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Teacher Characteristics Associated with Responsiveness and Exposure to Consultation and On-line Professional Development Resources

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Abstract

This paper is a natural follow-up to intent-to-treat findings indicating that the MyTeachingPartner Consultancy, inclusive of on-line video resources and web-mediated consultation, improved the quality of pre-k teachers' interactions with children. This study takes a close look at implementation fidelity within the effective MTP Consultancy condition over both years of implementation, in order to learn more about the ingredients of professional development that may have contributed to the success of the intervention. Variation in teachers' responsiveness (e.g., ratings of Consultancy worth) and exposure to the intervention (e.g., number of consultation cycles completed) are examined, with particular interest in the identification of teacher factors that may serve as supports or barriers to successfully implementing consultation supports and on-line professional development resources.

Over a decade ago, Bredekamp (1996) asserted that the field of early childhood education lacked a research base to document the effectiveness of approaches to producing highly skilled and effective early educators. More recently, the National Council for Teacher Quality (Walsh & Tracy, 2005) drew a similar conclusion that too little is known about how to prepare effective teachers. This shortage of empirical evidence in early childhood teacher training and professional development is startling, particularly given estimated demands for about 50,000 new early childhood educators by 2020 (Clifford & Maxwell, 2002) and persistent concerns that current training systems are insufficient to produce early education providers who will deliver the high quality classroom experiences needed to net benefits for children at-risk for early school adjustment problems (Early et al., 2007). There is an urgent need for research efforts to focus on identifying effective approaches to early childhood teacher training that produce change in teachers' practices known to relate to children's positive development (Horm-Wingerd, Hyson, & Karp, 2000; Ramey & Ramey, 2005). And, as efficacious professional development approaches are established, an important next step is to study variation in how they are implemented and determine factors that play a role in teachers' responsiveness and exposure to training, in order to facilitate at-scale replications.

In recent years, rigorous empirical attention has been directed at professional development for early childhood educators by a set of research teams funded through the Interagency School Readiness Consortium (ISRC). As part of the ISRC, an in-service professional development approach called MyTeachingPartner (MTP) was developed and implemented in a state-wide pre-k program. MTP encompasses two major components: (a) access to video exemplars of high-quality teacher-child interactions tied to specific dimensions of the Classroom Assessment Scoring System (CLASS; Pianta, LaParo, & Hamre, 2008), an observational assessment with established links to positive student growth; and (b) a consultation process that provides regular, multi-modal, ongoing, targeted feedback to pre-k teachers through a standardized protocol that focuses on reviewing videotapes of teachers' practices, using the CLASS as the basis for a common, validated understanding of teacher behavior. Two models of MTP professional development were recently implemented across two years and compared in a randomized controlled trial: (1) Web Only, in which teachers received workshop training in curriculum and had access to the video exemplars; and (2) Consultancy, in which teachers received workshop training, on-line video access, and regular, web-mediated consultation. Findings from the first year of the study indicate that when early childhood education providers received the Consultancy for a full year, these teachers improved the quality of their interactions with children (Pianta, Mashburn, Downer, Hamre, & Justice, in press), with subsequent improvements noted in children's language and literacy development (Downer, Pianta, & Fan, 2008; Mashburn, Hamre, Downer, Justice, & Pianta, 2008).

The current paper is a natural follow-up to the intent-to-treat findings reported by Pianta and colleagues (in press) in that it takes a close look at implementation fidelity of professional development within the effective MTP Consultancy group over both years of implementation. There is a rich literature that underlines the importance of examining implementation fidelity in order to learn more about the ingredients that may contribute to the success of an effective intervention (Dusenbury, Brannigan, Falco, & Hansen, 2003; Greenberg, Domitrovich, Graczyk, & Zins, 2005; O'Donnell, 2008), yet very little of this work examines interventions focused on the professional development of teachers. This paper therefore explores variation in MTP Consultancy teachers' responsiveness (e.g., ratings of Consultancy worth) and exposure to the consultation intervention (e.g., number of consultation cycles completed), with a particular interest in the identification of teacher factors that may support or deter high levels of responsiveness and exposure to professional development opportunities.

Teacher-Child Interactions as a Target for Professional Development

It has long been argued that teacher training provides the necessary leverage to ensure that children experience high quality preschool learning environments (Barnett, 2004; Saracho & Spodek, 2006), which in turn has led to numerous policies aimed at raising the average education level and credentialing requirements within the early childhood education teacher workforce at state and federal levels (Pub. L. No.110–134, 2007; Whitebook et al., 2004). Yet, recent empirical evidence indicates that the link between education/credentialing levels and either effective teaching practices or children's developmental outcomes is inconsistent at best (Early et al., 2007). There is, however, abundant evidence that teacher-child

interactions in early childhood classrooms are linked to children's development of social, academic, and language competencies (e.g., Burchinal et al., 2005; Howes, Phillipsen, & Peisner-Feinberg, 2000; Howes et al., 2008; Matsumura, Patthey-Chavez, Valdes, & Garnier, 2002; Meyer, Waldrop, Hastings, & Linn, 1993; Nelson-LeGall & Resnick, 1998; NICHD ECCRN, 1996; 2002a,b; Peisner-Feinberg & Burchinal, 1997). In combination, these findings suggest that more attention needs to be paid to the content and experiences teachers receive within pre- and in-service professional development, and in turn how this professional development results in positive experiences for children at a more proximal level.

