Children's Active Engagement in Public School Language Therapy

Relates to Greater Gains

Mary Beth Schmitt, PhD, CCC-SLP

The University of Texas at Austin

2504 Whitis Avenue

BLDG CMA Suite 4.116A; MS A1100

Austin, Texas 78712

Marybeth.schmitt@austin.utexas.edu

There are no conflicts of interest

Abstract

Purpose: The current study examined children's engagement as an active ingredient of language therapy in the public schools and considered the potential interplay between engagement and dose on outcomes.

Method: Participants included 135 children with language impairment (LI) receiving business-as-usual therapy from 70 speech-language pathologists. Two video-taped therapy sessions from each participating child were coded for children's level of engagement as well as time in language-focused therapy (dose).

Results: Hierarchical linear modeling was used for analyses; children's level of engagement (i.e., active engagement) was significantly, positively related to children's language gain and was not moderated by dose.

Conclusions: Findings suggest that children's active participation in therapy sessions is a significant component to effective language therapy and underscores the need for further research.

Introduction

Currently, over 1,000,000 children in the United States are diagnosed with language impairment (US DOE, 2010) and are served by over 91,400 speech-language pathologists in the public schools (U.S. DOE, 2008). To date, very little empirical research exists to guide school-based SLPs in how to effectively accelerate children's language growth. A systematic review by Cirrin and Gillam (2008) identified only 21 studies investigating language intervention for school-age children, and even fewer that focused on the primary grades. Given the dearth of information on effective language-intervention practices, the intent of this research project is to assess the extent to which two potentially active ingredients of language intervention may explain variance in children's language gain over 9-months of therapy participation.

The focus on these two potentially active ingredients, namely children's engagement during intervention and the interaction with treatment dosage, is supported by rigorous classroom-based research showing that these intervention ingredients are not only malleable but also explain considerable variance in children's language growth over time (Connor et al., 2010; Ladd & Dinella, 2009). To date, no similar studies have examined how these intervention ingredients might relate to treatment gains for children with language impairments. Thus, in an effort to fill a critical research gap immediately relevant for researchers and SLPs, this study investigates two dimensions of intervention that may predict language gain for young school-age children being treated for language impairments, namely children's engagement and the interplay with treatment dosage.

Engagement

Child-level factors may have a significant role to play in the extent to which children experience language gain across the school year. One child-level factor shown

to have an impact in learning is engagement, also referred to as the School

Engagement Hypothesis (see Ladd & Dinella, 2009). The School Engagement

Hypothesis posits that for children to benefit from learning; to achieve measurable

academic outcomes, they must fully engage in the learning environment. The simple act

of attending school and being in the presence of instruction is insufficient for learning.

School Engagement Hypothesis highlight three forms of engagement: cognitive,

emotional, and behavioral (Fredricks, Blumenfeld, and Paris, 2004). Cognitive

engagement is the extent to which children use cognitive resources to learn and master

new tasks. Emotional engagement is the degree to which children feel connected at

school, including their peers and teachers. Behavioral engagement is the extent to

which children actively participate in the learning environment. Fredericks and

colleagues (2004) suggest that the best mechanism for measuring cognitive and

emotional engagement is through student interviews and questionnaires. For young

children in public school, these forms of measurement are unreliable. Behavioral

engagement, however, is best measured through direct observation of children's

interactions in learning environments. Given the current study's focus on early

elementary-aged children, further discussions of the School Engagement Hypothesis

will center on behavioral engagement.

  In many ways, behavioral engagement may be best considered as an observable

manifestation of the child's self regulation abilities (see Ponitz & Rimm-Kaufmann, 2011;

Ready et al., 2005). Children with strong self regulation abilities, manifested as high

levels of engagement, demonstrate the ability to attend to instructional activities, follow

directions, and participate in learning opportunities. In contrast, children with low levels

of engagement are easily distracted, have difficulty following directions, and tend to

disengage from academic activities. Children may manifest low engagement through

disruptive behaviors (i.e., wandering around the room, engaging in alternative activities) or through more passive behaviors (i.e., sitting and listening without actively participating in the activity). Researchers conceptualize engagement on a continuum ranging from highly engaged to completely disengaged, rather than the presence or absence of participation.

Studies of early learning suggest that engagement may play a critical role in outcomes (e.g., Frijters et al., 2000). Specifically, findings from educational research have shown that children who begin school with high levels of engagement show greater gains not only for their beginning year of academics (McClelland et al., 2000; Ponitz & Rimm-Kaufmann, 2011), but also long term impacts on learning (Ladd & Dinella, 2009; McClelland et al., 2000).

