

Improving the Quality of Early Care and Education through
Professional Development: Evaluation of an Observational Assessment Tool

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Dedication

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Abstract

High quality early childhood care and education providers fill an essential societal role preparing children to be socially, behaviorally, and cognitively “ready to learn” upon school entry, yet many care settings in the United States are mediocre to poor in quality, particularly for infants and toddlers. Many professional development opportunities aim to change provider characteristics such as knowledge, attitudes, or beliefs, assuming that this will lead to a change in caregiving behavior, but the relationship between such characteristics and actual behavior has not been well-established. In the current study, data were analyzed from a longitudinal randomized control intervention study examining the use of the Ounce Scale™—an authentic, observational assessment tool—by 98 child care providers of infants and toddlers. It was hypothesized that provider characteristics would be positively associated with, and predictive of, caregiving behavior, and that use of the Ounce Scale™ would deepen providers’ complexity of thought regarding children’s behavior and actual caregiving behavior as reflected in the provider-child relationship. Knowledge of infant development and complexity of thought regarding child behavior predicted many aspects of caregiving behavior. Beliefs about spoiling, traditionalism of child-rearing, and dissatisfaction with caregiving predicted specific aspects of caregiving behavior, and many other attitudes and beliefs did not predict caregiving behavior at all. Although learning and using the Ounce Scale™ had little overall effect, several interaction effects suggest that it did impact the caregiving behavior of providers with certain characteristics.

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Improving the Quality of Early Care and Education through Professional Development:
Evaluation of an Observational Assessment Tool

In the past several decades, increasing rates of females in the workforce have led to increasing numbers of children under the age of five experiencing nonmaternal care. The 2001 National Education Household Survey estimates that 52% of the nation's infants and toddlers and 74% of preschoolers are in nonparental care arrangements (Martinez-Beck & Zaslow, 2006). The National Institute of Child Health & Human Development Study of Early Child Care found that by the age of three, over 90% of children have experienced some type of nonmaternal care, and over 50% are regularly in nonmaternal care 30 or more hours per week (NICHD-ECCRN, 2001).

As child care responsibilities for young children have shifted from mothers to a combination of mothers, fathers, other relatives, and non-related caregivers, researchers and policymakers alike have turned their attention to the potential effects of this care on children's development. Meanwhile, as the public's awareness has evolved regarding the importance of the early years on children's individual development, their later contribution to society, and the increased impact of early (rather than later) interventions and education, society has come to view child care as more than simple "babysitting" (Peters & Bristow, 2006). The research field has matured from an initial state of asking gross questions such as "is child care bad for children?" to a more nuanced examination of the many proximal and distal factors that mediate and moderate child care's potential effects (Scarr & Eisenberg, 1993), as exemplified by the National Institute of Child Health and Human Development's (NICHD) Study of Early Child

Care (NICHD-ECCRN, 2001). Policymakers have put increasing pressure on accountability in caregiving and educational practices at ever earlier ages (Pianta, 2006). In short, attention in both research and policy has shifted from focusing on a comparison of “moms versus not-moms” (Scarr & Eisenberg, 1993) to delineating effects of parental versus nonparental care, with acknowledgement and examination of a wide diversity of nonparental care arrangements (e.g., Zigler, Gilliam, & Barnett, 2010).

The Early Care and Education Landscape

Early childhood care settings in the United States today take many forms. The most informal settings are those in which a child is cared for by a relative or non-relative in a private home—either that of the child or that of the care provider. These care arrangements are known as “family, friend, and neighbor” or FFN care, and have no licensing requirements. Somewhat more formal are settings which involve one or more caregivers who run an organized, licensed child care business out of their own home, often caring for children of multiple ages. These are typically referred to as family child care (FCC) or home-based settings (e.g., Kagan, Kauerz, & Tarrant, 2008). The most formal settings are licensed and include both for-profit and non-profit child care centers, as well as public and private prekindergarten (preschool) programs and targeted interventions such as Head Start and Early Head Start. As a group, these settings are referred to as center-based care (e.g., Kagan et al., 2008). As of 2005, there were over 335,000 licensed child care facilities in the United States, roughly one third of which were centers, the other two-thirds of which were family child care homes (NARA & NCCIC, 2005).

These various care settings share the important characteristic of providing overlapping services to a common population, though they do so in varied ways. The educational and professional development expectations for providers in licensed settings—both family- and center-based—are typically greater than for unlicensed and more informal providers such as FFN care. Thus, this discussion will focus on professional development for licensed early childhood care and education providers. It is appropriate that the field has adopted the term “early care and education” to describe these multiple settings in which children spend their time, as at this age *caring for* and *educating* children are inseparable tasks.

The Fundamental Importance of Early Care and Education

Evidence supporting the importance of early care and education experiences is overwhelming. Classic studies of preschool and early intervention programs have shown that while some benefits appear early and then seem to fade (sometimes referred to as “fade-out” effects), others do not emerge until years later (so-called “sleeper” effects) and can affect lifespan development in areas such as increased educational attainment and earnings, and decreased arrests (Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002; Reynolds et al., 2007; Schweinhart et al., 2005). Benefits of these early experiences are not limited to the participating child: mothers of early intervention participants were shown to achieve higher educational attainment and increased earnings themselves (Ramey et al., 2000), and society as a whole benefits economically (Rolnick & Grunewald, 2003; Temple & Reynolds, 2007).

It is important to note that these findings stem from controlled intervention studies in which teachers were well-qualified and highly trained, and services sometimes extended beyond preschool programming to include other social services. Their relevance to the “real world” of children’s care settings, therefore, has at times been questioned. Benefits have also been found, however, in studies of community child care “as is” (NICHD-ECCRN, 1999, 2002b; Votruba-Drzal, Coley, & Chase-Landale, 2004), though those effects may be modest in size (Burchinal et al., 2009).

Although early care and education includes the aforementioned various types of care arrangements, research shows that the specific type of care does not predict developmental impacts as well as the quality of the care arrangement does (e.g., Loeb, Fuller, Kagan, & Carrol, 2004; NICHD-ECCRN, 2001; Votruba-Drzal et al., 2004). Large-scale studies such as the NICHD Study of Early Child Care have shown multiple benefits of high quality care on children’s development (e.g., Belsky et al., 2007; NICHD-ECCRN, 1999, 2002b). Numerous other studies offer additional evidence of the positive impacts of high quality care, including improved cognitive and social skills, later adjustment, and general well-being (e.g., Burchinal et al., 2008; Burchinal, Roberts, Nabors, & Bryant, 1996; Howes, Phillips, & Whitebook, 1992; Peisner-Feinberg et al., 2001; Vandell, 2004; Vandell & Wolfe, 2000). In short, high quality early childhood care and education providers fill an essential societal role serving not only as caregivers, but also as educators, who can prepare children to be socially, behaviorally, and cognitively “ready to learn” upon school entry.

The Need for Improvement

Unfortunately, the majority of children in early care and education settings are not privy to these developmental advantages, as most care in the US is mediocre to poor in quality with respect to either structural quality (regulable features such as safety standards) or process quality (non-regulable features such as the interactions between children and providers), or both. For instance, many child care settings do not meet minimum professional standards such as appropriate child to staff ratios and class size, indicating low structural quality (e.g., Barnett et al., 2010; NICHD-ECCRN, 1999). It is estimated that positive caregiving is “very” or “somewhat” uncharacteristic of over half of the care received by birth to three-year-olds in the US, indicating low process quality for this vulnerable population of infants and toddlers (NICHD-ECCRN, 2000). In an examination of public pre-kindergarten in 11 states, 18.8% of programs were rated as “poorest quality” and only 14.5% as “highest quality” (LoCasale-Crouch et al., 2007). Infant and toddler care settings have been found to rate particularly low when examining quality of care (Kreader, Ferguson, & Lawrence, 2005; Gallagher, Rooney, & Campbell, 1999). Low quality care has deleterious effects on important developmental outcomes, such as externalizing behavior problems (e.g., Votruba-Drzal et al., 2004).

Professional Development for Providers

Professional development activities, often required in some form for licensing of care providers, provide a potential opportunity for improving quality of care. In early childhood education, professional development is comprised of various activities,

categorized as three main components: education, training, and credentialing (Maxwell, Field, & Clifford, 2006). Education refers to professional development that occurs within the formal educational system, training refers to that which occurs in other settings, and credentialing is considered as a separate category because the credentials are typically granted from an organization that does not actually provide the professional development opportunity (Maxwell et al., 2006).

The focus of professional standards, such as those put forth by the National Association for the Education of Young Children¹ is clearly linked to more formal care settings, where providers are more likely to be encouraged to obtain educational degrees and credentials. The content recommended for such education and credential programs,

¹ The National Association for the Education of Young Children (NAEYC)'s current recommendations for the content of early childhood professional development cover five "core standards," each with three to five "key elements," that are shared across all levels of professional development and types of care settings. In brief, these core standards are: (a) promoting child development and learning; (b) building family and community relationships; (c) observing, documenting, and assessing to support young children and families; (d) teaching and learning; (e) becoming and growing as a professional (Hyson & Biggar, 2006; NAEYC, 2001b). Regarding educational level of the teaching staff in a child care setting, NAEYC recommends that all teachers have a minimum of an associate's degree, and that 75% of teachers in a care setting have at least a bachelor's degree in an early childhood field (NAEYC, 2001a). In addition, assistant teachers or aides are to have or be working towards earning a CDA (child development associate) credential or equivalent (NAEYC, 2001a). Beyond these formal degrees, all teaching staff should complete professional development (of any kind, e.g., community training or college coursework) related to the curriculum, assessment, and other tools used in their setting, the specific age group they are caring for, and children with special needs (NAEYC, 2001a).

however, is also applicable to training opportunities, though there are fewer formal institutional settings through which the consistency and quality of training opportunities might be monitored (and no accreditation status to confer regarding training); therefore the use of core standards in designing training opportunities is unknown. Despite its unstandardized nature, training is a very popular option for child care providers looking to maintain licensure or pursue professional development, and is the focus of this discussion.

As the aim of research has shifted to understanding the contexts within which child care is most beneficial for children and families, the professionalization and qualifications of early childhood care and education providers² has taken a central place in discussions of the future of the early childhood care and education field. Recent policies and initiatives such as *Pathways and Partnerships for Child Care Excellence* (U.S. Department of Health & Human Services Administration for Children & Families Office of Child Care, 2010) and the *Good Start, Grow Smart* presidential initiative that followed the *No Child Left Behind Act of 2001* demonstrate policymakers' hopes that professional development of care providers is one pathway to improved care and outcomes for our youngest citizens (Martinez-Beck & Zaslow, 2006). Though it seems intuitive that professional development should improve the quality of care offered by child care providers, the current state of research does not allow one to answer that

² For the purposes of this discussion, the term “provider” will refer to licensed providers of care and education for children in the pre-school years, regardless of the setting in which care is provided (family- or center-based), or official title of the individual (e.g., teacher, assistant teacher).

question unequivocally. In fact, relatively little is known about *how* to provide effective professional development for child care providers (Sheridan, Edwards, Marvin, & Knoche, 2009).