One measure of teacher-child interactions with particular promise in predicting children's social and academic development is the Classroom Assessment Scoring System (CLASS; Pianta, et al., 2008). Across 700 classrooms sampled in 11 states, variation in teachers' use of instructionally and emotionally supportive interactions with children, as assessed by the CLASS, were directly related to growth in children's achievement test scores and social behavior ratings over the pre-k year (Howes et al., 2008; Mashburn, Pianta, et al., 2008) and into kindergarten (Burchinal et al., 2008). Ratings of teachers' instructional support (e.g., focusing on concept development and providing high quality feedback) were most consistently associated with children's academic achievement. However, on average instructional support ratings were quite low, despite teachers being fully credentialed, experienced, and using an organized curriculum (Pianta et al., 2003). As it becomes clearer that teacher degrees and certifications alone are insufficient to meet the goal of enhancing children's early learning (Early et al., 2007), interventions seeking to improve the quality of these interactions have great potential to contribute to the positive development of children (Pianta, 2005; Raver et al., 2008).

MyTeachingPartner Consultancy Approach to Professional Development

The MyTeachingPartner (MTP) Consultancy is an approach to in-service professional development that directly facilitates teacher-child interactions with known links to children's school readiness. Teachers in the MTP Consultancy have access to video exemplars of high quality teacher-child interactions and experience bi-weekly, web-mediated interactions with a consultant guided by the CLASS framework. These consultation interactions focus on: (a) observing video footage from the teacher's classroom to identify effective teacher-child interactions; (b) providing the teacher with feedback about alternative approaches to interacting with students; and (c) establishing a non-judgmental, non-evaluative supportive relationship with a knowledgeable individual (Hadden & Pianta, 2006). Results from the first year of this two-year randomized controlled evaluation trial compared improvement in specific dimensions of teachers' observed classroom interactions across two intervention conditions (Pianta et al., in press). Teachers exposed to the MTP Consultancy supports, in contrast to those who received support only via on-demand access to video-resources on the web (Web Only), showed greater improvements in aspects of interaction that involved reading and responding to students' cues (Teacher Sensitivity), using a variety of formats to actively engage children in instruction (Instructional Learning Formats), and intentionally stimulating language development (Language Modeling).

Results further indicated that the MTP Consultancy offered the greatest benefit to classrooms in which teachers experienced the most significant demands. In particular, when classrooms had 50% or fewer of children classified as poor, there were no differences in rates of change between teachers in the Consultancy and Web Only conditions. However, in high poverty classrooms, teachers who received the consultation supports had greater increases in the quality of teacher-child interactions than teachers who did not receive these supports. Thus, within the highest poverty classrooms, participating in the Consultancy condition was associated with positive changes in Teacher Sensitivity and Instructional Learning Formats while teachers participating in the Web Only condition actually declined over the year in the quality of their interactions on these dimensions.

Following evidence that the MTP Consultancy can alter teacher-child interactions, the next logical question becomes whether this change in classroom context may have an echo in children's social, literacy, or language skills. Using both RCT intent-to-treat and quasi-experimental treatment-on-the-treated analyses, preliminary findings suggest that children make significantly greater gains in language and literacy skills when their teachers receive MTP Consultancy support (Downer et al., 2008; Mashburn, Hamre, et al., 2008). For example, controlling for relevant covariates (child, teacher, and classroom characteristics), children showed significant gains in directly assessed receptive language skills when their teachers received Consultancy support, compared to those who were in classrooms with teachers who received no such support.

Implementation Fidelity in School-based Intervention Research

The importance of examining implementation quality during the evaluation of interventions has been recognized for decades (Carroll et al., 2007; Moncher & Prinz, 1991; Sechrest, West, Phillips, Redner, & Yeaton, 1979). Though terminology fluctuates, the definition of implementation quality has been consistent in its focus on the extent to which an intervention is implemented in line with original intentions. In school-based intervention literature, Dane and Schneider (1998) have taken this basic definition and outlined five distinct elements of implementation quality: adherence, exposure, quality of delivery, participant responsiveness, and program differentiation. The current study will focus on two of these elements: exposure, in the form of Consultancy cycles completed, time spent on the website, and time spent during iChat video conferences; and teacher responsiveness, as reflected in teachers' ratings of the Consultancy's worth, the number of words that teachers used in responding to consultant feedback, and consultants' ratings of teachers' responsiveness to the intervention.

There are strikingly high rates of variability in implementation for past and recent trials of school-based program effectiveness (Berman & McLaughlin, 1976; Rohrbach, Grana, Sussman, & Valente, 2006). Cordray and Pion (2006) noted that in reviewing close to 5,000 references for their recent chapter on treatment fidelity, the measurement of implementation quality within intervention trials remains inconsistent at best. In fact, several meta-analyses of school-based interventions in the 1990s indicated that only 15-59% of reviewed studies measured and reported implementation quality (Dane & Schneider, 1998; Greenberg, Domitrovich, & Bumbarger, 1999; Gresham, Gansle, Noell, Cohen, & Rosenblum, 1993),

and these measurements often covered only one element of implementation (e.g., exposure). This pattern is perplexing given how invaluable implementation quality data can be in learning about the barriers and facilitators to conducting a research-based intervention in real-world classrooms and understanding the role that certain elements of the intervention may play in intervention outcomes (Domitrovich & Greenberg, 2000; Greenberg et al., 2005). The current study is particularly unique in that most of the school-based intervention studies cited above examined the fidelity with which teachers implemented a curriculum or teaching practices with students, whereas this study focuses on how engaged teachers are in professional development supports that are aimed at supporting their classroom interactions with children.