Alternatively, children with low levels of engagement not only manifest lower levels of academic abilities (Bodovski & Farkas, 2007) but also show reduced gains in learning across the school year (McClelland et al., 2000; Ponitz & Rimm-Kaufmann, 2011). Of most significance for this study, research by Cooper and Speece (1988) showed that children with low levels of engagement were more likely to be referred for special education. Additionally, a study by McClelland, Morrison, and Holmes (2000) investigated 540 kindergarteners and their academic outcomes at the end of kindergarten and the end of 2nd grade. Of the 82 children identified with poor engagement, over 17% of them had reported language problems. Further, a study by Bodovski and Farkas (2007) found that engagement had the biggest impact on children who started the year with low academic skills. Children with low academic skills yet high engagement made more gains over the school year than children with low academic skills and low engagement.

Studies in the educational literature suggests that engagement may play a critical role in learning, especially for children already at risk for limited gains. From a theoretical perspective, the quality and quantity of treatment provided to children during therapy sessions may be irrelevant if the child is not fully engaged in treatment – or said differently – willing and able to benefit from the treatment being provided. However, the extent to which engagement relates to language learning for children with LI is unknown. Therefore, this study will investigate children's engagement within language therapy sessions in the public schools and the relation of engagement to outcomes at the end of the school year for children with LI.

Interplay Between Engagement and Dose

Prior research on children's engagement, specifically for children at risk for academic failure, suggests that children's engagement may interact with other factors to impact outcomes of educational or therapeutic interventions (see also Ponitz & Rimm-Kaufman, 2011). One element of language therapy understood to be critical to children's language learning is that of dose. Experts have suggested that what happens *within* therapy sessions, including treatment dose, represents a key feature of treatment that may explain differential gains between children receiving therapy (Warren et al., 2007). For the purposes of this study, I conceptualize treatment dose as the percent of time in therapy the SLP spends explicitly addressing language targets. The actual techniques used may vary as well as the actual targets addressed within this time; thus, as an index of treatment dose, the metric of "time spent targeting language" is necessarily general but empirically tenable (see Connor et al., 2010). In real terms, consider a child who receives 60 minutes of therapy per week in which 80% of the time is spent addressing language targets, versus a child who receives 60 minutes of therapy per week in which 60% of time is spent addressing language targets. The

increased dose observed for the first child should relate to increased language gain for children actively engaged in that therapy.

Empirically, studies of dose on language gain are mixed with some studies showing that increases in dose have a direct and positive impact on learning outcomes (see McGinty et al., 2011 and Connor et al., 2010) while other studies show no relation between the two (e.g., Hassinl & Leonard, 2010). An investigation of treatment intensity for 294 children with LI showed that the interplay of dose and frequency was a significant predictor of language outcomes (Schmitt et al., 2017). Although much more research is certainly warranted to fully understand the role of dose on children's outcomes, that was not the goal of the current study. Instead, we consider dose as a potentially critical factor in understanding children's engagement.

Theoretically, high engagement in language therapy sessions may only relate to children's outcomes if they are engaged in productive language therapy (i.e., dose). Children with high levels of engagement, experiencing language therapy sessions with low levels of dose, may not make as many gains over the academic year as peers with high levels of engagement experiencing high levels of dose. Said differently, children's engagement may only relate to gains to the extent that they are accessing sufficient language therapy to effect change on their language system. If this is true, then we would expect to see an interaction effect between dose and engagement such that children with high levels of engagement and high dose would experience more gain in an academic year than children with high levels of engagement and low dose or children with low levels of engagement but high dose. Research by Ponitz and Rimm-Kaufmann (2011) suggests that there is empirical evidence to support this hypothesis. Their study found that kindergarten children's level of engagement mattered most during structured, instructional time (high dose). Children who had lower engagement

(measured as off-task behaviors) during structured, instructional time (high dose) had lower spring scores than peers with higher engagement (fewer off-task behaviors). This study was conducted with typical children in a regular classroom setting measuring literacy outcomes. The extent to which engagement interacts with the instructional opportunities in pull-out therapy for children with LI remains unknown.

While the field of speech-language pathology has an increasing volume of efficacy studies designed to identify preferred treatments for improving children's language skills, a substantial need remains in understanding what aspects of treatment are most influential to children's gains. Indeed, if we are to invest in large scale experimental studies that systematically evaluate planned variation in treatment components, we need to have a much more thorough understanding of those ingredients that actively contribute to children's gain over time. In this regard, the proposed work will significantly advance our understanding of language intervention within public schools by examining the unique relation between child engagement and language gain as well as the interactive relations between child engagement and dose in predicting language gain. Results from this study will serve the speech-language pathology community of clinicians and researchers by identifying significant features of intervention that may systematically improve outcomes for children with language impairment.