In pursuing professional development opportunities, much of the early childhood workforce relies on specialized training, often in the form of workshops and conferences (Kagan et al., 2008). As significant policy, funding allocation, and employment decisions continue to be made based on the perception that training matters, clarifying what is known about the efficacy of training is a timely and important task. Training shares important features with other forms of professional development, but also raises unique issues with regard to how it is quantified and studied, how it is used and by whom, and its potential effects (see Tout, Zaslow, & Berry, 2006 for a review).

Each particular training opportunity is unique in its method of delivery, content, and intensity, making it difficult to generalize across various training opportunities. Thus, researchers often draw conclusions about the impact of training based on aggregates such as total number of hours in training, or whether training has ever been attended, which may mask the true effects of individual training opportunities (Maxwell et al., 2006; Tout, Zaslow, & Berry, 2006). Unfortunately, researchers are not consistent in the way they define “training,” or whether they explicitly define it at all, which greatly complicates the issue of measurement (Martinez-Beck & Zaslow, 2006). In recent years, some states have begun to establish registries to track and approve training and other professional development opportunities, which will aid researchers in

measuring basic content and usage rates of training by providers. As noted earlier, this paper will adopt the definition proposed by Maxwell et al. (2006), who define “training” as a professional development opportunity that occurs outside of the formal educational system. Within that broad definition fall many offerings, which differ along multiple dimensions, such as type of training (e.g., workshop style, mentoring), content, amount, intensity, and timing of the training (Maxwell et al., 2006).

Pianta (2006) has discussed the fact that the current professional development system simply is not producing desired results, particularly when considered from the current political climate of accountability. Current in-service training rarely connects the training with an individual provider’s actual practices, favoring instead a general approach of conveying knowledge, curriculum, techniques, and so on, that are not tailored to individual participants (Pianta, 2006). Professional development efforts, Pianta has argued, need to focus on changing the actual quality of care received by children, which is done by changing the provider’s own psychological processes and interactions with children—something unlikely to happen through group-based, traditional training methods (Pianta, 2006). The findings of recent studies confirm that having a practical, experience-based component included in training may improve benefits (e.g., Neuman & Cunningham, 2009).

Professional development may have many desired outcomes, but for early care and education, they all point toward improved practice with children (improved quality of care). The “structure→process→outcome” model discussed by the NICHD ECCRN (2002) demonstrates this expectation, in positing that structural features of quality affect

process quality, which affects child outcomes. Also important, however, are intermediating processes and characteristics at the provider level—which presumably come somewhere between structural quality (e.g., training experience) and process quality (putting what is learned into practice) (Fukkink & Lont, 2007, suggest a similar model). The providers' own thoughts, beliefs, understanding, and knowledge, through which their practice emerges, presumably influence providers' ability to individualize care and instruction for each child, a practice seen as an essential part of high-quality early childhood education (Hyson & Biggar, 2006). The general goal of high quality care is understood to be positive child outcomes (e.g., Burchinal et al., 2009), so there is also a presumed connection between professional development and child outcomes, such as school readiness. Thus, there are desired outcomes on three levels: (a) the adult-focused goal is professional growth (e.g., changes in provider knowledge, attitudes and beliefs related to caregiving, understanding and interpretation of child behavior); (b) the quality-focused goal is improved quality of care (e.g., provider-child interaction, instruction, and quality of the environment); and (c) the child-focused goal is enhanced development (e.g., school readiness, well-being). Many attempts at training and education focused on this audience assume that changing providers' knowledge, attitudes, and beliefs will in fact change their actual practice—yet this assumption is largely untested. Studies often examine only one of these three outcome levels, or examine multiple levels but do not directly examine their relation to each other, focusing instead on the effect of professional development on each specific outcome. One notable exception to this is a study of family child care in California (Borden,

Machida, & Varnell, 2000), which investigated not only the impact of training on process quality (improvement in quality was found), but also the relationship between knowledge of infant development and process quality. Borden, et al. (2000) found that knowledge predicted process quality above and beyond structural quality. What is evident is that professional development can be at least modestly effective in addressing each of the above-stated goals; the process through which this occurs is what remains unknown (Sheridan et al., 2009).

Effects of Professional Development on Quality of Care

There is some evidence that training can improve quality of care for both family and center-based child care providers. In a recent meta-analysis, Fukkink and Lont (2007) concluded simply that “training seems to matter” (p. 305); beyond that generalization one runs into often contradictory evidence. In their secondary analyses of data collected from the Family Child Care and Relative Study and the California Licensing Study, Burchinal, Howes, and Kontos (2002) found that participating in training workshops was associated with higher quality among family care providers, as indicated by higher scores on the Family Daycare Rating Scale (FDCRS) and lower detachment scores on the Arnett Caregiver Interaction Scale (CIS). Mathews, Thornburg, Espinosa, and Ispa (2000) similarly found positive quality changes in the form of lower detachment and increased sensitivity, global quality, and interactions for family and center providers. Weekly home-visits from a trainer were found to improve quality (measured by FDCRS scores) for family child care providers who were not associated with a professional organization (DeBord & Sawyers, 1996). Bromer, Van

Haitsma, Daley and Modigliani (2009) found that direct training opportunities, one-on-one interactions with and visits from a specially trained coordinator resulted in modest to large improvements in global quality (measured by FDCRS scores) for family child care providers.

Findings from the Cost, Quality, and Outcomes Study point to improvements for center providers as well: environmental quality (measured by the Infant-Toddler Environmental Rating Scale (ITERS) and the Early Childhood Environmental Rating Scale (ECERS)) and caregiver-child interaction (CIS) scores were higher for those who participated in workshop-style training³, even when controlling for the effects of ECE education and other teacher and classroom characteristics (Burchinal, Cryer, Clifford, & Howes, 2002). The modest to moderate-sized effects of workshop training on quality improvement remained stable regardless of the providers' level of formal education, though overall quality was still higher for those with formal education than those without (Burchinal et al., 2002).

Not all trainings are successful in improving quality, however. Doherty, Forer, Lero, Goelman and LaGrange (2006) found that completion of a post-secondary training program did not predict quality for family child care providers. A consultation model examined by Campbell and Milbourne (2005) had no significant effect on global

³ Three types of workshops, based on the context in which they were presented, were examined. Improvements in quality were found for each type: in-service workshops (at the workplace), workshops in the community, and workshops at professional meetings (Burchinal et al., 2002).

quality for infant care or provider sensitivity. Similarly, Jaegar, Shlay, and Weinraub (2000) found no effect of training on caregiving behavior.

Other evidence suggests improvement in certain aspects of quality, but not in aspects central to the provider-child relationship, such as warmth and sensitivity. Raikes, Raikes, and Wilcox (2005) found a positive association between hours of training and global quality, but not sensitivity, for family providers. In a correlational study of highly educated public prekindergarten teachers, participation in training was related to high quality practices in the classroom such as the use of language and reasoning, but was not related to provider warmth and sensitivity or engagement⁴ (Marshall et al., 2002). Global quality, measured by FDCRS scores, showed a modest increase in two of the three states (the third state showed no change) after participation in the Family-to-Family program, whereas process quality, measured by scores on the Arnett Caregiver Interaction Scale (CIS)⁵ and the Adult Involvement Scale, showed no change in any of the three states involved in the study (Kontos, Howes, & Galinsky, 1996). Findings from the Quality Interventions for Early Care and Education

⁴ The authors created composite variables based on subscales and specific items from their quality measures. Stimulation is a composite of the Language-Reasoning, Activities, and Program Structure subscales of the ECERS; warmth and sensitivity is a composite of the Interactions subscale of the ECERS and the Arnett CIS; engagement is a composite based on two items from the Adult Involvement Scale (Marshall et al, 2002).

⁵ Kontos et al. (1996) refer to this as the Arnett Scale of Provider Sensitivity; other studies, however, refer to it as the Arnett Caregiver Interaction Scale (CIS), so I have used that title here to be consistent.

(QUINCE) Project have shown that the Partners for Inclusion⁶ intervention affected global quality but that no impact was found on caregiver sensitivity (CIS) (Bryant et al., 2009). When examining training for family providers that was related directly to sensitive caregiving, however, Howes, Galinsky, and Kontos (1998) did find improvements in sensitive caregiving.

Many of the professional development trainings that have succeeded in improving provider sensitivity involve one-on-one mentor or consultant relationships with the care provider. A study by Fiene (2002)⁷ compared workshop style training with a mentorship approach for center-based providers of infants and toddler care. Though differences in overall scores were not significant, the mentoring group did show improved quality in several subscales—sensitivity and appropriate discipline on the CIS and learning activities and routines on the ITERS—whereas the control group showed a decrease in scores on the interactions subscale of the ITERS, and no change on other

⁶ This Partners for Inclusion (PFI) model involves community-based consultants working alongside care providers in an ongoing way, providing on-site consultation and technical assistance based on a joint assessment of needs (Palsha & Wesley, 1998).

⁷ Fiene (2002) used a randomized experimental design to investigate the effectiveness of a mentorship approach to training, as compared to workshop-style training, for center-based providers of infants and toddlers in Pennsylvania. Nineteen providers were assigned to the mentoring group, which received four months of one-on-one, assessment-based training, while the other nineteen providers were in a control group that received workshop-style training only. Quality was measured in terms of global quality (ITERS), caregiver interaction (CIS), and classroom organization (Bloom Scales of Organization Climate).

measures (Fiene, 2002). MyTeachingPartner⁸, an internet-delivered consultation model emphasizing individualized feedback for providers, did yield improvements in the quality of interactions with children (Pianta, Mashburn, Downer, Hamre, & Justice, 2008). The Right from Birth (RITE) study is an experimental evaluation comparing the effectiveness of workshop-style training versus coaching in the form of 20 full-day coaching sessions spread over 4-6 weeks, for center and family care providers of infants and toddlers (Ramey, Ramey, Grace, & Davis, 2007; Ramey, Ramey, Grace, Davis, & Timraz, 2008). Preliminary reports have shown improved quality as a result of both training formats, with improvements for the RITE program much higher than the workshop-style training for center-based providers in particular, and this improvement was maintained over one year post-training (Ramey et al., 2008). It is important to note, however, that not all consultation or mentorship models have been successful in improving relationship-based aspects of care (e.g., Bryant et al., 2009).

