms in which teachers repeated vocabulary words after children had used them. These findings are similar to results in language research, and particularly to studies showing that middle-class mothers' efforts to repeat and expand on their children's language result in children's language growth (Hoff, 2003, 2009).

This is an interesting and important finding for two reasons. It reinforces the importance of getting children to use the vocabulary in conversations. It may not be sufficient for children to hear adults use vocabulary words; they may need to use the words themselves. Equally important is that the teacher needs to validate children's use of the target words by repeating what children have said. Many times children say things in classrooms but their remarks go unacknowledged. Having an adult provide feedback, even in the form of repeating what children have said, can reinforce the importance of the words. Furthermore, it is possible that when one child makes a remark in a classroom, that individual child benefits, but other children may not hear or understand that remark. Having the teacher amplify the remark for the group, drawing attention to the remark and stating it in a clear voice, may be a necessary additional step, particularly for young children. Encouraging teachers to use small-group book readings in which they are better able to hear, repeat, elaborate on, and invite more children's responses might promote greater effects of child talk and interaction.

As a final point, it is interesting that children who were exposed to more target theme-related vocabulary words during classroom book readings performed better on the PPVT-III. This is an interesting issue, because the PPVT-III includes a broad range of words far beyond those related to the classroom theme of spring or even to other classroom themes. It could be the case that children who are exposed to richer vocabulary experiences around particular social and natural science concepts not only learn words related to those concepts but also begin to attend more to words in general. This enhanced attention to words might lead to broader acquisition of words and thus explain the increases on standardized measures of vocabulary.

In sum, we found that teachers' use of target vocabulary during reading contributes to children's vocabulary learning during the preschool year. Also, teachers' response to children's remarks advance word knowledge. To increase children's vocabulary, teachers may consider recasting and explaining children's comments as a strategy to improve vocabulary instruction. Too often, teachers of young children respond to students' remarks with answers that only clarify whether the child's answer was right or wrong. Guiding teachers to respond more fully to children, using the target vocabulary as often as possible, could be helpful in children's overall vocabulary development.

## Implications

Teachers struggle with how to improve instruction for children and how to increase children's vocabulary. The findings from this study and other research in the field suggests that teachers could implement three simple yet valuable strategies during book reading to improve children's vocabulary. When talking during book reading, teachers should explicitly use book vocabulary in conversations about the book. For example, when reading *Butterfly, Butterfly* in the context of a theme on insects, teachers should explicitly mention (ideally through open-ended prompts) the different insects that appear throughout the book, such as "Tell me about where this earthworm lives" or "How is the butterfly different from all of the other insects Lucy [the main character] has encountered?" This will afford children multiple exposures to words in the meaningful context of book reading, which will increase their familiarity with these words.

In addition, teachers should encourage children to explicitly use book vocabulary. Hearing a word is the beginning of the process of learning and remembering that word, but providing opportunities for children to use the new word to communicate their needs and ideas will help to reinforce the child's sense of its phonological, contextual, grammatical, and semantic aspects (Hirsh-Pasek & Golinkoff, 2012). For example, the teacher might ask "How do you think this butterfly began its life?" to target insect theme-related words such as *caterpillar*, *metamorphosis*, and *chrysalis*.

To increase children's vocabulary, teachers may consider recasting and explaining children's comments as a strategy to improve vocabulary instruction. Too often, teachers of young children respond to students' remarks with answers that only clarify whether the child's answer was right or wrong. Guiding teachers to respond more fully to children, using the target vocabulary as often as possible, could be helpful in children's overall vocabulary development.

In addition, teachers can repeat words after children use the word, reinforcing the children's use of words. These data suggest that when a child hears the teacher say a word after he or she or a peer has used that word, the child is more likely to learn the word. This repetition may provide both (a) some validation to the child that he or she is using the word correctly and (b) another chance to hear the word in context. Given what we know about the lack of vocabulary instruction in early childhood classrooms, particularly those serving children in poverty, these strategies may help to increase the frequency of book-related vocabulary words used throughout the day and result in children learning new words.

Finally, these findings, in the context of the broader literature, have several implications for teacher professional development. First, the unique role of teacher talk in children's vocabulary gains suggests that other professional development interventions with goals similar to those of *ExCELL* might target this essential teacher practice. Second, book reading may be a uniquely feasible and valuable context in which to situate this work.

## LIMITATIONS AND FUTURE DIRECTIONS

The current study only examined one book reading, and future research could examine a series of different book readings and/or repeated readings of the same book. This strategy would provide a more comprehensive look at the book reading experience. Furthermore, teachers were observed reading only in spring, and a pretest of book reading would be a helpful covariate.

Future work will need to examine this issue. Finally, in light of the resource-intensive nature of *ExCELL*, the intervention included a relatively small number of teachers and classrooms, which limits statistical power. The current study included several differences between intervention and comparison classrooms that were in the expected direction and of meaningful effect size but not statistically significant; future work with a larger sample might reexamine these issues.

## CONCLUSION

This study sought out active ingredients in the *ExCELL* intervention that uniquely explained children's vocabulary gains over the preschool year. Evidence suggested that teachers' talk about vocabulary words during shared book reading, and particularly their repetition of vocabulary words that children used, explained a significant part of the variance in children's receptive knowledge of vocabulary words. Thus, teacher (and, implicitly, child) talk during book reading operates as a key bridge between *ExCELL* teacher professional development and preschoolers' vocabulary learning.

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