Rationale and Study Aims

Classroom-based research suggests that children's engagement explains considerable variance in academic success over time; however, no studies to date have examined the unique and interactive effects of this ingredient for children with LI receiving BAU therapy in the public schools. To fill this gap, the current study addressed two study aims:

1. Investigate the relation between engagement and language gain for children with LI.

2. Investigate the extent to which treatment dose moderates the relation between engagement and language gain for children with LI.

Methods

This study investigated the relations among treatment dose, children's engagement during language therapy, and language gain over time for 139, 5-7 year-old children receiving intervention in the public schools for language impairment (LI). Of these children, only those with complete data set were included in analyses (*n* = 135). This study used data collected as part of a longitudinal 3-cohort study designed to examine characteristics of speech-language therapy experiences in primary schools (STEPS). All procedures for STEPS were approved by the institution's Internal Review Board.

Participants. Participants included 70 SLPs in the public schools and multiple school districts within two Midwestern states whose participation spanned an entire academic year. All SLPs fully consented to participate in the study and did so with the permission of their program administrators. Once SLPs were consented, they identified up to 10 children on their caseloads for potential participation in the study and provided consent materials to the children's caregivers. To be considered for participation, children had to be in kindergarten, first, or second grade, have a diagnosed language impairment, and currently be receiving language therapy in the schools. Of the children for whom consent was received, project staff identified a subset (typically 3 to 5 per SLP) to enroll in the study, selecting those who best fit study criteria. For the proposed study, two children were randomly selected from each SLP's caseload who completed the entire study and had at least two therapy videos, for a total sample size of 135 children.

All SLPs had a state license in speech-language pathology and 93% had their certificate of clinical competence. SLPs in the current study were primarily female (97%) and had a range of experience (M = 16 years, Range = 0 to 36). Children in this study had a mean age of 75.4 months (SD = 8.4; Range = 59 to 95 months); 59% (n = 81) were male. Of these 135 children, 55% were in kindergarten, 45% in first grade. The average family income for this sample was $45K - $50K (Range = < $5K to > $85K); 52% ($n$ = 71) were Caucasian and 10% (n = 14) were African American [Other = 9.4% (n = 13); 29% unreported].

As previously indicated, participating children were recruited and enrolled in the larger study based on their diagnosis and treatment of LI in the public schools without any imposed guidelines on diagnostic and treatment criteria from the research team. As such, these data hold strong external validity as they represent business-as-usual language intervention in public schools. The children received an average therapy session of 23 minutes (range 6.3 min to 37.4 min) with the vast majority in small group settings of 2-4 children (61%). In terms of goals, 94% of the present sample had at least one goal in grammar or vocabulary, with other goals represented including narratives (17%), pragmatics (25%) and literacy (5-%). As further indication of their LI status, children in the current study had a mean fall CELF-4 Core Language Composite of 68 (SD = 17); 16% of these children (n = 23) had reported comorbid diagnoses (e.g., developmental delay, apnea, ADHD).

Procedures. All children were individually assessed in the fall and spring of their participating year. Assessments were conducted by trained assessors who completed extensive training, met reliability standards, and were supervised in the field for initial testing administration. In addition, each SLP videotaped five therapy sessions for each child during the academic year and sent them to study investigators for analysis. The

child assessments and therapy videotapes were the focus of the proposed investigation, as they provided information regarding (1) children's language skill, (2) children's engagement during therapy, and (3) treatment dose.

Language skill. Children's language skill was measured using four subtests of the Clinical Evaluation of Language Fundamentals-4 (CELF-4; Semel, Wiig, & Secord, 2003) administered in the fall and spring of the academic year. The four subtests include Concepts and Following Directions, Word Structure, Formulated Sentences, and Recalling Sentences, which together comprise the Core Language Composite. This measure has a reported split-half reliability of .85-.97 and an interrater reliability of .88 - .99 for subtests.

Engagement. To measure child engagement during each therapy session, the Classroom Observation Protocol for the Early Learning Study (Rimm-Kaufman, 2005) was adapted for application to language therapy (ICC = .97; Ponitz & Rimm-Kaufmann, 2011). The protocol for the current study, Therapy Engagement Protocol, consisted of four categories: Off Task, Passive, Intermittent, and Active (see Appendix for coding definitions; comprehensive coding instructions are available from the author). The protocol was developed using an iterative process to ensure that the coding scheme accurately captured engagement as a unique construct (i.e., children's engagement regardless of the focus of the activity). Once the coding scheme was written, two doctoral candidates in speech pathology independently coded ten videos. The codes for these videos were compared, any discrepancies were discussed and needed adjustments in the coding scheme were made. These ten videos were then used as master coded videos for training purposes. Two research assistants completed an iterative training process to familiarize themselves with the coding scheme and to practice coding against master coded videos. Once the coders had completed training,