Understanding Conditions that Support Implementation during Real-world Application

As research-based professional development resources are brought into real-world classrooms and scaled up across multiple settings, it is critical that evaluation studies are designed to identify contextual factors that support implementation and those that lead to variability and reduced uptake (Mihalic, 2001; Penuel, Fishman, Yamaguchi, & Gallagher, 2007). The implementation of school-based intervention is likely to be affected by a number of contextual factors at the classroom level, namely characteristics of teachers and their interactions with children (Dusenberry et al., 2003; Greenberg et al., 1999). For example, teachers who are more enthusiastic (Gingiss, Gottlieb, & Brink, 1994; Parcel et al., 1995), feel more efficacious in the classroom (Rohrbach, Graham, & Hansen, 1993; Sobol et al., 1989), are less authoritarian (see Rohrbach et al., 2006), demonstrate good teaching skills (see Rohrbach et al., 2006), and have fewer years of experience (Rohrbach et al., 1993) implement at higher rates of quality than teachers who do not exhibit those qualities. The current study examines several teacher factors in the prediction of implementation quality for the MTP Consultancy, including experience, beliefs, and global teacher-child interactions.

Research Questions

This study follows up intent-to-treat findings for MyTeachingPartner by closely examining experiences of teachers in the effective professional development condition - Consultancy. In particular, the study addresses two main research questions in regard to teachers' responsiveness and exposure to the Consultancy across two years of participation:

1. To what extent was there variability in teachers' responsiveness (teachers' ratings of the Consultancy's worth, the number of words that teachers used in responding to consultant prompts, and consultants' ratings of teachers' responsiveness) and exposure (Consultancy cycles completed, time spent on the website, and time spent during conferences) to the Consultancy?
2. What role do teacher characteristics and teacher-child interactions play in predicting these levels of responsiveness and exposure across two years of implementing a model of professional development?

Method

Participants

Participants were 62 teachers involved in the Consultancy condition for two consecutive years as part of a professional development study of state-funded preschools in one mid-Atlantic state, described in more detail later in this section (see Pianta et al., in press for additional study details). Teachers participating in this analysis represented 21 different school districts statewide in state-funded classrooms serving 4-year-old children exhibiting social and/or economic risks. Ninety-seven percent of the teachers were women. The majority of teachers reported their race/ethnicity as Caucasian (79%), 20% reported African American, and 1% reported multi-racial. All of the teachers held a Bachelor's degree, and 35% had an advanced degree. Teachers were an average of 44 years old, had an average of 9 years of pre-k classroom experience, and taught in classrooms in which 69% of children were from families below the federal poverty level ($SD = 30\%$; as reported by parents). Table 1 provides additional information about teacher demographics that are included in regression models as predictors.

Of the original 77 teachers in the Consultancy condition at the beginning of year 1, eleven dropped out of the study during the first year and 4 dropped out of the study during the second year, resulting in an attrition rate of 14% during year 1 and 6% during year 2. To estimate potential attrition bias, analyses were conducted comparing teacher and classroom characteristics for the 62 teachers who fully participated and those who did not. Results indicate that there were no statistically significant differences between the two groups of teachers for the percentage that had an advanced degree ($\chi^2=.117, ns$), but there was for years of experience teaching pre-kindergarten ($t=4.944, p<.05$) and percentage of children in the classroom from families below the federal poverty level ($t=4.158, p<.05$). Thus, teachers who participated in the full study for two years had more pre-k experience and classrooms with higher levels of poverty than those who did not stay in the study.

General Procedures

Teachers were elected to participate in this study at the invitation of their school districts, and random assignment into treatment conditions occurred at the district level. Participation in the larger study involved receiving professional development over two academic years, focused on high quality implementation of a language/literacy and social/emotional development curriculum. The language and literacy curriculum implemented by teachers was the My Teaching Partner-Language & Literacy Curriculum (MTP-L&L; Justice, Pullen, Hall, & Pianta, 2003), while the social-emotional development curriculum was the Preschool Promoting Alternative Thinking Strategies curriculum (PATHS; Domitrovich, Greenberg, Kusche, & Cortes, 2004). Additional details are available at: www.myteachingpartner.org/about/about_activities.php. Near the start of the academic year, teachers completed a 2-day professional development workshop that provided an overview of the MTP-L&L and PATHS curricula, modeled implementation of various activities, and demonstrated access to the curriculum's companion website providing video clips of exemplary instruction.

The participants in this study were in the Consultancy condition, which included the above training as well as a teaching consultant. Consultants were not assigned randomly, but instead systematically, often by district, to reduce scheduling conflicts. All six consultants were English-speaking women with MA degrees or above in a field directly relevant to early childhood education. Each consultant was experienced in teaching young children and was trained to reliability on the CLASS, because its emphasis on a standardized and common lens for observing and providing feedback on teacher-child interactions. Consultants met weekly with a supervising staff member for problem-solving, case presentations, and fidelity checks.

Teachers in the Consultancy condition videotaped their implementation of an instructional activity every two weeks, mailed the tape to their consultant, who then edited the tape into a series of 1-2 minute segments that focused on a specific aspect of interaction. Those edited segments were paired with specific written feedback that explicitly focused on interactive behaviors of the teacher and the children's cues and responses. Included with the written feedback were questions designed to call the teacher's attention to aspects of their behavior, to which teachers responded on the web. These videos, written feedback, and questions were then posted on a private website for the teachers' viewing and response. Teachers and consultants then engaged in an on-line video conference (using iChat) to discuss the prompts and feedback, and to problem-solve. This entire cycle was spread over two weeks and was repeated throughout both years of participation. Each time a videotape arrived, it was logged into a database to provide frequency counts for each teacher. Additionally, consultants kept year-long logs of their contacts with each teacher participating in the consultation process, and noted information related to the focus of the session and the amount of time.