Effects of Professional Development on Provider Characteristics

The mechanisms underlying improvements in quality—particularly in aspects of process quality such as provider sensitivity—is unclear. There is some evidence that

⁸ The MyTeachingPartner project has examined the use of internet-based consulting; all 113 teachers participating in the project attended a workshop-style training to introduce a common curriculum package focusing on language, literacy, and social relationships; beyond this, all teachers gained access to a website with the curriculum information and suggestions, pre-selected video examples of effective instruction, and other additional website features, and a randomly assigned group of teachers also received ongoing support from a consultant (Mashburn, Pianta, Downer, & Hamre, 2007; Pianta, 2006; Pianta et al., 2008).

training affects provider characteristics, such as knowledge and attitudes. However, whether these then influence actual caregiving practice is unclear, as provider characteristics such as knowledge, attitudes, and beliefs and provider practice are rarely examined in the same study (Zaslow, Tout, Halle, Vick, & Lavelle, 2010). Mueller and Orimoto (1995) found that a comprehensive training program for FCC providers, which included didactic sessions as well as support groups, observing mentors, and being observed by mentors, resulted in providers' improved knowledge in several relevant areas, as well as an increase in perceived skills, confidence, interest, and commitment. Some studies have shown that training can affect provider attitudes, such as an increase in positive attitudes toward developmentally appropriate practice (Mathews et al., 2000; Naber, 1995), but others have shown no effect on attitudes (Jaeger et al., 2000; Bryant et al., 2009.)

One might assume that improvement in knowledge about development and/or caregiving might cause changes in quality, yet evidence does not consistently support this. An experimental study of the impact of training on caregivers' knowledge and application of temperament concepts found that while knowledge of temperament concepts did increase, the application of those concepts in the classroom in the form of the caregivers' acceptance of children's behavior and feelings did not change after receiving the training, which consisted of three hours of workshop-style presentation from an expert in temperament research (Franyo & Hyson, 1999). Conversely, some studies show that quality has improved but knowledge has not. Fiene (2002) measured provider knowledge before and after four months of training via mentorship, using the

Knowledge of Infant Development Inventory (KIDI). No change was found in provider knowledge for either the mentorship or comparison (workshop-style) group, yet the mentorship group did show some improvements in quality, including in sensitivity (Fiene, 2002). Neuman and Cunningham (2009), examining data from the Project Great Start Professional Development Initiative, found that coaching had no effect on provider knowledge related to early literacy (which was the focus of the training), but did find improvements in caregiver practices for those who received the consultation.

One study that did find improvement in both knowledge and practice was a workshop-style training about sleep safety for infants. Moon and Oden (2003) found an increase in provider knowledge relative to their topic-specific 60-minute workshop on the “Back to Sleep” campaign and sudden infant death syndrome (SIDS), and *also* found a change in the provider behavior (after the training, more providers put infants to sleep on their backs, and this change in practice was maintained over a six month period).

In short, change in provider knowledge appears to be an obtainable outcome of training, though translating that knowledge into deeper understanding in order to affect provider behavior may be beyond the reach of at least workshop-style training attempts. Perhaps training such as that evaluated by Moon and Oden (2003), which saw “success” in changing provider behavior, was effective because it addressed a single, very concrete, behavior (e.g., in what position to put an infant to sleep), rather than a whole approach to caring for children (e.g., accepting each child’s unique temperament, such as the training evaluated by Franyo & Hyson (1999)), which might require more

intensive training or a different format, such as coaching or mentorship. However, knowledge does not appear to be essential to the process of change, as some studies have found quality increase without an accompanying increase in knowledge (Franyo & Hyson, 1999; Fiene, 2002; Neuman & Cunningham, 2009).

On the whole, little work has been done examining provider characteristics that may be precursors to changes in quality—a notable gap in the literature pointed out by Sheridan et al. (2009), who explain that as a field we know much more about *what* professional development is than about *how* it works. Desired outcomes are not often delineated when designing professional development opportunities, making later evaluation of those outcomes difficult. In particular, very little is understood regarding the process of change that occurs, or is hoped to occur, as a result of participating in training or other professional development activities. Bringing these desired outcomes to the forefront by examining how change occurs as a result of professional development could go far in improving the design and effectiveness—and therefore cost effectiveness—of future professional development endeavors.

As discussed earlier, training in general aims to change qualities of the provider, such as knowledge, skills, beliefs, and understanding, in order to affect quality of care, with the ultimate goal of improving child outcomes (although these desired outcomes may be more or less acknowledged by those designing and conducting the training). These multiple outcomes are acknowledged implicitly in the fact that various researchers have measured effects on these three levels—provider characteristics, quality of care, and child outcomes—yet the underlying process of change has not been

explicitly addressed in the literature. Provider, quality, and child outcomes are examined, but often not in the same study, and the relationships among these outcome levels has not been fully elucidated. The current study sought to address this gap by examining (1) provider characteristics, including provider knowledge about infant development, multiple aspects of attitudes and beliefs regarding caregiving, and complexity of thought regarding child behavior, (2) provider's actual caregiving behavior as reflected in the provider-child relationship, and importantly (3) whether and how provider characteristics predict concurrent and future provider behavior. It was expected that provider characteristics would predict both concurrent and future provider behavior (Hypothesis 1).

Authentic Assessment as Professional Development

Given our lack of clarity regarding why some professional development offerings are successful while others are not, various approaches to training need to be evaluated. Research suggests that training which incorporates direct application to the provider's everyday practice may be more successful in changing provider behavior (Zaslow, 2009; Neuman & Cunningham, 2009). Additionally, improving knowledge of child development and the ability to individualize care and instruction are also seen as essential ingredients of high quality care (e.g., Hyson & Biggar, 2006; Neisworth & Bagnato, 2004). One method incorporating these three elements—knowledge of child development, individualized care, and application to everyday practice—is authentic assessment. Authentic assessment is the “systematic collection of information about the naturally occurring behaviors of young children and families in their daily routines”

(Neisworth & Bagnato, 2004, p. 204). It is a method of assessment proposed as a more developmentally appropriate alternative to conventional, standardized testing. Two of the key features distinguishing authentic assessment from conventional assessment are the location of the testing and the identity of the assessor (Neisworth & Bagnato, 2004). Assessment is not limited to licensed psychologists and other formally educated individuals who are relatively removed from the lives of the children they are assessing—rather, it is the adults most involved in the child’s life who conduct authentic assessments, including parents and early care and education providers. Therefore, authentic assessment offers a unique platform for obtaining dual objectives—assessing children’s developmental progress, and assisting parents and child care providers in understanding the child’s development and current needs. It is no surprise that attention has turned to these assessment techniques both for their utility in assessment and for their potential benefits to caregiving.

One such type of authentic assessment is observational assessment.

Observational assessment is a context-sensitive, authentic assessment technique in which the child’s developmental progress is assessed through ongoing observations of the child in his or her daily activities and care settings (Meisels & Beachy-Quick, 2008; Meisels, Wen, & Beachy-Quick, 2010). In our current political climate of accountability, testing has spread to all levels of education, including early childhood. Authentic, context-based assessments—such as observational assessment, in which providers observe children in their natural settings and activities—are particularly appropriate for assessing young children whose development is labile (Meisels et al.,

2010). Furthermore, the ability to skillfully observe children is key in improving one's instructional effectiveness (Meisels & Atkins-Burnett, 2006). In other words, when teachers or care providers are able to accurately observe and interpret children's behavior, they are better able to individualize their caregiving behavior to meet each child's needs. This individualization of care, though important at all ages, is critical when caring for infants and toddlers, for whom what is considered developmentally appropriate varies greatly within a short amount of time (Meisels, Dombro, Marsden, Weston, & Jewkes, 2003). This may be one reason that quality of care for infants and toddlers has been found to be even lower than that of preschoolers (e.g., Phillipsen, Burchinal, Howes, & Cryer, 1997), and indicates the need for training efforts aimed at infant and toddler providers in particular. Training efforts focused on teaching observational assessment skills offer a new approach to professional development for early care and education providers.

The Ounce Scale™ is one such observational assessment tool (Meisels et al., 2003). Created for use with children from birth to 42 months of age, the Ounce Scale™ is comprised of three components: the developmental profile and standards, the observational record, and the family album. Each of these components is context-sensitive, providing a means for ongoing naturalistic assessment of the child's needs and abilities. The developmental profile and standards provide guidelines to help the care provider correctly assess whether the child is “developing as expected” or “needs development” in each of six broad areas of development: personal connections, feelings about self, relationships with other children, understanding and communicating,

exploration and problem solving, and movement and coordination. The observational record provides a structured way for the care provider to take ongoing notes pertinent to the child's development in each area, and the family album guides parents in collecting information relevant to the child's development. After each making observations independently, parents and providers are to have periodic conferences (every 4-6 months, depending on age of the child) to discuss the child's development and goals for care and instruction.

The Ounce Scale™ has several goals, including to “provide a structure for families and professionals to become better observers of their children and (4) to strengthen relationships between infants and toddlers and their parents and others who care for them by helping the parents and caregivers better understand how to support children's development” (Meisels et al., 2010, p. 57). In fact, qualitative data indicate that the Ounce Scale™ can be successful in achieving a number of professional development outcomes, such as increasing provider knowledge, observational skills, and understanding of curriculum, among others (Meisels & Beachy-Quick, 2008). Thus, using observational assessments such as the Ounce Scale™ as professional development tools holds promise as a potential means for improving provider characteristics that may drive change in the actual quality of care experienced by children in early care and education settings.

Current Study

The current study had two main goals: (a) to explore the relationship between provider characteristics and actual caregiving behavior; and (b) to explore how an

observational assessment tool (the Ounce Scale™) might be useful as a professional development tool for care providers of infants and toddlers. To address these goals, data were analyzed from the Ounce Research Project (ORP), an intervention study examining the effects of the Ounce Scale™ on child care providers and parents of infants and toddlers. It was hypothesized that (a) provider characteristics including knowledge, attitudes, beliefs and complexity of thought regarding child behavior would be positively associated with, and predictive of, caregiving behavior as reflected in the provider-child relationship; (b) use of the Ounce Scale™ would deepen providers' complexity of thought regarding children's behavior; and (c) use of the Ounce Scale™ would improve the provider's caregiving behavior as reflected in the provider-child relationship. The logic model underlying these hypotheses is shown in Figure 1.