they then completed reliability testing to a standard of 80% exact agreement before

coding videos for engagement. An additional ten percent of all videos were double-

coded to establish inter-rater reliability for the engagement measure, for a kappa of .71

which is considered strong (Landis & Koch, 1978). For consistency in data, the same

videos were used for engagement and dosage coding (n = 270). To code for

engagement, coders rated each moment of therapy in 15-second intervals in a mutually-

exclusive and exhaustive framework based on the child's level of engagement for that

interval. After the therapy session had been coded in full, the total number of intervals in

which the child was coded as "Actively Engaged" were summed for each therapy

session. The total number of intervals in which children were actively engaged between

the two coded therapy sessions was not statistically significant (t = 1.13; p = .268) and

was significantly correlated (r = .499; p = <.001). Therefore, the total number of actively

engaged intervals was averaged across two sessions to represent each child's level of

engagement for the present study

     Treatment Dose. To measure treatment dose, two video-taped therapy sessions

representing two points across the school year for each child were coded and analyzed

(n = 278). Each session was coded using the Language Intervention Observation Scale

(LIOS), a systematic observation system created to capture five discrete dimensions of

intervention on a moment-by-moment basis (Justice & Schmitt, 2010). To obtain this

information, each therapy video was coded using The Observer XT Software which

captures the unfolding of behaviors in real-time. Trained coders conducted three passes

of each therapy session in its entirely to capture the five treatment dimensions (i.e.,

Interaction, Materials, Talk Time, Targets, Techniques). Prior to coding, coders

completed a comprehensive training program and achieved reliability thresholds for

each of three training videos (i.e., overall kappa of .80 and .70 for each dimension of

intervention); an additional 10% of all therapy sessions were randomly selected and double coded (kappa = .78 which is considered high; Landis & Koch, 1977).

For this study, to capture dose, the study team was interested in one specific dimension of the LIOS system, namely the *target* dimension; this represents *what* the SLP targeted during therapy and was coded using a mutually-exclusive and exhaustive coding scheme. That is, each moment in a child's therapy session was coded in real-time for one of 14 intervention targets, including 12 speech and language codes and 2 non-therapeutic codes (i.e., session management, null). Of these 14 codes, the study team was interested in the 9 LIOS codes relevant to children's language skills (i.e., grammar, vocabulary, communicative functions, discourse/conversation, narrative, listening comprehension, abstract language, metalinguistics, literacy). The coding software allowed coders to capture the cumulative amount of time spent targeting each of these nine dimensions of language for each therapy session. The cumulative amount of time spent on the nine language targets as computed for each coded therapy session. Prior work of these data showed that Dose across sessions was significantly correlated (r = .498; p = .01; Schmitt et al., 2016). Therefore, for the purposes of this study, the time on language targets was averaged across two therapy sessions per child was used to represent "Treatment Dose".

Data Analyses

To analyze these data, hierarchical linear modeling (HLM) was used for all analyses. Because the children were nested within SLPs, any variance seen in children's outcomes cannot solely be explained by the child alone. HLM allows us to investigate child-level factors, such as Engagement and Dose, while accounting for the fact that the children are not completely independent in this sample. In this way, HLM controls for any overestimation of study findings (i.e., Type I error) due to the nested

nature of the data. As an initial step, a composite language score was computed by z-scoring all spring raw scores from the four individual subtests of language from the CELF-4, using the fall means and standard deviations of the study sample in the calculation [e.g., (Spring Raw Score - Fall Mean Raw Score)/Fall Standard Deviation]. Z-scores were then averaged across all 4 subtests of the CELF-4 Core Language battery to create the outcome variable. By using fall means and standard deviations, the spring outcome variable represents children's language gain from fall to spring of their participating year. Additionally, by creating a composite score from children's raw score values, rather than using the CELF-4 Core Language Composite, the research team was able to capture discrete changes in children's language over the academic year. Second, an unconditional model was run with Language Gain entered as the outcome variable and no other predictors. Third, a conditional model was run with Language Gain as the outcome variable and Engagement as a level-one predictor, with presence of a comorbid diagnosis (e.g., ADHD) entered as a covariate; note that comorbid diagnosis was not a significant predictor of Language Gain; therefore, for parsimony, it was removed as a covariate in subsequent models. Fourth, a separate conditional model was run with Language Gain as the outcome variable and Engagement, Dose, and an interaction term (Engagement x Dose) entered as level-one predictors. All predictors were group-mean centered.