Measures

Data were gathered from multiple sources at various time points during the 2004-2005 and 2005-2006 academic years (September-June), including measures of teacher characteristics, teachers' interactions with children, teachers' responsiveness to different components of MTP professional development, and teachers' exposure to these components.

Predictor Variables

Teacher demographics—Teachers reported their year of birth, education level, and years experience teaching. Teacher *age* was calculated by subtracting birth year from the year of survey completion. Teachers were designated as having an *advanced degree* when their education level was a Master's degree or above. And, a variable was created that only included *years of experience teaching* four-year-old children and younger.

Teacher beliefs—Teachers completed the *Modernity Scale* (Schaefer & Edgerton, 1985), which examines teachers' beliefs about children. This 16-item Likert-type questionnaire discriminates between "traditional" or relatively *adult-centered* perspectives on interactions with children and more "modern or progressive" child-centered perspectives. Scores are derived by computing the mean of all items, with child-centered beliefs reverse-scored. Teachers holding an adult-centered view agreed with statements such as "Children must be carefully trained early in life or their natural impulses make them unmanageable." Teachers

with child-centered beliefs agreed with statements such as “Children should be allowed to disagree with their parents if they feel their own ideas are better.” This measure has been shown to relate to teachers’ practice, in that teachers with more child-centered beliefs exhibit higher quality interactions in the classroom (Pianta et al., 2005) than teachers with adult-centered views. Cronbach’s alpha for the Modernity scale was .79 in a previous sample of preschool teachers serving at-risk youth (Hamre, Pianta, Downer, & Mashburn, 2008) and was .78 in the present sample.

Teachers also completed an abbreviated version of the *Teacher Self-Efficacy Scale* (TSES; Bandura, 1997) that assessed teachers’ sense of *efficacy* regarding management and motivation of children in their classrooms. The response scale ranged from “Nothing” to “A great deal” and items included questions such as “How much can you do to get through to the most difficult students?” and “How much can you do to keep students on task on difficult assignments?” This measure has been shown to positively correlate with teachers’ perceptions of support (Woolfolk-Hoy, 2000). Additionally, teachers with high self-efficacy were able to effectively scaffold struggling students to learn (Gibson & Dembo, 1984) and made more positive predictions of student academic success (Tournaki & Podell, 2005). Cronbach’s alpha for the Self-efficacy scale was .86 in a previous sample of preschool teachers serving at-risk youth (Hamre et al., 2008) and was .85 in the present sample.

Teachers’ interactions with children—Teachers were instructed to submit digital videos of their implementation of instructional activities every two weeks and mail these to the project offices throughout the two school years (September to June). There was a standard protocol for teachers to follow when taping (e.g., where to set up the camera, record for at least 30 minutes, include all of the instructional activity) that was covered during the introductory training workshop and reinforced throughout the study via contact with consultants.

The quality of teacher-child interactions was rated on the first 30 minutes of each submitted video, using 9 dimensions of interaction described by the CLASS (Pianta et al., 2008). The CLASS is an observational assessment of teacher-child interactions in classroom settings (see www.classobservation.com for more information). Factor analysis of the CLASS dimensions yields three factors, which, in this study, comprised the following items (Pianta et al., in press; Hamre, Pianta, Mashburn, & Downer, 2007): emotional support, which includes the dimensions of Positive Climate, Negative Climate (reversed), and Teacher Sensitivity; classroom organization, which includes the dimensions of Effective Behavior Management, Instructional Learning Formats, and Productivity; and instructional support, with dimensions including Language Modeling, Concept Development and Quality of Feedback. In prior work, higher scores on these dimensions of teacher-child interactions predict growth in pre-k children’s achievement (Howes et al., 2008; Mashburn, Pianta, et al., 2008); first-graders’ achievement gains (Hamre & Pianta, 2005); social adjustment in early childhood and elementary school (NICHD ECCRN, 2006) and concurrent levels of student engagement (Downer, Rimm-Kaufman, & Pianta, 2007; La Paro, Pianta, & Stuhlman, 2004). Each dimension is rated on a 7-point scale with behavioral indicators and anchor point descriptions provided for low, medium, and high levels of that dimension.

Tapes were coded by a team of observers trained to reliability. Training consisted of exposure to short video clips illustrating each CLASS dimension, followed by practice coding of at least five master coded videos of preschool classrooms. Following training, each observer had to pass a reliability test in which they needed to score within one point of the master code on 80% of scores, across five additional video segments. After passing the reliability test, observers were assigned randomly to tapes, and the coding team met on a weekly basis to conduct joint drift tests and discuss any coding-related concerns. Inter-rater reliability for each of the seven CLASS dimensions was computed by comparing the ratings made by two independent observers of 33 randomly-selected tapes. Ratings that were within 1 point of each other along the 1 to 7 rating scale were considered to reflect an acceptable degree of accuracy. The percentage of ratings that were within 1 point of each other for each of the CLASS dimensions ranged from 79-94%. This level of agreement is comparable to the inter-rater reliability data reported for the other scales of the CLASS that have been used in large scale observational studies of preschool through third grade classrooms that used live observation procedures (La Paro et al., 2004; NICHD, 2002b, 2006).