Method

The current study examined data collected as part of the Ounce Research Project (ORP)⁹, a longitudinal randomized control intervention study examining the use of the Ounce Scale™ by child care providers and parents of infants and toddlers throughout Minnesota. Providers randomly assigned to the intervention group received training in using the Ounce Scale™ according to a training model developed specifically for ORP, which included four in-person class sessions over the course of six months and follow-up contacts with an Ounce trainer over the next six months, while the provider actively practiced using the Ounce Scale™ with one (initially) or two (after six months) children

⁹ The Ounce Research Project (ORP) was funded by grants from the McKnight Foundation and the United Way.

in their own care setting. Providers randomly assigned to the control group were given vouchers to attend pre-existing Ounce Scale™ training sessions after the completion of the study.

A pre-post-post study design was used, in which data were collected at three time points: baseline, post-training (approximately six months later), and post-follow-up (approximately six months after post-training), herein referred to as Time 1, 2, and 3. At each data collection point, providers and parents were mailed a packet of questionnaires to complete. In addition, community-based data collectors conducted and recorded a brief phone interview and scheduled a visit to the child care setting, where they videoed the focal child for 30-45 minutes.¹⁰ Providers and parents received gift cards of increasing value at each time point as incentives to participate throughout the study.

Participants

In the Ounce Research Project, data were collected from four sources: the training coordinator, trainers, providers, and parents. Twelve female trainers (ages 38-59; 11 Caucasian) participated in the project. All trainers had previous experience working with the Ounce Scale™, direct experience working in early care and education

¹⁰ Every attempt was made to standardize the timing of observations, within reason. Data collectors were to visit in the morning, during a time when the infant or toddler was not expected to be sleeping and when the enrolled provider would be free to interact with them as usual (e.g., center providers were not on break, planning curriculum, etc.).

programs, experience providing on-site consultation, coaching or mentoring for early care and education staff, and were otherwise shown to be well-qualified.¹¹

Providers were recruited via flyers, email, and direct mailings from child care resource and referral agencies and various early childhood and child care newsletters. A total of 242 providers contacted the project to express interest in participating, with 122 of them meeting all eligibility criteria¹² and remaining interested after speaking with project staff. Thus, providers were randomly assigned from a pool of 122 eligible providers to the Ounce-now (intervention) or Ounce-later (control) group (65 intervention, 57 control). The control group was offered the opportunity to receive training on the Ounce Scale™ after they completed their participation in the study.

¹¹ Trainers were recruited and selected for the study by the training coordinator, based on geographic spread around the state, experience, access to internet/e-mail, ability to follow study protocol and commitment to participate for a full year.

¹² Providers were eligible for the study if they met the following criteria: had interest in learning how to use the Ounce Scale™; were willing to attend the four training sessions required to learn to use it; were willing to stay engaged in ORP for the full 12 months; had at least two children under the age of 2½ who were in direct care for at least 20 hours per week, who were not the provider's own children, who would stay in the care setting for 6-12 months, and whose parents were very likely to want to participate in the project as well; were willing to be randomly assigned to the intervention or control group and possibly receive Ounce training immediately or in the following year; and were willing to participate fully in all data collection activities.

Due to attrition¹³ in the recruitment and initial training phases, the study began with 98 providers (59 family, 39 center; 45 intervention, 53 control) in twelve sites (four in a large metropolitan area and eight outstate). At Time 3, there were 76 providers remaining (47 family, 29 center; 41 intervention, 35 control). Rates of attrition from Time 1 to Time 3 were similar between family and center providers, and attrition analyses revealed no additional significant differences.¹⁴

The 98 participating providers ranged in age from 21 to 65 (median age = 37.5). Among the entire sample, 97 providers were female; the one male was a family provider. Caucasians comprised 95-96% of the overall sample and each subgroup. Providers had worked in the child care field for an average of 11.2 years since age 18, and had received an average of 22.7 hours of training specific to infants/toddlers. This was a relatively¹⁵ well-educated, middle-class sample, with 35.4% having earned a

¹³ Reasons for provider attrition varied, ranging from provider leaving her position, to child leaving the setting, provider having family issues that made it difficult to continue, etc. Analyses revealed no significant differences between those that left the study and those that remained, aside from education: those who left the study were more highly educated than those that remained.

¹⁴ There were no differences in their knowledge about infant development, their perceptions of their relationships with the parents of the focal child, their beliefs about child rearing and child development, or their motivation to be a child care provider.

¹⁵ Several studies indicate that the overall education level of the early childhood workforce is not high, as only 20-30% of center teachers, and 10-15% of family providers have a bachelor's degree or higher; those degrees are not necessarily related to education or child development (Brandon & Martinez-Beck, 2006).

bachelor's degree and 28% a two-year college degree. Household incomes fell mostly in the \$20,000 to \$80,000 range, with 23% at \$20-40,000, 20% at \$40-60,000, and 21% at \$60-80,000. (See Table 1 and Table 2 for additional demographic information.)

Children were selected by providers based on meeting study criteria (e.g., correct age range), and the provider's belief that s/he would be able to work with the parent and that the family would be able to participate for the entire length of the project. All providers began with one focal child for the first six months and were asked to add a second focal child for the second six months (while continuing with the first child). Thus, there are two cohorts of children/parents in the ORP sample—Cohort 1, which participated in ORP for the full year, and Cohort 2, which participated in ORP for the second six months. Data were collected from parents of focal children at three time points (Cohort 1) or two time points (Cohort 2). Data from providers were collected at all three time points. The current study focuses on data collected regarding providers and their interactions with Cohort 1 children.

Measures

Demographic data were collected via questionnaire from providers at Time 1. Participants provided answers to questions regarding education, income, hours and types of training, age, racial/ethnic background, experience in child care, provider type (family- or center-based), intention to remain in the field, number of children present in home/classroom at one time (group size), age of the focal child (infant or toddler), sources of support for caregiving, whether they had a paid assistant, memberships in professional organizations, and pre-existing knowledge of infant development. In

addition to the demographic questionnaire, providers completed questionnaires asking about their attitudes and beliefs about caregiving, perceived influence on children's development, and knowledge about infant development. They also participated in audio-recorded phone interviews (speech samples) to measure complexity of thought regarding child behavior, and were observed (and videoed) in their own setting to measure caregiving behavior.

Education, training, activities and supports. The demographic questionnaire included questions about the provider's level of education, types of specialized training they had taken, whether or not they had a paid assistant, sources of informal and formal supports for caregiving, and membership in professional organizations. Numerical values were assigned to education levels ranging from 1 (8th grade or less) to 9 (MA/MS degree or higher). Scores in our sample ranged from 3 to 9, with scores of 7 and 8 the most common (two-year college degree, BA/BS or higher), followed by scores of 3 and 4 (graduated high school, and some college). Providers were asked if they had any specialized infant/toddler training and then indicated which types from a list of five common trainings offered in the area, with space to write-in up to three additional trainings. Thus, scores for types of training ranged from 0 to 8; on average, providers had attended about three trainings each. Less than half the sample (42.7%) reported having a "paid, regular assistant" to help with child care duties. Sources of informal and formal supports for caregiving were calculated by totaling the number of sources endorsed from a list of common sources such as "resource and referral agency." The majority of providers (73%) indicated having 2-4 sources of support. Forty-two percent

of providers indicated that they did not belong to any professional organizations; 21% belonged to one, 23% belonged to two, and 10% belonged to three or more. Complete demographic data by whole sample and by intervention and control group are shown in Table 1 (categorical variables) and Table 2 (scale variables).

Knowledge of infant development. The Knowledge of Infant Development Inventory (MacPhee, 1983) is a self-report questionnaire assessing basic knowledge of infant and toddler development. For each statement, participants indicate whether they agree, disagree, or are not sure. Scores for both accuracy and confidence in knowledge are computed; for these analyses a combined score of the percentage accurate multiplied by the percentage attempted was used. Scores range from 0 to 1, with higher scores indicating more knowledge and confidence. Items measure basic knowledge of all domains of infant development, as well as practical caregiving knowledge, and include statements such as “Infants understand only words they can say,” and “The baby’s personality or temperament is set by 6 months of age; it doesn’t change much after that.”

Attitudes and beliefs about caregiving. Several questionnaires were used to assess provider’s attitudes and beliefs about a variety of aspects of caregiving; these measures are summarized below, with more detailed descriptions of each in Appendix A. Descriptive statistics for each measure are given in Table 3.

The Parent Modernity Scale (Schaefer & Edgerton, 1985) is a 16-item scale that measures providers’ “traditional” (or authoritarian) and “progressive” (or child-

centered) views regarding the care of children. A higher total score represents more traditional, adult-centered child rearing beliefs.

Intrinsic motivation for caregiving and dissatisfaction with caregiving were measured with several items adapted from a questionnaire used with early childhood providers in a study by Kontos, Howes, Shinn, and Galinsky (1995). Providers rated each item on a 5-point scale, ranging from 1 (not at all the way that I feel) to 5 (exactly the way that I feel). Scores on each subscale were totaled, with higher scores on intrinsic motivation indicating more motivation to be a child care provider and higher scores on dissatisfaction indicating more dissatisfaction with being a child care provider.

The Family Activities Inventory (Harper & Parry, 1999) is a self-report questionnaire measuring perceived caregiving skills, beliefs, and practices from a strength-based perspective. One section, measuring perceived caregiving skill, was used in the current study. Higher scores indicate that the provider perceives her/himself to be more skilled than the average caregiver.

The Luster Parent Opinion Survey (Luster, 1985), a self-report questionnaire measuring beliefs about children and caregiving, was used to measure a variety of attitudes and beliefs about caregiving. Five of the six subscales on the Luster were used: beliefs about spoiling, freedom to explore, discipline and control, perceived influence, and perceived competence. Higher scores on beliefs about spoiling indicate a strong belief that children can be spoiled by too much attention and affection. Higher scores on beliefs about freedom to explore indicate the belief that infants should be free to explore

their environment. Higher scores on beliefs about discipline and control indicate belief in the importance of strict discipline and self-control. Higher scores on perceived influence indicate the perception that caregivers do influence children's development and outcomes (as opposed to luck or fate). Higher scores on perceived competence indicate that the provider perceives her/himself to be a competent and knowledgeable care provider.