Results

The first research aim was to investigate the unique relation of Engagement on Language Gain for children with LI receiving BAU therapy in the public schools. Initial descriptive statistics show great variability in study variables. Children were actively engaged in therapy for an average of 11.6 intervals (15 second intervals across the therapy session, which translates to an average of 2.9 minutes of active engagement in

therapy) with a range of 0 to 64 intervals of active engagement (0 to 16 minutes).

Likewise, children experienced an average dose of 11.62 minutes, ranging from 0

minutes to 23 minutes in therapy. Pearson product correlations showed a significant,

positive correlation between Active Engagement and Fall Language (r = .196, p < .05)

and Spring Language (r = .241, p < .01). All other study variables were not significantly

correlated, including presence of comorbid diagnoses

An unconditional model was run with Language Gain entered as the outcome

variable without any predictors. This model suggested that children with LI in the

present study experienced .51 SD of change over the academic year (γ_{00} = .51, p <

.001). To answer study aim 1, Language Gain was entered as the outcome variable and

Engagement entered as a Level 1 Predictor. There was a significant association

between Engagement and Language Gain (γ_{10} = .03, p = .01). For every interval that

children were actively engaged in therapy, their language gain over the year increased

by .03 SD. Each interval represents 15 seconds of therapy; therefore, as an

extrapolation, these results suggest that children who are actively engaged for an

additional 8 minutes in therapy above the average (2.9 minutes) experience 1 SD of

gain above the mean (see Table 1).

To answer study aim 2, Language Gain was entered as the outcome variable

and Engagement, Dose, and an interaction term (Engagement x Dose) entered as Level

1 Predictors. Additionally, the presence or absence of comorbid diagnoses was entered

to control for any variance attributable to more complex language needs. There was no

significant effect of the interaction term on Language Gain (γ_{10} = < .01, p = .88; See

Table 2 for complete results).

Discussion

The present study adds to our current understanding of best therapy practices for children with LI receiving language intervention in the public schools. Currently, there is a substantial lack of evidence-based research available to guide SLPs in their provision of intervention for these children (Cirrin & Gillam, 2008). This study sought to investigate engagement as a potentially active ingredient of therapy relating to children's language gain over an academic year. Study findings suggest that children's active engagement has a significant association with their language gain. Implications of all study findings and recommendations for future research are detailed below.

Engagement and Language Gain

The most salient finding of this study was the association between children's active engagement in therapy and language gain over an academic year. This finding converges with a growing body of evidence that suggests positive associations between children's engagement and academic outcomes (Bodovski & Farkas, 2007; Frijters et al., 2000; Justice et al., 2003; Ponitz & Rimm-Kaufman, 2011). Children who are actively engaged in therapy, by definition, participate more in therapeutic activities than peers with low engagement. Although this study is correlational design and no causal relations can be determined, the practical significance of the current findings is noteworthy: 8 more minutes of engaged therapy is significantly associated with 1 *SD* of gain above the average amount of gain for a child with LI receiving BAU therapy (i.e., .50 *SD*).

This finding is critical for SLPs, working with children in the public schools, who are charged with supporting children's remediation of language to support academic outcomes. Recall that to be coded as actively engaged, children had to be acting on the treatment prompt/activity either expressively (e.g., answering a question, commenting) or receptively (e.g., following direction). All other forms of engagement such as passive

(e.g., children sitting and listening to the SLP) and off task (e.g., children engaged in non-treatment activities) were not related to children's gains. Although this study was not designed to explore the mechanism behind children's engagement, I explore several possible explanations for why children's active engagement may be associated with improved language gains.

First, it may be that children who are actively engaged are positioned to benefit from therapeutic intervention to a greater extent than peers with lower engagement. Arguably it is the therapeutic nature of the language session that drives language gain rather than engagement alone. Said differently, if we assume that the therapy session is focused on goals and targets appropriate to the child's needs, then children with high levels of engagement may be poised to benefit from that environment to a greater extent than children with low levels of active engagement.

Second, children's active engagement may lead to an increased number of opportunities to target (and ultimately master) treatment goals. Williams (2012) found that children with speech sound impairments who receive significantly more opportunities or trials to practice target sounds showed more gains than children with fewer opportunities. Specifically, children with SSD need a minimum of 50 trial per session, and ideally 75-100 opportunities per treatment session, to master their goals. Although such data don't yet exist for LI, decades of research has documented practice effects for academic performance including math (e.g., Peladeau et al., 2003) and reading (e.g., Topping et al., 2007) as well as motor learning such as piano (e.g., Coffman et al., 1990) and handwriting (e.g., Dixon et al., 1993). In these studies, students of any age who are provided multiple opportunities to practice a new skill are more likely to experience improvements than students with fewer practice opportunities (see also Rosenshine & Berliner, 1978). As such, children who are actively engaged for

more time during a therapy session may have an increased number of opportunities to practice language targets than children who are less actively engaged.