Following the guidelines of the instrument, *emotional support*, *classroom organization*, and *instructional support* domain scores were calculated for each segment sent in by the teacher. Then, an initial score in each domain was calculated from the average of tapes sent in by that teacher dated from the beginning of the school year until November 15th.

Criterion Variables

Responsiveness to the intervention—A consultant report of the *teacher responsiveness* measure contained 6 items with an alpha of .92. Consultants rated teachers on items such as “Teacher implements new strategies and approaches” and “Teacher asks follow-up questions during iChat discussions and in prompts.” The correlation between winter and fall scores was .75, so a composite of the two scores was made to represent the perceived responsiveness of the teacher to the intervention in each year. Also, the teachers reported on *Consultancy worth*, a 5-item scale (alpha .97) that assessed their end of the year use and satisfaction with various MTP Consultancy components (e.g., web, consultation). For example, on a 4-point scale from *Strongly Disagree* to *Strongly Agree*, teachers responded to items such as “The MTP Consultancy adds value to my teaching practice” and “The MTP Consultancy helps me see ways that I can be a better teacher.” Additionally, from the Consultancy cycle process described above, teachers in the Consultancy responded via an on-line interface to written prompts that asked them to reflect on their practice. The amount of words written in the prompt responses was used as an indication of the time and effort that teachers put into responding to consultants’ prompts. The total *words in the prompt responses* were summed and then averaged for each Consultancy cycle.

Exposure to the intervention—The number of biweekly *Consultancy cycles* completed during each intervention year, as determined by teachers responding to consultants’ video posting and prompts, were recorded. Consultants also kept logs of their contacts with each teacher, noting the total time spent during each iChat conference. The sum of these iChat minutes was divided by the total cycles completed to create an average amount of *time in iChat conferences* per intervention year. Finally, to assess usage of resources available on

the MTP web-site, a web-tracking system documented each web page that was visited and the amount of time spent on each web page for each teacher. From the data collected by the web-tracking system, we assessed the total amount of time teachers spent on each page (with a cut-off of fifteen minutes per page per session). Because the website was not fully operational until after the school year started in the first year of the study, there was some variability in the number of months that teachers could use the resource in the two years of the intervention. Thus, the total time spent per page type was divided by the number of months that teachers could have used the website (seven months the first year, ten months the second year), resulting in the average amount of time teachers spent per month on the different pages. On the *Consultancy page*, teachers in this intervention condition could watch their edited video clips. Teachers could spend as much or as little time viewing and reviewing their teaching practices as edited by their consultant. The *quality teaching and video pages* of the website provided text and video examples of other teachers effectively interacting with children. As teacher-child interactions were a key focus of the Consultancy, independent time teachers spent on the web pages seeking additional information related to these interactions was of interest.

Results

Preliminary Analyses

Descriptive statistics for teacher characteristics and teacher-child interaction variables, used later as predictors, are reported in Table 1. A series of preliminary analyses were run to describe the professional development implementation variables, used later as criterion variables, across both years of teacher participation in the MTP Consultancy (see Table 2). First, it is evident from standard deviations that there is considerable variability in the implementation variables during both years. Second, correlations were calculated to examine the stability of responsiveness and exposure to the Consultancy intervention across both study years. These correlations were large in magnitude, ranging from .61 to .87. Third, to examine mean changes in responsiveness and exposure to the Consultancy intervention across the two study years, paired sample *t*-tests were calculated for each implementation variable. For the most part, responsiveness and exposure were not significantly different over time, but during the second year of the intervention teachers did complete fewer consultation cycles and spent less time on the Consultancy webpage. In addition, they spent more time on the Quality Teaching and Video sections of the website. However, given the high stability of teachers' responsiveness and exposure to the Consultancy intervention from year one to year two, each implementation variable was averaged across the 2-year professional development intervention (see Table 3) for use as a criterion variable in the following set of regression analyses. Table 4 reports bivariate correlations among these criterion variables. Several criterion variables were highly correlated, but were not composited so that potentially unique change and prediction patterns could be explored.

Prediction of Responsiveness and Exposure to Professional Development Resources

This study examined how various teacher characteristics predicted teachers' responsiveness and exposure to a 2-year professional development experience of consultation and website resources. Multiple linear regressions were used to predict responsiveness and exposure

criterion variables with consultant, teacher characteristics, and teacher-child interaction variables organized into conceptually distinct blocks. The consultant was entered in the first block (as a dummy code for each of the six consultants), and, to preserve power, was removed from the model if the block was not a significant contributor. The next block entered included teachers' age, education and experience, with the following block examining the influence of teachers' beliefs about children and efficacy. Lastly, emotional support, classroom organization, and instructional support from the beginning of the intervention were entered in a block to examine the extent to which the initial quality of teachers' interactions with children was associated with their participation in professional development designed to enhance these interactions. Seven distinct implementation variables served as criterion variables and were organized into a pair of conceptual categories: responsiveness (consultant perception of teacher responsiveness, teacher perception of Consultancy worth, number of words in prompt responses) and exposure (cycles completed, iChat time, time on Consultancy page, time on quality teaching and video pages) to the intervention. Given the small sample size, the significance value for reporting results was set at $p < .10$. Standardized betas and R^2 changes are presented in Table 5 and discussed below.

Other than ratings of Consultancy worth, a significant amount of variance was accounted for in the implementation variables (R^2 ranging from 24 - 50%), though more so for exposure than responsiveness to the professional development resources. Consultant effects were significant for only two exposure variables, but accounted for more of the final R^2 than any other predictor block in those models. Specifically, teachers varied in the number of cycles completed and time spent in iChats based on their assigned consultant.