Complexity of thought regarding child behavior. Largely unstructured speech samples were obtained via phone conversations with parents and providers participating in the Ounce Research Project. Parents and providers were asked to speak for about five minutes about the focal infant or toddler so that researchers could “get to know the child.” Speech samples were coded using a system developed for ORP (as described in Pleuss, Susman-Stillman, & Shkolnik, 2009 and included in Appendix B), which assesses the speaker's complexity of thought regarding the child. Coding was completed by two of the coding system developers, with reliability checks on approximately 12% of the speech samples. The two coders' scores were significantly correlated at .89 ($p < .001$), with no significant difference in mean scores. The purpose of this coding system is to capture aspects of adult thoughts and attitudes that underlie the adult-child relationship and adult-child interaction, and the extent to which those thoughts and attitudes reflect a continuum of complexity of adult thinking in relation to infant and toddler development. To code speech samples, transcripts are analyzed and broken down into thought units—statements or parts of statements conveying a single thought or idea—which are coded as falling within a category (child description, adult practices

with the child, goal, or priority) and level (1, 2, or 3), and may be connected to each other. A chart of each speech sample is then created which diagrams the thoughts and connections (see Figure 2); quantitative scores are also assigned, with higher scores indicating more complexity of thought. Speech samples were collected from 87 providers at Time 1, 73 providers at Time 2, and 54 providers at Time 3. In our sample, scores ranged from 5 to 227, with overall means of 91.5, 87.8, and 79.3 at Time 1, 2, and 3, respectively. See Appendix B for more details about the speech sample coding system.

Caregiving behavior. Providers and the focal children were videotaped in their regular child care settings for 30-45 minutes, participating in activities and interacting with each other as they normally would. When necessary, data collectors followed the focal children to insure full observation of their activities and interactions during that time. Interactions were videotaped for 70 provider-child pairs at Time 1, 74 at Time 2, and 52 at Time 3. Two videos were excluded from analysis, as the providers did not interact enough with the child to allow for coding of emotional availability, due to secondary providers (e.g., assistant teachers in centers) being “on duty” with the focal children during those videotaped segments. Thus, a total of 70 (Time 1), 73 (Time 2), and 51 (Time 3) observations were included in analyses.

Observations were coded using the 4th edition of the Emotional Availability (EA) Scales (Biringen, 2008) by two coders trained to reliability by the author of the scales. Reliability checks were conducted on approximately 18% of the videos. Reliability was calculated by comparing coders’ scores on each subscale, testing for

mean differences and strength of correlation. Correlations between coders ranged from .658 on nonintrusiveness to .747 on the emotional availability total score (all correlations were statistically significant; $p < .001$); the only subscale with a significant mean difference between coders was involvement ($p = .013$). The emotional availability scales assess six dimensions of the emotional availability present in the dyadic interaction between a parent (or other caregiver) and child. Though originally developed for use with parents and children, the emotional availability scales are also applicable to other dyads (Biringen, 2008) and have been used with child care providers (e.g., Shivers, 2008; Biringen, et al., 2008; Zimmerman & McDonald, 1995). Although all scales are dyadic in nature, the first four emphasize the role of the adult in the relationship, whereas the last two emphasize the child. Each scale is scored from 7 to 29, with lower scores indicating poorer emotional availability in the dyad. When interpreting results, scores of 20 and above were considered to indicate “good enough” caregiving, with 27 and above indicating very high quality on each particular scale.

Adult sensitivity. To score high on sensitivity, the emotional communication in the dyad is generally affectively positive, with the adult aware of the child’s signals and responding appropriately to them. High sensitivity is also marked by awareness of timing (e.g., waiting for the child to finish an activity before directing them to another), flexibility in play or interaction, acceptance and respect of the child, fairly frequent interaction (given the context), and an ability to skillfully resolve conflicts or to avoid them altogether. In our sample, average scores for sensitivity were 25.7 at Time 1, 25.6 at Time 2, and 25.3 at Time 3.

Adult structuring. A high score on structuring indicates that the adult is able to provide appropriate guidance and suggestions, successfully scaffolding the child's environment. High-scoring providers tend to use just the right amount of structure, are able to set limits and remain firm as needed, flexibly use both verbal and nonverbal means to guide the child, and consistently behave in the adult role (i.e., no role-reversal or peer-like behaviors). In our sample, average scores for structuring were 25.7 at Time 1, 25.6 at Time 2, and 25.6 at Time 3.

Adult nonintrusiveness. The nonintrusive adult is one who follows the child's lead, interacting without interrupting, which results in a spacious and comfortable interaction. Additionally, a high score on nonintrusiveness indicates that the adult avoids constantly directing the child's activities, talks as a means to communicate rather than overpower or command, incorporates teaching and learning in a relational rather than didactic way, only interferes with the child when necessary (e.g., stopping one child from hurting another), and that there is no indication from the child that the adult is intrusive. In our sample, average scores for nonintrusiveness were 24.7 at Time 1, 24.6 at Time 2, and 25.0 at Time 3.

Adult nonhostility. To score high on nonhostility, the adult must lack hostility in action, words, and physical gestures, treat the child with respect, and cultivate a nonhostile environment. Some slight signs of covert hostility may be present in "good enough" scores (e.g., subtle gestures or postures indicating boredom, rolling of the eyes), whereas more obvious signs such as tension-filled silence would warrant a lower score. Signs of overt hostility such as ridiculing or angry verbal statements, rough

handling of the child, or losing composure easily warrant a low score on nonhostility. In our sample, average scores for nonhostility were 27.0 at Time 1, 27.0 at Time 2, and 26.5 at Time 3.

Child responsiveness. The child responsiveness scale is the counterpart to the adult sensitivity scale, in that it also measures appropriateness of affect, as well as ability to regulate emotion and behavior, and how well the child responds to the adult. Both over-responsiveness and under-responsiveness yield lower scores, as they indicate either the presence of anxiety, in which the child is overly eager to please the adult, or a more detached relationship, in which the child is not interested in interacting with the adult. Children who show age-appropriate autonomy, appropriate physical contact with the adult (again, neither too much nor too little), do not take on the caregiver role (no role-reversal), do not avoid the caregiver, and are not overly task-oriented (to the exclusion of the adult), score high in responsiveness. In our sample, average scores for responsiveness were 25.8 at Time 1, 26.6 at Time 2, and 26.0 at Time 3.

Child involvement. This scale examines whether and how the child seeks out interaction with the adult, with the highly involved child showing initiative in beginning and sustaining interactions. Highly involved children seek out the adult when in need or distressed, and are able to use the adult as an emotional base. They lack over-involving qualities such as gaining attention via negative behaviors, and are flexible in their ability to signal the adult, using eye contact, physical positioning, and verbal bids to

invite the adult into interaction. In our sample, average scores for involvement¹⁶ were 22.1 at Time 1, 23.1 at Time 2, and 23.0 at Time 3.

Overall emotional availability. For the purposes of this study, a summary score was created to encompass all of the above aspects of emotional availability in the dyad. Each of the six scales was summed to create one total score, ranging from 42 to 174, with 120 and above as a rough indicator of “good enough” emotional availability, and 162 and above indicating very high quality. In our sample, average scores for overall emotional availability were 150.9 at Time 1, 152.5 at Time 2, and 151.4 at Time 3.

One of the most important indicators of process quality for care of infants and toddlers is the relationship between individual children and the care provider; therefore, the emotional availability scales are appropriate as a marker of the general quality of caregiving behavior, as they assess this important and over-arching aspect of infant and toddler caregiving. As shown in Table 3, our sample as a whole, including intervention and control subgroups, had mean scores that were “good enough” or better on all emotional availability scales at all three time points.

Results

Planned analyses addressed three hypotheses: 1) knowledge, attitudes and beliefs about caregiving, and complexity of thought regarding child behavior would be

¹⁶ Child involvement scores are more affected by age than the other subscales of the Emotional Availability Scale, in that young infants are less able to initiate interaction than older infants, toddlers, and young children. This may be one reason that the average scores on involvement are lower for our sample than the other subscales.

positively associated with, and predictive of, caregiving behavior, 2) participating in this form of professional development would deepen providers' complexity of thought regarding children's behavior, and 3) participating in this form of professional development would also improve providers' actual caregiving behavior as reflected in the provider-child relationship. Additional analyses were conducted to further investigate the role of provider characteristics in caregiving quality over time and in how the Ounce Scale™ intervention was received.

Overall Analytic Strategy

The potential relationship between knowledge, attitudes and beliefs about caregiving, and complexity of thought regarding child behavior and actual caregiving behavior, as reflected in the provider-child relationship, was examined first. Both concurrent and future predictive relationships were examined. It was expected that knowledge of infant development (measured by the KIDI), attitudes and beliefs about caregiving (measured by the Parent Modernity Scale, untitled questionnaire from Kontos et al. (1995), Luster Parent Opinion Survey, and the perceived caregiving section of the Family Activities Inventory), and complexity of thought regarding child behavior (as measured by speech sample analysis), would be predictive of both concurrent and future caregiving behavior (measured by the Emotional Availability Scales) for care providers of infants and toddlers (Hypothesis 1). This hypothesis was addressed using multiple linear regressions to examine concurrent prediction, and linear mixed models to examine prediction of caregiving behavior over time.

Second, the effects of the intervention were investigated. It was expected that learning and using the Ounce Scale™ would deepen providers' complexity of thought regarding child behavior (Hypothesis 2), as well as improve their actual caregiving behavior as reflected in the provider-child relationship (Hypothesis 3). The second and third hypotheses were addressed using linear mixed models to examine longitudinal patterns of change over time, with speech sample scores and emotional availability scores (respectively) as outcome variables. Finally, follow-up linear mixed models using additional predictors were run to examine the potential impact of provider type (family versus center), knowledge, attitudes and beliefs about caregiving, and complexity of thought regarding child behavior on how the intervention was received by providers.

Descriptive Statistics

Descriptive statistics were calculated at Time 1 for the entire sample and by intervention group status to describe the data, confirm assumptions of normality required for inferential statistical analyses, and in order to make decisions regarding specific covariates to include in other analyses. Results are shown in Table 3. After examining distributions, data (continuous variables) were considered to meet the assumptions of normality.

Hypothesis 1

Hypothesis 1 posited that knowledge of infant development, attitudes and beliefs about caregiving, and complexity of thought regarding child behavior would be positively associated with, and predictive of, caregiving behavior. Concurrent prediction

was assessed using multiple linear regression analyses; prediction over time was assessed using linear mixed models.

Regression analyses. Concurrent predictions related to the first hypothesis were addressed using multiple linear regression with Time 1 data for the sample as a whole. Bivariate correlations between all Time 1 predictor variables with emotional availability at Time 1 are shown in Table 4. Complexity of thought regarding child behavior was positively correlated with each emotional availability score (range of r from .286 to .378; $p < .05$), as was knowledge of infant development (range of r from .242 to .433; $p < .05$). Additionally, two subscales of the Luster Parent Opinion Survey were correlated with subscales of the Emotional Availability Scale. The beliefs about spoiling subscale was negatively correlated with emotional availability total scores, nonintrusiveness, and nonhostility (range of r from -.275 to -.398; $p < .05$). The perceived influence subscale was positively correlated with the nonhostility subscale of emotional availability ($r = .333$; $p = .006$).