Third, children's active engagement may represent an absence of threats to active engagement, namely group size and SLP talking time. Prior work showed that children with LI who received therapy in large groups (5-7 children) experienced a decline in language gains over the academic year as compared to other service delivery models (Schmitt, 2013). If we draw on Williams's findings (2011), group size by nature may reduce the number of opportunities afforded to each individual child in the session. As such, children with higher levels of engagement may represent not only an increased number of opportunities, but language therapy in a setting that *allows* for these practice effects. Similarly, if children's active engagement is a measure of their opportunities to expressively or receptively respond, then increases in SLP or peer talk time may present a threat to active engagement.

Interplay Between Engagement and Dose on Language Gain

The second research aim investigated the extent to which dose moderated the relation between Engagement and Language Gain. Somewhat surprisingly, our study found no such interaction; engagement was a unique predictor of language gain regardless of the amount of time SLPs spent addressing language in the session. The lack of significance stands in contrast to findings from Ponitz and Rimm-Kaufmann (2011) that did find an interaction between children's engagement and instruction; children who were more off task during instructional time made less gain in literacy than children with fewer off task behaviors. I offer several possible explanations for my study's finding. First, in the Ponitz and Rimm-Kaufmann (2011) study, they investigated the interplay between engagement and form of instruction (i.e., teacher-managed vs child-managed). Their study observed participants in their classroom during the day in

which literacy instruction was being targeted. Although exact minutes in instruction were not counted, it was assumed that instructional time was focused on the target (literacy). For speech-therapy sessions, all children were receiving pull-out, small group therapy in which there was much variability in the instruction received, regardless of the length of session, with dose ranging from 0 minutes to 23 minutes for participants. As such, time in instruction (dose) may interact differently with engagement than the form of instruction children experience.

Second, Dose in the present study was coded as any language target (Syntax, Morphology, Vocabulary, etc) during the session. However, for children with language impairment, the specificity of the dose to their specific language needs may be a critical factor over and above time on language overall. For example, a child who has weaknesses in grammar should arguably receive language therapy targeting grammar rather than other areas such as vocabulary or pragmatics. Prior work suggests that children's IEP goals are not related to their identified areas of need (Schmitt et al., 2014); however, whether or not children's IEP goals relate to time on language targets in therapy remains unknown.

Third, Engagement was coded regardless of the language target at that moment in time. Potentially, children who are actively engaged with their environment may be able to extract and benefit from more generic language modeling as might occur during shifts in activities (coded as management) peer-to-peer conversation without any SLP initiation or guidance (coded as null), or other articulation or voice targets. If so, this would suggest a fairly robust association between children's engagement and language gain.

Limitations/Areas for Future Research

Limitations of the current work as well as areas for future research are presented in the following paragraph. First, children's engagement was coded in 15 sec intervals, which forced an exclusive coding scheme and necessitated the addition of the Intermittent code (i.e., multiple levels of engagement in one interval). Future studies using a continuous on-line system for capturing children's engagement may provide a more nuanced measure of their active participation in therapy. Second, this study focused exclusively on children's engagement and did not investigate the quality of that engagement as it relates to language therapy. Future research should investigate the quality of the response from the child, whether the child initiated or responded to the SLP, and how the SLP or peers respond to the child's communication to fully understand the nature of active engagement in language therapy sessions. Third, this study did not account for group size, SLP talk time, or peer talk time. As previously explained, children's active engagement may reflect the absence of potentially counterproductive service delivery models that certainly need to be more fully understood. Additionally, understanding whether children's dose in therapy aligns with their goals is a critical component of understanding children's language therapy in the public schools as well as fully understanding the role of dose on outcomes. Future research is needed to understand child-level and treatment-level factors that explain – and predict - children's engagement in therapy sessions.

This study was correlational in design, so causal conclusions between children's level of engagement and language outcomes cannot be made. However, this is an important and timely area for future research. Children's active engagement matters with respect to their language gains. SLPs charged with supporting children's language growth in the public schools have the added responsibility, given these findings, of finding ways to support active engagement in each therapy session. As we continue the

conversation, however, it is critical that we understand *why* active engagement matters to children's language outcomes. Specifically, we need to fully understand factors of the child (e.g., behavior regulation, severity of language impairment), SLP (e.g., experience), and therapy session (e.g., group size, location) that may support children's active engagement in intervention. Certainly there are many factors that may promote - or hinder - children's engagement in intervention. Identifying these factors is an important next step in furthering research on engagement and the role in children's language gain.

Acknowledgments

References

Bodovski, K., & Farkas, G. (2007). Mathematics growth in early elementary school: The roles of beginning knowledge, student engagement, and instruction. *The Elementary School Journal, 108,* 115-130.