Several teacher characteristics also played a role in predicting variance in exposure variables. Older teachers were more likely to spend time on both the Consultancy and quality teaching/video pages of the website than younger teachers, and spend more time in iChats with their consultant. Additionally, teachers with more pre-kindergarten teaching experience spent less time on both components of the website. Teachers' beliefs about children and their reports of self-efficacy also contributed significantly to variance in ratings of their responsiveness. Teachers reporting higher levels of self-efficacy and more adult-centered beliefs were rated in general as less responsive to the professional development intervention by their consultant. In contrast, higher self-efficacy levels were associated with greater use of the Consultancy and quality teaching and video web pages.

Finally, teachers' initial levels of teacher-child interaction quality were related to consultant reports of responsiveness to the intervention as well as the number of words in prompt responses, how much time teachers spent in iChats, and time spent on the Consultancy webpage. Teachers displaying more positive emotional support at the beginning of the year spent more time in iChats and were rated as more responsive to the professional development intervention by consultants. In contrast, teachers observed to have lower initial classroom organization also spent more time in iChats and were perceived as more responsive to professional development resources by their consultant. Additionally, teachers providing greater instructional support toward the beginning of the year tended to write more words in their prompt responses and spend more time on the Consultancy webpage.

Discussion

Given initial findings that the MyTeachingPartner Consultancy was effective at improving preschool teachers' interactions with children (Pianta et al., in press), the current study closely examined the fidelity of implementation to understand variation in teacher responsiveness and exposure to professional development as a function of teacher characteristics and teacher-child interactions. Despite ongoing monitoring and provision of supports throughout both years, results indicate that variation *did* exist in the degree to which teachers' demonstrated responsiveness to participation in the Consultancy and were exposed to key elements of the in-service professional development model. Though responsiveness and exposure to professional development resources were relatively stable across two years, evidence suggested that teachers' engagement with a few resources either waned or increased somewhat over time. Additionally, there is evidence that implementation varied systematically as a function of the consultant assigned to teachers, as well as the professional and training experiences, belief systems, and initial teacher-child interaction quality levels of participating teachers. Findings underscore the importance of fully measuring and studying implementation fidelity and can be used to inform future methods to improve responsiveness and exposure to web-based, consultation models of early childhood professional development.

There was consistent evidence that teachers with different consultants showed systematically distinctive levels of exposure to the intervention. Specifically, there were significant consultant effects on the number of cycles completed and the amount of time spent in iChats. These findings may be confounded in part by the fact that teachers were not randomly assigned to consultants – all teachers within a given district tended to be assigned to one consultant to reduce scheduling issues. However, the magnitude of these differences and the variation within districts suggests that these consultant effects are meaningful. Some consultants may have been more successful at engaging teachers, thus leading to more completed cycles and longer iChat times. As discussed in greater detail below, these factors suggest a need for more consistency across consultants in the way consultation is conducted, and require future study of specific consultant characteristics that may contribute to the uptake of professional development resources by teachers.

Though teachers' exposure and responsiveness to the professional development resources were largely stable across the two years of implementation, teachers did become less engaged in some intervention components and more engaged in others during the second year. Teachers completed fewer Consultancy cycles and spent less time watching their own videos on-line in the second year of the study. This is consistent with consultants' anecdotal reports that it became somewhat harder to get teachers to send in videos and respond to prompts about their own videos in the second year. However, iChat conferences remained similar in length from one year to the next, averaging a little under thirty minutes. This pattern of exposure suggests that during the second year teachers' were less engaged in elements of the MTP Consultancy that required more independent effort on their part. However, once connected to their consultants during iChat conferences, teachers took advantage of the full amount of consultation time, similarly across both years; it could be that this type of personal support and contact is a key factor in determining teachers'

engagement in long-term, on-going professional development efforts. Also in the second year, teachers spent more time viewing quality teaching videos. This is likely due to a more systematic push for teachers to use these resources, after a usability analysis (Nielsen, 1999; Rubin, 1994) at the end of Year 1 of the project suggested that teachers were not frequently using the quality teaching resources. During the summer between project years, the quality teaching web pages were restructured to be more teacher-friendly (Kinzie et al., 2006) and consultants were instructed to more consistently ask teachers to visit the site on a regular basis.

Teachers' demographic characteristics explained a moderate amount of variance in the time they spent viewing their own videos on the Consultancy web page (20%) and viewing other teachers on the Quality Teaching web pages (20%). Teachers with more experience teaching pre-k spent less time on the website, whereas older teachers somewhat surprisingly spent more time on the website – both viewing their own and others' videos. This age finding is at first perplexing, given that older adults tend to use the internet less often than younger adults; however, internet usage by older adults is far from minimal, and in fact for the age group of teachers in this sample ($M=44$) the usage rates average 85% based on a recent phone poll of over 2,000 adults in the United States (Pew Internet & American Life Project, 2007). In fact, adults in this age range use the internet for certain purposes more often than younger internet users (Fox & Madden, 2005). So, it could be that older teachers and those teachers who have less experience teaching in pre-k classrooms recognize these on-line video resources as something new and engaging, and that this novelty creates the energy to pursue the on-line resources.