Regression models were run for each subscale of the Emotional Availability Scales and overall emotional availability score. Potential predictors included: knowledge of infant development, traditionalism of child-rearing beliefs, intrinsic motivation for caregiving, dissatisfaction with caregiving, perceived caregiving skill, beliefs about spoiling children, beliefs about freedom to explore, beliefs about discipline and control, beliefs about talking with children, perceived caregiver influence, perceived caregiving competence, and complexity of thought regarding child behavior. It was expected that knowledge would contribute to caregiving behavior. For

each model, therefore, knowledge scores were entered first and the remaining predictors were then entered stepwise. In models where knowledge was not a significant predictor, it was dropped and the model was then run with all predictors entered stepwise.

Knowledge of infant development and complexity of thought regarding child behavior were consistent predictors of caregiving behavior. In combination, these two predictors accounted for 22.2% of the variance in emotional availability overall ($F(2, 58) = 9.58, p = .01; R^2_{adj} = .222$), 18.4% of the variance in adult sensitivity ($F(2, 58) = 7.79, p = .001; R^2_{adj} = .184$), and 19.5% of the variance in adult structuring ($F(2, 58) = 8.28, p = .001; R^2_{adj} = .195$). Knowledge alone accounted for 8.7% of the variance in adult nonhostility ($R = .32, F(1, 59) = 6.73, p < .05; R^2_{adj} = .087$), and complexity of thought alone accounted for 7.8% and 8.9%, respectively, of the variance in child responsiveness ($R = .31, F(1, 59) = 6.06, p = .017; R^2_{adj} = .078$) and child involvement ($R = .32, F(1, 59) = 6.90, p = .011; R^2_{adj} = .089$). The only additional significant predictor, aside from knowledge of infant development and complexity of thought regarding child behavior, was provider beliefs about spoiling. In combination, these three predictors accounted for 28.5% of the variance in adult nonintrusiveness ($F(3, 57) = 8.99, p < .001; R^2_{adj} = .285$). Table 5 summarizes regression analyses with multiple predictors.

Longitudinal analyses. To examine the relationship between knowledge, attitudes and beliefs about caregiving, and complexity of thought regarding child behavior with caregiving behavior over time, growth curve modeling was used in the form of linear mixed models (LMMs; Fitzmaurice, Laird, & Ware, 2004, Chapter 8)

using the PROC MIXED procedure in SAS¹⁷. Growth curves were fit for emotional availability scores, first with no predictor and then with scores on knowledge, attitudes and beliefs, and complexity of thought measures as predictors. For all LMMs, restricted maximum likelihood estimation was used, under the assumption that missing data were missing at random (Fitzmaurice et al., 2004, Chapter 4). When graphing results for models with no predictor or using only qualitative¹⁸ predictors (e.g., by intervention group status), each line represents the group mean score on the outcome in question, with time progressing from left to right along the horizontal (x) axis. When graphing results for models using quantitative predictors, graphing is more complex as the LMM approach allows analysis of continuous variables without forcing categorization upon them. On these more complex graphs, the range of trajectories predicted for each group is shown with shading, and lines indicate the extremes (minimum and maximum) and mean for each group.

Unconditional models. First, unconditional quadratic models were run on each emotional availability score, in order to identify overall patterns of change in caregiving behavior in the entire sample. Means suggested there may be nonlinear change present,

¹⁷ The longitudinal data analysis for this paper was generated using SAS software, Version 9.2 of the SAS System for Windows. Copyright © 2008 SAS Institute Inc. SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc., Cary, NC, USA.

¹⁸ In terms of predictors for linear mixed models, “qualitative” refers to any predictor variable that can take on only a limited number of discrete values (i.e., is categorical, such as control and intervention groups) and “quantitative” refers to any predictor variable that can take on a range of values (i.e., is continuous, such as KIDI scores).

so quadratic models were created by squaring the time metric in the model to account for nonlinear change. However, quadratic terms were not statistically significant in any of the unconditional models, so the quadratic terms were dropped, simple linear models were run in order to assess linear change. Caregiving behavior was quite stable over time for the entire sample—no significant change, quadratic or linear, was seen in any of the emotional availability measures when looking at the sample as a whole.

Conditional models by knowledge, attitudes and beliefs, and complexity of thought regarding child behavior. Linear mixed models (using SAS PROC MIXED) were used to test main effects of Time 1 scores for each aspect of knowledge, attitudes and beliefs regarding caregiving, and complexity of thought regarding child behavior on score trajectories over time for each subscale of the Emotional Availability Scales, while controlling for intervention group status.

Analyses revealed that knowledge at Time 1 is predictive of overall emotional availability ($p = .002$; shown in Figure 3) and five emotional availability subscales. Those in our sample with the lowest KIDI scores had consistently lower scores on sensitivity ($p = .004$), nonintrusiveness ($p < .001$), nonhostility ($p = .007$), responsiveness ($p = .033$), and involvement ($p = .023$) over time than those with average or high KIDI scores. Figure 4 shows this pattern.

Provider's complexity of thought regarding child behavior (speech sample scores) predicted change in caregiver emotional availability overall ($p = .036$), nonintrusiveness ($p = .003$), child responsiveness ($p = .046$), and child involvement ($p = .022$) over time. In each of these interactions, emotional availability scores are

significantly different as a function of complexity of thought at intercept (i.e., Time 1, $p = .011, .002, .015,$ and $.013,$ respectively), and then proceed to follow different trajectories of change. Providers with the highest complexity of thought scores have the highest emotional availability scores at Time 1, with those scores decreasing over time, whereas those with the lowest complexity of thought scores have the lowest emotional availability scores at Time 1 but appear to increase over time, creating an overall impression of regression to the mean, as shown in Figure 5 and Figure 6. In addition, complexity of thought predicted difference in intercept but not change over time for sensitivity ($p = .023$) and structuring ($p = .029$), also shown in Figure 6.

In addition to knowledge about infant development, traditionalism of beliefs about caregiving, beliefs about spoiling, and dissatisfaction with caregiving also influenced caregiving behavior. Providers with very traditional beliefs at Time 1 were more intrusive in their caregiving relationships ($p = .036$ for intercept). Concerns about “spoiling” children with too much attention or affection was predictive of more hostile caregiving ($p = .036$) and more intrusive caregiving ($p = .002$ for intercept, $p = .005$ for linear slope; see Figure 7), though the degree of difference in intrusiveness disappears over time. Dissatisfaction with caregiving at Time 1 showed a particularly interesting pattern, in that there appear to be no differences in caregiving behavior at Time 1, but over time those providers who are less satisfied became more hostile in their caregiving ($p = .004$; see Figure 8).

Summary of Hypothesis 1 findings. Hypothesis 1 was partially supported, as some knowledge, attitudes and beliefs predicted some aspects of caregiving behavior.

Knowledge of infant development and complexity of thought regarding children's behavior accounted for much of the variance seen in caregiving behavior. Knowledge of infant development was predictive of multiple aspects of concurrent caregiving behavior, including overall emotional availability, sensitivity, structuring, nonintrusiveness, and nonhostility, as well as multiple aspects of future caregiving behavior, including overall emotional availability, sensitivity, nonintrusiveness, nonhostility, responsiveness, and involvement. Complexity of thought regarding children's behavior was predictive of all aspects of concurrent and future caregiving behavior except nonhostility. Beliefs about spoiling predicted future (but not concurrent) nonhostility as well as both concurrent and future nonintrusiveness. Traditionalism of beliefs predicted future (but not concurrent) intrusiveness. Dissatisfaction with caregiving predicted future (but not concurrent) nonhostility. Other attitudes and beliefs including intrinsic motivation for caregiving, perceived caregiving skill, beliefs regarding freedom to explore, beliefs regarding discipline and control, perceived influence and perceived competence did not predict any aspects of either concurrent or future caregiving behavior. These findings are summarized in Table 6.

Hypothesis 2

Hypothesis 2 posited that learning and using the Ounce Scale™ would deepen providers' complexity of thought regarding children's behavior. Ounce and control groups were first compared to ensure random assignment was successful. The hypothesis was then tested longitudinally, using linear mixed models with intervention

group status as a qualitative predictor and speech sample scores as the outcome measure.

Intervention versus control group comparisons. Providers were randomly assigned to the intervention or control group. To ensure that randomization worked (i.e., that groups did not differ systematically in relevant ways), intervention and control group providers were compared on all demographic and predictor variables at Time 1. Chi-square comparisons revealed no significant difference between intervention and control providers in whether or not they had specialized early childhood education or training or whether they had infants versus toddlers enrolled in the study. Mann-Whitney *U* tests revealed no significant differences between groups in education level or intention to continue working in the child care field. Independent sample *t*-tests revealed no differences in hours of infant/toddler-specific training, group size, years of experience in the child care field, age of provider, membership in professional organizations, or in sources of child care support and information. Independent sample *t*-tests were conducted to evaluate any pre-existing group difference in knowledge of infant development, caregiving attitudes and beliefs, complexity of thought regarding child behavior, and emotional availability scores. Intervention and control providers differed in levels of dissatisfaction at Time 1, with intervention providers more dissatisfied (mean = 3.17) than control providers (mean = 2.25; $p < .05$). They did not differ on any other measures of knowledge, attitudes, or beliefs about caregiving, or on complexity of thought regarding child behavior (speech samples). Intervention and control providers also did not differ in emotional availability scores at Time 1. As the

only significant difference between intervention and control providers was in dissatisfaction toward caregiving, random assignment was considered successful. Because the difference in dissatisfaction puts the intervention providers at a presumable disadvantage in terms of showing positive intervention effects, this was not controlled for in subsequent analyses.

Longitudinal analyses. To examine the relationship between intervention group status and complexity of thought regarding child behavior, growth curve modeling in the form of linear mixed models was used, as described earlier. First, unconditional quadratic models were run in order to identify overall patterns of change in complexity of thought regarding child behavior for the sample as a whole. Means suggested there may be nonlinear change present, so quadratic models were created by squaring the time metric in the model to account for nonlinear change. However, quadratic terms were not statistically significant in any of the models, so the quadratic terms were dropped and simple linear models were run in order to assess linear change. Complexity of thought scores did show linear change, with scores decreasing over time for the sample as a whole ($p = .02$). Intervention group status was then used as a qualitative predictor to test the hypothesis.

Conditional models by intervention group status. Quadratic models were run on complexity of thought regarding child behavior, conditional by intervention group status, to assess any differences in quadratic trend between the intervention and control groups. There was no significant difference in quadratic change over time between intervention and control groups. Because the quadratic term was not significant, it was

dropped from the model and linear change was examined. In a simple linear model no significant difference was found between the intervention and control groups on complexity of thought regarding child behavior.