Cirrin, F.M., & Gillam, R.B. (2008). Language intervention practices for school-age children with spoken language disorders: A systematic review. *Language, Speech, and Hearing Services in Schools, 39,* S110-S137.

Coffman, D. D. (1990). Effects of mental practice, physical practice, and knowledge of results on piano performance. *Journal of Research in Music Education*, *38*(3), 187-196.

Connor, C. M., Morrison, F.J., Fishman, B., Giuliani, S., Luck, M, Underwood, P.S...Schatschneider, C. (2011). Testing the impact of child characteristics x instruction interactions on third graders' reading comprehension by differentiating literacy instruction. *Reading Research Quarterly, 46, 189-221*.

Dixon, R. A., Kurzman, D., & Friesen, I. C. (1993). Handwriting performance in younger and older adults: Age, familiarity, and practice effects. *Psychology and aging*, *8*(3), 360.

Fredricks, J.A., Blumenfeld, P.C., & Paris, A.H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74,* 59-109.

Frijters, J.C., Barron, R.W., & Brunello, M. (2000). Direct and mediated influences of home literacy and literacy interest on prereaders' oral vocabulary and early written language skill. *Journal of Educational Psychology, 92*, 466-477.

Hassink, J.M., & Leonard, L.B. (2010). Within-treatment factors as predictors of outcomes following conversational recasting. *American Journal of Speech-Language Pathology, 19,* 213-224.

Justice, L. M., Logan, J., Schmitt, M. B., & Jiang, H. (2016). Designing effective speech-language interventions for children in the public schools: Leverage the spacing effect. *Policy Insights from the Behavioral and Brain Sciences*, *3*(1), 85-91.

Justice, L.M., Chow, S., Capellini, C., Flanigan, K., Colton, S. (2003). Emergent literacy intervention for vulnerable preschoolers: Relative effects of two approaches. *American Journal of Speech-Language Pathology, 12,* 320-332.

Ladd, G.W., & Dinella, L.M. (2009). Continuity and change in early school engagement: Predictive of children's achievement trajectories from first to eighth grade? Journal of Educational Psychology, 101, 190-206.

Landis, J.R., & Koch, G.G. (1977). The measurement of observer agreement for categorical data. *Biometrics, 33,* 159-174.

Leonard, L. B., Camarata, S.M., Pawtowska, M., Brown, B., & Camarata M.N. (2006). Tense and agreement morphemes in the speech of children with specific language impairment during intervention: Phase 2. *Journal of Speech, Language, and Hearing Research, 49,* 749-770.

McClelland, M.M., Morrison, F.J., & Holmes, D.L. (2000). Children at risk for early academic problems: The role of learning-related social skills. *Early Childhood Research Quarterly, 15*, 307-359.

McGinty, A.S., Breit-Smith, A., Fan, X., Justice, L.M., & Kaderavek, J.N. (2011). Does intensity matter? Preschoolers' print knowledge development within a classroom-based intervention. *Early Childhood Research Quarterly, 26,* 255-267.

Mullen, R., & Schooling, T. (2010). The national outcomes measurement system for pediatric speech-language pathology. *Language, Speech, and Hearing Services in Schools, 41*, 44-60.

Péladeau, N., Forget, J., & Gagné, F. (2003). Effect of paced and unpaced practice on

skill application and retention: How much is enough? *American Educational Research Journal*, *40*(3), 769-801.

Ponitz, C.C., & Rimm-Kaufman, S.E. (2011). Contexts of reading instruction: Implications for literacy skills and kindergarteners' behavioral engagement. *Early Childhood Research Quarterly, 26,* 157-168.

Raudenbush, S. W., & Bryk, A. S. (2002).*Hierarchical linear models: Application and data analysis methods.* Thousand Oaks, CA: Sage Publications.

Ready, D. D., LoGerfo, L. F., Burkam, D. T., & Lee, V. E. (2005). Explaining girls' advantage in kindergarten literacy learning: Do classroom behaviors make a difference? *The elementary school journal*, *106*(1), 21-38.

Rimm-Kaufman, S. E. (2005). Classroom observation protocol for the early learning study. Unpublished protocol, University of Virginia, Charlottesville.

Rosenshine, B., & Berliner, D. C. (1978). Academic engaged time. *British Journal of Teacher Education, 4(1),* 3–16.

Schmitt, M.B. (2013). *Active Ingredients of Speech-Language Therapy in the Public Schools for Children with Language Impairment.* The Ohio State University.

Schmitt, M.B., Justice, L.M., Logan, J.A.R. (2017). Intensity of language therapy: Contribution to children's language outcomes. *International Journal of Language and Communication Disorders.*

Schmitt, M.B., Justice, L.M., Logan, J.R., Schatschneider, C., & Bartlett, C. (2014). Do Symptoms of Language Disorders Align with Treatment Goals? An Exploratory Study of Primary-Grade Students' IEPs.