Teacher beliefs accounted for a small amount of variance in teachers' responsiveness and exposure to the MTP professional development resources. Interestingly, teachers' beliefs about raising children were significantly associated with responsiveness to the MTP Consultancy prior to teacher-child interaction quality being entered into the model, but not afterward. This could be due to the fact that the CLASS, a foundation for content of the Consultancy, focuses on elements of teacher-child interactions typically valued by individuals endorsing a child-centered approach to classroom practice. For example, the dimension Regard for Student Perspectives focuses on how teachers can provide opportunities for children to be autonomous, active learners in the classroom; teachers who also value these types of teacher-child interactions may have been more likely to participate in the professional development. Additionally, self-efficacious teachers watched more videos of other teachers on-line and spent more time reviewing their own video on the Consultancy webpage. These teachers may be confident enough in their own classroom practices that they are not threatened by watching teaching exemplars and critiquing themselves to improve their own practice, supported by literature that reports teachers with a strong sense of efficacy tend to be more open to innovative ideas and disposed to trying new classroom practices if these will support their students' needs (Guskey, 1988; Stein & Wang, 1988).

Finally, teachers' initial quality of interactions with children was systematically associated with their engagement in the professional development intervention. Teachers observed to show higher emotional support at the beginning of Year 1 were rated more responsive by

consultants and spent more time in iChat conferences. Because of the reciprocal nature of consultation, it may be that teachers who are sensitive and warm with children in the classroom are also easy to work with in a consultation relationship; this in turn may have led to consultants being more responsive to these teachers and thus reinforcing of their continued engagement in the Consultancy process. On the other hand, these teachers may also have been more comfortable with the relational element of working one-on-one with a consultant, given their propensity toward relationship-building in the classroom. Additionally, teachers displaying higher instructional support tended to write more words in response to prompts and spend more time on the Consultancy webpage. The first finding may be due to the confound of verbal skills, because instructional supports, such as modeling language and providing in-depth feedback loops, and writing responses to prompts are both likely to require a solid vocabulary and verbal abilities. As for the second finding, teachers who value and focus on the process of learning (a key element of instructionally supportive interactions) in their classrooms may also be more amenable to watching and reflecting on the process of their own teaching via the Consultancy webpage. Somewhat unexpectedly, teachers whose classrooms were more disorganized at the beginning of each year were rated as more responsive to the Consultancy and spent more time in iChats. It could be that these teachers, in the context of struggling with managing children's behavior and setting up a productive learning environment, were more responsive to regular contact and supports available through the Consultancy because they saw themselves in greater need of assistance.

As a whole, these results raise several interesting points with relation to the implementation and study of mentoring and consultation interventions. First, as Bakermans-Kranenburg and colleagues (2007) have found in intervention research with parents of young children, it may be that 'less is more' when providing video-based feedback about adult-child interactions, favoring a short-term, focused approach. There is evidence that a year-long consultation focused on CLASS is effective in changing teacher-child interactions, and it seems somewhat challenging for teachers to remain engaged with some of the MTP Consultancy resources across a second full year. The purpose of the current study was to be one of the first to predict overall levels of exposure and engagement to professional development for early childhood teachers, but future work could also investigate predictors of these *changes* in implementation fidelity over time. Second, it is also clear that even within this study, which had a fairly well articulated model for delivery of services and regular meetings to support implementation fidelity among consultants, there were differences in how the consultation was delivered depending on who delivered it. This begs for future plans to provide even more systematic training and support focused on delivery of consultation, and to more carefully unpack what happens *during* iChat conferences through refined measurement of what a teacher and consultant say and do during these conversations. Third, even in tightly controlled experimental studies, it is unrealistic to assume that all participants in an intervention condition are equally engaged, and variation in responsiveness and exposure may actually mask intervention effects. Therefore, specifying key intervention components, and then systematically gauging the usage of and responsiveness to these components can provide a richer understanding of potential moderating factors in the success, or shortcomings, of professional development efforts. And last, there are a number

of teacher characteristics, including demographics, belief systems, and quality of interactions with children, that make significant contributions to variance in the extent to which the uptake of consultation and on-line video resources are successful. There may be ways to use this information in training of consultants to ensure that they can tailor supports to meet the individual needs of teachers, and in further web development to ensure applicability for diverse users.

Several limitations of this study must be considered when interpreting findings. Only teachers who consistently participated in the Consultancy condition were included in the models; these teachers were likely to be the most engaged in the professional development resources, so little was discovered here about what teacher and classroom factors may have contributed to those teachers who disengaged completely from the study. Another limitation is that this study did not address the extent to which specific elements of responsiveness and exposure to the Consultancy were associated with changes in teacher-child interactions. However, it should be noted that variation in access and exposure to MTP professional development resources has been examined in two related manuscripts, which indicate that greater support from a consultant contributes to growth in the quality of teacher-child interactions (Pianta et al., in press) and in children's language and literacy skills (Mashburn, Hamre, et al., 2008). Finally, there may be other contextual factors not captured here that alter intervention participation. As Feiman-Nemser (2003) notes, "even the best programs cannot compensate for an unhealthy school climate, a competitive teaching culture, or an inappropriate teaching assignment" (p. 28). The needs of the teacher, teaching context, and support may influence program effectiveness and, as these variables do not exist in isolation, need to be examined together (Huling-Austin, 1990) in future work.