Summary of Hypothesis 2 findings. Hypothesis 2 was not supported. No significant difference was found in intercept or trajectory of complexity of thought regarding child behavior between the intervention and control groups. This finding is included in Table 7.

Hypothesis 3

Hypothesis 3 posited that learning and using the Ounce Scale™ would improve providers' actual caregiving behavior as reflected in the provider-child relationship. This hypothesis was assessed longitudinally, using linear mixed models with intervention group status as a qualitative predictor and emotional availability scores as the outcome measures. Additional analyses were then conducted to further investigate the role of provider characteristics including provider type (family- versus center-based), knowledge, attitudes and beliefs about caregiving, and complexity of thought regarding child behavior, in predicting caregiving quality over time and in how the Ounce Scale™ intervention was received.

Longitudinal analyses. To examine the relationship between intervention group status and caregiving behavior over time, growth curve modeling was used in the form of linear mixed models, as described earlier. Separate growth curves were fit for each outcome variable, including the total emotional availability score and scores on the individual emotional availability scales of sensitivity, structuring, nonintrusiveness,

nonhostility, responsiveness, and involvement. Intervention group status was used as a qualitative predictor.

Conditional models by intervention group status. Quadratic models were run on caregiving behavior, conditional by intervention group status, to assess any differences in quadratic trend between the intervention and control groups. Responsiveness scores did have significantly different patterns of quadratic change between intervention and control providers ($p = .014$). Responsiveness scores for the control group showed slight gradual increase over time, while for the intervention group they showed an inverted U pattern (scores increased then decreased), as shown in Figure 9. The quadratic term was dropped to run linear models for emotional availability overall, sensitivity, structuring, nonintrusiveness, nonhostility, and involvement. None of these showed significant differences between the intervention and control groups in quadratic trend, linear trend, or intercept.

Additional Longitudinal Intervention Analyses

Key characteristics of the provider, including whether they provide care in a family-based or center-based setting, their knowledge, attitudes and beliefs about caregiving, and complexity of thought regarding child behavior, might interact with how they receive a professional development intervention such as learning to use the Ounce Scale™. Thus, these were investigated as potential predictors in additional linear mixed model analyses. As provider type had not previously been used as a predictor, the comparability of family- versus center-based providers at Time 1 was assessed first, as well as the main effect of provider type on caregiving behavior over time (via linear

mixed models). Potential interaction effects were then explored between each provider characteristic (provider type, knowledge, attitudes and beliefs, and complexity of thought) and intervention group status by running linear mixed models using multiple predictors.

Center- versus family-based provider comparisons. Center- and family-based providers were compared on all demographic and predictor variables at Time 1 to assess comparability of groups. Chi-square comparisons revealed no significant differences between center- and family-based providers in whether or not they had specialized early childhood education or training, or the age of the focal child participating in the study with them (infant versus toddler). Center providers were more likely to have a paid assistant than family providers (69% of center providers versus 24.6% of family providers had a paid assistant; $\chi^2 = 18.88$; $p < .001$). Mann-Whitney U tests were used to evaluate any possible difference in education level or intention to continue working in the child care field. No difference was found in intent to continue work in child care, but center-based providers were significantly more educated than family-based providers, $z = -2.66$, $p < .008$ (center-based providers had a mean rank of 57.29, while family-based providers had a mean rank of 42.48). Independent sample t -tests revealed that family-based providers were significantly older than center-based providers (means of 41.5 and 36.5 years; $p = .032$). Family-based providers belonged to more professional organizations related to child care (means of 1.54 and 0.46; $p < .001$), identified more sources of child care support and information than center-based providers (means of 3.28 and 2.69; $p = .027$), and had attended more types of

infant/toddler training (means of 1.54 and .46; $p = .003$). No differences were found in hours of infant/toddler-specific training, group size, years of experience in the child care field, or pre-existing knowledge of infant development. Independent sample t -tests were conducted to evaluate any possible difference on the measures of knowledge, caregiving attitudes and beliefs, complexity of thought regarding child behavior, and emotional availability scores. Center- and family-based providers did not differ significantly from each other at Time 1 on knowledge of infant development, any of the attitude and belief measures, or on complexity of thought regarding child behavior. There were significant differences between center- and family-based providers on two subscales of emotional availability. Both showed the same pattern of higher mean scores for family-based providers: child responsiveness (means of 24.10 and 26.71; $p = .007$) and child involvement (means of 20.36 and 23.10; $p = .002$).

Conditional models by provider type. Quadratic linear mixed models were first run on the outcome variables, conditional by provider type, to assess any differences in quadratic trend between center- and family-based providers. Speech sample scores were higher for family-based providers ($p < .001$) at the intercept (Time 1), and though both center- and family-based provider scores decreased over time, the quadratic trajectories were significantly different ($p < .001$). Quadratic terms of the emotional availability models were not significant, so linear models were run to examine differences in linear change over time. There were significant differences between family- and center-based providers on emotional availability total scores, sensitivity, structuring, responsiveness, and involvement, as follows.

Emotional availability total scores differed between center- and family-based providers in linear change over time ($p = .005$), with center-based provider scores beginning marginally lower than family-based providers ($p = .058$) and increasing over time, while family-based provider scores decreased over time. Four of the emotional availability subscales—sensitivity, structuring, responsiveness, and involvement—showed similar patterns of change, with significantly different, criss-crossing, linear trajectories for each outcome ($p = .035$ for sensitivity, $p = .025$ for structuring, $p = .001$ for responsiveness, $p = .002$ involvement). In addition to significant trajectory differences, the intercepts for responsiveness and involvement were also significantly different ($p = .003$ for responsiveness, $p < .001$ for involvement). Graphs depicting these patterns for the four subscales are shown in Figure 10.

Conditional interaction models, provider type by intervention. As center- and family-based providers were shown to differ in many respects, I tested whether provider type interacted with intervention group status in predicting caregiving over time. Results of interaction models including both provider type and intervention group status as predictors revealed several significant interaction effects. Provider type and intervention group status interacted to predict change in total emotional availability scores ($p = .018$), with family-based intervention and family-based control providers exhibiting nearly identical, nearly flat trajectories in emotional availability, but center-based intervention and center-based control providers exhibiting an increase in emotional availability over time; center-based control providers scored consistently higher than center-based intervention providers (see Figure 11). Adult sensitivity and

nonhostility, and child responsiveness and involvement, also revealed significant interaction effects of provider type by intervention group status on linear change over time ($p = .023, .046, .045, \text{ and } .024$, respectively). These results are shown in Figure 12.

Conditional interaction models, knowledge, attitudes and beliefs, and complexity of thought, by intervention. The use of linear mixed models allows modeling of change in caregiving over time for groups and individuals. The influence of both qualitative predictors (e.g., intervention group status, provider type), and quantitative predictors (e.g., intrinsic motivation scores) can be modeled, and the interaction of those predictors with each other can be tested. For these analyses combining two predictors, separate growth curves were fit for each outcome variable, including the total emotional availability score, and individual emotional availability scales of sensitivity, structuring, nonhostility, nonintrusiveness, responsiveness and involvement. On these complex graphs, one set of lines and shading represents intervention group providers' emotional availability scores as a function of their knowledge, attitude, belief, or complexity of thought score (minimum, maximum, and mean predictor scores indicated with lines). The other set of lines and shading in each graph represents the same for control providers; in all graphs time progresses from left to right.

To examine the role that knowledge, attitudes and beliefs, and complexity of thought play in affecting how the intervention was received, linear mixed models were run testing the interaction of intervention group status with each specific measure of a provider characteristic. Several significant interactions were found for a variety of

predictors. The most consistent statistically significant predictor was perceived influence of caregiving, in interaction intervention group status.

The provider's perceived influence on children's development (a subscale of the Luster Parent Opinion Survey) interacted with intervention group status in predicting change in caregiver sensitivity ($p = .025$ for intercept, $p = .01$ for linear slope), structuring ($p = .002$ for intercept, $p = .011$ for quadratic slope), and nonintrusiveness ($p < .001$ for intercept, $p = .002$ for linear slope) over time. In each of these interactions, intervention and control providers showed differences at intercept (i.e., Time 1), and then proceeded to follow very different trajectories of change. It appears that providers with extreme scores on perceived influence—particularly those who do not perceive caregivers as having much influence over children's development—have strikingly different caregiving behavior over time, and respond to the Ounce Scale™ intervention differently than those with more moderate views (e.g., see Figure 13). Perceived influence also interacted with intervention group status in predicting the intercept, but not change over time, of emotional availability total scores ($p = .01$ for intercept; linear slope was marginal at $p = .056$) and nonhostility ($p = .013$, see Figure 13).

Several other predictors affected specific aspects of emotional availability, in interaction with intervention group status. Provider knowledge interacted with intervention group status in predicting change in structuring ($p = .012$). Control group providers with different KIDI scores at Time 1 became more similar in structuring behavior over time, whereas intervention group providers with different KIDI scores at Time 1 became less similar over time (see Figure 14). Provider beliefs about the

possibility of “spoiling” children through too much attention or affection interacted with intervention group status in predicting the quadratic trajectory of structuring scores ($p = .042$), and beliefs about whether infants should have freedom to explore their environment interacted with intervention group status in predicting linear change in both the provider’s nonintrusiveness ($p < .001$) and the child’s involvement with the provider ($p = .028$). For nonintrusiveness, a significant difference in intercept was also found ($p < .001$). No consistent pattern emerged among these scattered findings. Provider characteristics that did not significantly interact with the intervention to affect any aspect of caregiving behavior including traditionalism of child-rearing beliefs, intrinsic motivation for caregiving, dissatisfaction with caregiving, perceived caregiving skill, beliefs regarding discipline and control, beliefs regarding talking and reading, perceived competence, and complexity of thought regarding child behavior.

Summary of Hypothesis 3 and additional intervention analysis findings.

Hypothesis 3 was not supported. No difference in intercept or trajectory was found between intervention and control groups for overall emotional availability, sensitivity, structuring, nonintrusiveness, nonhostility, or involvement. Responsiveness did show a significant difference, but not entirely in the expected direction, as intervention group scores, after first increasing beyond control group scores at Time 2, then returned to baseline at Time 3. However, adding additional predictors to the models revealed that there were several interaction effects involving the intervention and various provider characteristics including provider type, perceived influence, knowledge of infant development, beliefs about spoiling, and beliefs about freedom to explore. Thus it is not

the case that the intervention had no effect on providers, just that it had no main effect. For providers with certain characteristics, the intervention did have an effect, though not always in the predicted direction of improvement. These findings are summarized in Table 7.