Semel, E., Wiig, E. H, & Secord, W.A. (2003). *Clinical Evaluation of Language Fundamentals-Fourth Edition.* San Antonio, TX: The Psychological Corporation.

Topping, K. J., Samuels, J., & Paul, T. (2007). Does practice make perfect?

Independent reading quantity, quality and student achievement. *Learning and Instruction*, *17*(3), 253-264.

U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (2008). *Number of full-time and part-time public school staff, by type of staff and state:2007-08.* Available from:

http://nces.ed.gov/surveys/SASS/tables/sass0708_2009321_s1s_05.asp

U.S. Department of Education, National Center for Education Statistics (2010). *Students 3 to 21 years old served under Individuals with Disabilities Education Act, Part B, by type of disability*. Available from:

http://nces.ed.gov/programs/digest/d10/tables/dt10_045.asp

Warren, S., Fey, M., & Yodor, P. (2007). Differential treatment intensity research: A missing link to creating optimally effective communication interventions. *Mental Retardation and Developmental Disabilities Research Reviews, 13,* 70-77.

Williams, L. (2012). Intensity in phonological intervention: Is there a prescribed amount? *International Journal of Speech-Language Pathology, 14(5),* 456-461.

Table 1. Descriptive Statistics for Levels of Engagement and Dose

	N	*M*	*SD*	Range
Off Task	135	1.58 intervals	2.86	0 – 20.50 intervals
Passive	135	25.67 intervals	13.50	2 – 63.50 intervals
Intermittent	135	52.69 intervals	15.93	13.50 – 103.50 intervals
Active	135	11.59 intervals	10.47	0 – 64.00 intervals
Dose	135	11.61 minutes	5.44	0 – 23.43 minutes

Note. Engagement was coded in 15 second intervals for the duration of each session. Data are the average # of intervals participants experienced each level of engagement. Dose is presented as average number of minutes engaged in language therapy during the session.

Table 2. HLM Results for Research Aim 2

	Engagement	Dose	Interaction
Random Effect			
Mean Language Gain	.51**	.52**	.52**
Fixed Effect			
Engagement	.03**	-	.02
Dose	-	-.01	-.01
Interaction Term	-	-	<.01
Variance Components			
Intercept (t_{00})	.29	.25	.29
Level 1 (s^2)	.59	.65	.59

** p< .01

Note. Significant values for the Random Effect Mean Language Gain suggest only that the average Language Gain (Without predictors) was significantly different than zero. A significant fixed effect of engagement means that Engagement was a significant predictor of Language Gain. No other variables were significantly associated with Language Gain.

Appendix

Level of Engagement	Definition	Examples
1: Off Task	- Uninvolved in the directed task - Eye gaze is off the targeted speaker or activity - Child is focused on other objects or people - Child is physically turned away/disconnected from the directed task/people - Child refuses to participate - Any attempts by the SLP to redirect the child are unsuccessful - Child may be engaged in activities not directed or intended by the teacher (off task activities) - Child may or may not be disruptive. Off task suggests child is not engaged in identified activity but does not necessarily relate to behavior problems.	- Child is turned around in chair, facing away from SLP/activity - Child is looking all around room or eye gaze is averted from the speaker/activity - Child is playing with materials on table rather than engaging with the SLP/peers/directed activity - Child continually interrupts activity to talk about other topics - Child continually gets up from table/walks around room/plays on floor - There is no intended activity and children are engaged in activities not intended by the SLP - You have evidence that the child understood the directions but is choosing to not comply
2: Passive	- Child is passively engaged - Child may be looking in general direction of activity but it is unclear whether or not child is actively focused on activity - Child stays focused and attentive even if it's another child's turn to actively participate - Visible concentration and focus on targeted activity - Child is using "Active Listening" but not otherwise responding	- Child is facing the speaker, but not contributing to the conversation or interaction - Child watches the activity, but does not volunteer for turns in the activity - Child displays inconsistent levels of engagement for a particular cycle between off task and passive/active engagement - Child is quietly waiting for an activity to begin
3: Intermittent	Child fluctuates between active and passive engagement.	Child answers a few questions during an interval but the rest of the time is passively engaged in the activity

4: Active	• Child actively participates in targeted activity. Participation may be speaking or nonverbal/action-based. • Child volunteers information/participates in group activities not specific to one child. • To code Active, the child must be engaged in an activity intended by the SLP.	• Child answers questions • Child completes activity directed by the SLP, such as writing name or coloring on a page • Child participates in choral reading or calls out answers when elicited by SLP