This study took a refined look at the ways in which teachers were engaged in professional development resources, and in particular contributed to an understanding of the conditions under which teachers were most responsive and engaged in the Consultancy process. It is readily apparent that attending to all elements of program fidelity can inform revisions to professional development delivery, and has the potential to unveil particular teaching resources that contribute to the benefits teachers receive from participating in professional development. In order to continue improving pre- and in-service training opportunities for teachers in the field of early childhood education, it is essential that distinct components of professional development systems continue to be rigorously examined (Birman, Desimone, Porter, & Garet, 2000; Borko, 2004; Clifford & Maxwell, 2002; Pianta, 2005). When the reciprocal process of development and investigation includes focused examination of implementation fidelity, empirically informed decisions can be made about how to leverage limited financial and personnel resources to support teachers in improving their interactions with children so that optimal learning occurs.

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Table 1
Descriptive Statistics for Teacher Characteristics and Teacher-Child Interactions Used as Predictor Variables (N=62)

	%	<i>M</i>	<i>SD</i>	Range
Teacher Demographics				
Advanced Degree	35			
Age	44	11		25-67
Years experience with prek and younger	9	7.6		0-26
Teacher Beliefs				
Initial Self-Efficacy	4.33	.46		3.33-5
Initial Adult-Centered Beliefs	2.21	.54		1.31-3.63
Teacher-Child Interactions				
Initial Emotional Support	5.47	.74		2.87-7
Initial Classroom Organization	5.09	.80		2.67-6.67
Initial Instructional Support	2.88	.84		1.33-6.33

Table 2
Differences in Responsiveness and Exposure to the Consultancy Intervention between Years 1 and 2

	Year 1			Year 2			<i>R</i>	<i>T test</i>
	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range		
Consultant Report of Teacher Responsiveness	3.72	.68	2.17-4.92	3.60	.68	1.33-4.83	.71	1.613
Teacher Report of Consultancy Worth	3.71	.54	1.8-4	3.73	.52	2-4	.86	.372
Words in Consultancy Prompt Responses Per Cycle	242.84	109.78	73.56-548.75	234.26	115.17	52.60-584.30	.87	1.434
Consultancy Cycles Completed	12.43	3.66	4-19	10.32	3.98	3-17	.61	5.001*
Minutes Per Cycle Spent in iChat	26.54	6.30	12-38.50	26.71	7.02	11.67-40.38	.79	-.248
Minutes Per Month Spent on Consultancy Page	43.62	32.05	.13-174.45	31.65	25.56	4.63-163.36	.83	5.033*
Minutes Per Month Spent on Quality and Video Pages	6.07	6.95	0-37.48	7.76	10.08	0-58.42	.70	-1.878 ⁺

⁺ $p < .10$

* $p < .001$

Table 3
Descriptive Statistics for Responsiveness and Exposure to the Consultancy Intervention
Averaged Across 2 Years

Criterion Variables	Over Two Years		
	<i>M</i>	<i>SD</i>	Range
Consultant Report of Teacher Responsiveness	3.66	.63	1.92-4.71
Teacher Report of Consultancy Worth	3.72	.51	1.9-4
Total Words in Consultancy Prompt Responses	5562.50	3013.47	925-12988
Total Consultancy Cycles Completed	22.81	6.85	8-35
Total Minutes Spent in iChat	622.32	250.78	121.33-1056.03
Total Minutes Spent on Consultancy Page	622.67	464.80	93.52-2854.80
Total Minutes Spent on Quality and Video Pages	119.99	139.64	0-846.55

Table 4
Correlations between Intervention Responsiveness and Exposure Variables Averaged across Two Years

	Teacher Responsiveness	Consultancy Worth	# Words in Prompt responses	Cycles Completed	iChat Time	Time on Consultancy Page
Consultancy Worth	.45**					
# Words in Prompt responses	.47**	.24				
Cycles Completed	.38**	.27*	.63**			
iChat Time	.51**	.26	.76**	.86**		
Time on Consultancy Page	.06	.10	.62**	.52**	.58**	
Time on QT and Videos	.15	.06	.38*	.38**	.45**	.87**

* $p < .05$

** $p < .01$

Table 5
Prediction of Responsiveness and Exposure to the Consultancy Intervention across Two Years

Predictors	Criterion Variables											
	Responsiveness						Exposure					
	Teacher Responsiveness		Consultancy Worth		# Words in Prompt responses		Cycles Completed		iChat Time		Time on Consultancy Page	
	R ²	β	R ²	β	R ²	β	R ²	β	R ²	β	R ²	β
Block 1 Consultant ^a							.221 [*]		.321 ^{***}			
Block 2 Teacher	.028		.055		.048		.045		.034		.199 ^{**}	
Age		.007		.126		.225		.079		.267 [*]		.529 ^{***}
Advanced Degree		-.202		-.199		.063		-.144		-.152		-.059
Years Experience prek		-.073		-.102		-.103		.140		-.075		-.385 [*]
Block 3 Beliefs	.078 ⁺		.002		.028		.009		.027		.033	
Adult-centered beliefs		-.118		.005		-.117		.108		-.072		-.035
Self-efficacy		-.127		.033		.068		.128		.095		.191 [*]
Block 4 Initial Quality	.158 [*]		.006		.159 [*]		.045		.118 [*]		.058	
Emotional Support		.493 [*]		.097		.129		.271		.448 [*]		.087
Classroom Organization		-.379 [*]		-.116		-.248		-.327		-.487 [*]		-.131
Instructional Support		.176		-.018		.396 ^{**}		.101		.171		.077
Final R ²	.265 [*]		.062		.235 ⁺		.319 ⁺		.499 ^{***}		.290 [*]	
											.248 [*]	

^aBlock 1 was included in the model only when significant.

⁺ $p < .10$

^{*} $p < .05$

^{**} $p < .01$

^{***} $p < .001$