Discussion

Summary of Findings

The first hypothesis, that provider knowledge, attitudes and beliefs, and complexity of thought regarding child behavior would predict concurrent caregiving behavior, was only partially supported. Knowledge of infant development consistently played a role in predicting caregiving, as did complexity of thought regarding the focal child. However, none of the other provider attitudes and beliefs predicted concurrent caregiving behavior, including traditionalism of child-rearing beliefs, intrinsic motivation for caregiving, dissatisfaction with caregiving, beliefs about spoiling, beliefs about talking and reading, beliefs about discipline and control, beliefs about freedom to explore, perceived influence and perceived competence. Exploratory analyses did reveal that some predictors—traditionalism of beliefs, beliefs about spoiling, and dissatisfaction—affected aspects of caregiving behavior over time, though not concurrently. Knowledge about infant development proved to be a strong predictor of both concurrent *and* future caregiving.

The second and third hypotheses, regarding effects of using the Ounce Scale™, were not supported. The only outcome to show a significant main effect between the intervention and control groups was child responsiveness, which rose steadily over time

for the control group, but increased sharply and then dropped back to baseline for the intervention group. Thus it seems the intervention had negligible effect on the caregiving behavior of our providers. It is important to note that additional exploratory analyses revealed that the intervention may have had effects, but only for providers with certain characteristics—and not always in the anticipated direction (that of improvement). The intervention may have had positive effects on the caregiving of providers who at Time 1 did not think that infants should be free to explore their environment (low freedom to explore scores) and those who did not think that caregiving has much influence on a child (low scores on perceived influence).

Exploratory analyses revealed that certain characteristics of providers affected how the intervention was received. One such characteristic was provider type. On several outcome measures, including sensitivity, child responsiveness and child involvement, center providers who received the intervention improved over time, while family providers who received the intervention showed a decline. Whether the care provider perceived themselves as having an influential role in the development of children in their care was also a relevant factor, though not in a predictable way across emotional availability scales. Additionally, beliefs regarding freedom to explore and beliefs about spoiling interacted with the intervention to affect specific aspects of caregiving behavior. Clearly further investigation is necessary regarding the role of provider characteristics in how interventions are received.

In sum, these findings show that we cannot assume there is a one-size-fits-all approach to training, mentoring, and other professional development efforts—provider

characteristics such as type of provider, knowledge, beliefs, and attitudes affect not only caregiving behavior over time, but also how providers receive an intervention and whether that intervention is effective in changing their actual caregiving behavior.

Methodological Strengths

Its multi-method approach, use of randomization, and use of naturalistic observation are methodological strengths of this study. By taking a multi-method approach to data collection, insight was gained into providers' own attitudes and beliefs via self-report measures, while objective, expert assessment of providers' speech regarding a child and actual behavior with that child was also obtained. This is particularly important when measuring caregiving behavior. Prior research has shown that providers may know what developmentally appropriate practice is, yet do not always behave in ways consistent with that knowledge (e.g., Naber, 1995). If asked to self-report regarding their own caregiving behavior, providers may be likely to produce an inaccurate report. Furthermore, a new measure—a coding system to measure complexity of thought regarding child behavior based on brief speech samples—was developed and tested in the current study. This measure proved to be informative, as it was a significant predictor of most aspects of caregiving behavior that were measured.

Experimental control in this study was relatively high given the standard in the field. Enrolled providers were randomly assigned to the intervention or control group, and both participants and data collectors were blind as to the way speech samples and videos would be coded. By utilizing video footage of providers and children in their natural environment—the child care setting during a typical morning—an authentic

view of what daily interactions are like for the child was provided. Thus, the child and provider were able to be studied in the comfort of their own setting (which elicits more natural behavior) while also providing an objective record of that behavior to be assessed and analyzed.

The Ounce Research Project collected a wealth of valuable data resources, some of which have yet to be fully examined. Information collected from parents, for example—which included similar self-report measures and speech samples—was not included in the current study. Data were also collected regarding a second focal child for many providers, which allows the potential for future analysis comparing the provider's interactions with two different children. Multiple video recordings of each provider-child pair over the course of the study could be re-examined at a later time using different coding schemes (to measure aspects of caregiving other than emotional availability, characteristics of the provider, or of the environment), in order to answer additional questions related to the daily experience of infants and toddlers in child care settings. Similarly, the speech sample data, in the form of audio recordings, transcripts, and pictorial charts mapping out the sample, could be mined for additional information.

In addition, most of the self-report measures analyzed at Time 1 in the current study were also collected at Time 2 and Time 3. These data could be fruitful for further investigation of the role of knowledge, attitudes and beliefs, and complexity of thought on both caregiver behavior and how an intervention is received. The current longitudinal analyses, for instance, used static predictors—scores on a measure at Time 1 only—to predict caregiving behavior over time. It is also possible to use linear mixed

models with dynamic predictors, that is, multiple measures of a predictor over time. Future analyses could investigate whether accounting for attitudes and beliefs found to be predictors in the current study, perceived influence for example, predict differently when accounting for change in the predictor itself over time. Additionally, linear mixed modeling can be used to identify subgroups of participants—perhaps this type of analysis could be used to “work backwards” in identifying relevant provider characteristics or types of providers that show particular trends in caregiving over time, or particular patterns of response to the intervention.

Caveats and Limitations

Some caution is needed when interpreting the results of this study. The sample, though it may represent a large proportion of child care providers in Minnesota, is likely not representative of child care providers in other areas of the country. Additionally, the diversity of the sample in multiple respects, including racial/ethnic make-up and educational level, is limited. Observational procedures could be improved with more standardization of events recorded, so that similar types of interactions were seen across providers—for instance, recording at least part of a meal, large group activity, and free play situations.

More attention should be paid not only to the timing within the day or week, but also to the timing of observations within the year. Some providers have drastically different schedules and approaches to caregiving in the summer versus during the school year, focusing on curriculum and planned activities more heavily during the school year and free play and time outside during the summer. In addition, children are

more likely to enter or leave care settings at certain times of the year (i.e., beginning of the school year and beginning of the summer), which could have an impact on behavior of both the children and the providers. Therefore, certain aspects of caregiving (e.g., structuring) may be “pulled for” depending on what time of year the observation is conducted. Given that many of our Time 3 videos were recorded in late summer, it is possible that this affected our results in some way. Finally, this analysis did not control for the length of time that providers had been working with the focal child prior to enrolling in the study. Some of the providers were just getting to know the focal child as the study began, whereas others had cared for the child for months. The length of prior relationship may impact caregiving behavior and the emotional availability of the relationship over time (e.g., one might expect newer provider-child relationships to have more “room to improve” than longstanding relationships).

The Ounce Scale™ appeared to have little effect on caregiving behavior when examined alone. Digging deeper into the data revealed that it actually did affect caregiving behavior, but only in conjunction with certain provider characteristics. Some of these findings are difficult to interpret, and point mostly to the need for further exploration. It is possible that many other provider characteristics, not measured in this study, are also relevant to how an intervention is received. More research is needed to explore which provider characteristics affect caregiving behavior and to determine more precisely what those effects are. In addition, factors that could interact with provider characteristics or behavior, such as coworker behavior, physical working conditions,

and child behavior, could be relevant to how an intervention is received or to how knowledge is applied.

It is important to note that this intervention could be considered a relatively “weak test” of the Ounce Scale™’s potential impact. Providers in the intervention group chose just one child to work with and use the scale with at first, and added a second after six months. In their validation study of the Ounce Scale™, Meisels et al. (2010) had child care teachers use the Ounce Scale™ with every child in the classroom. It could be that by using the scale with only one or two children, providers were not able to fully incorporate it into their daily routine, and thus were less able to reap the benefits that using the Ounce Scale™ can generate. Additionally, outcomes were measured during the provider’s first experiences using the Ounce Scale™, rather than after they had mastered using the scale. There may be a steep learning curve for mastering use of the Ounce Scale™, in which case it would be difficult to find effects when a provider is first beginning to use it. If providers had used the Ounce Scale™ with their entire class, or had longer to practice and become comfortable with the instrument, we may have seen more effects of the intervention.

Finally, fidelity to the training model is a potential factor. The way in which the Ounce Scale™ was taught to the providers, and then used by the providers, is relevant and could explain why we did not see larger intervention effects. For the Ounce Research Project, some data were collected from both trainers and providers regarding implementation, but those data have yet to be fully analyzed.

Contributions to the Field

This study contributes to current knowledge in the field in several ways. First, this study explored the presumed link between provider characteristics, including knowledge, beliefs, attitudes, and complexity of thought regarding child behavior, and provider caregiving behavior—a previously untested assumption that is essential to examine in order to improve professional development in the field. Second, this study provided information from an experimental design about the utility of the Ounce Scale™, an observational assessment tool, as a professional development tool for child care providers. Third, this study yields information about whether a new coding scheme for use with speech samples (or other transcript data) might be a useful addition to the field as a way to capture information about providers' thinking patterns regarding understanding and interpretation of children's behavior. And fourth, this study explored the role that provider characteristics play in how an intervention is received.

Implications and Applications

Desired outcomes are not often delineated when designing professional development opportunities, making evaluation of those outcomes difficult. In particular, very little is understood regarding the process of change that occurs, or is hoped to occur, as a result of participating in training or other professional development activities. The current study began to examine this process of change, by documenting links that exist between child care providers' self-reported knowledge, attitudes and beliefs, and complexity of thought and an objective measure of caregiving behavior as reflected in the provider-child relationship. Bringing these desired outcomes to the forefront by examining how one level influences the other, and how change occurs as a

result of professional development, could go far in improving the design and effectiveness—and therefore cost effectiveness—of future professional development endeavors.

Understanding this process of change is relevant for policymakers as well, who may not recognize that policies themselves cannot directly affect process quality or child outcomes. Professional development activities are called for in policy based on the assumption that changes in the structural quality of a care setting (which policy can dictate), will affect process quality (there is some research support for this assumption, e.g., NICHD-ECCRN, 2002a). Thus, for the purposes of accountability, whether a training program may be considered successful should depend on its particular goals and which level of impact/outcome is most relevant to the particular program—some trainings are geared more directly at improving the physical care environment, for instance, and perhaps should not be expected to have effects on the provider's understanding and knowledge, whereas others focus specifically on some aspect of provider understanding. Therefore, when planning for accountability measures as a part of publicly funded programs, assessment should be done at the appropriate level to test change that can realistically be expected from the required or proposed professional development activity (e.g., as suggested by Pianta, 2006).

Finally, these findings are useful for prospective parents on the market for early care and education services. Particularly in the case of attitudes such as dissatisfaction with caregiving, which seemed irrelevant (was not a significant predictor) at Time 1 but over time became a strong predictor of caregiving, parents would be well-served to be

aware that certain attitudes and beliefs (such as dissatisfaction with the job) are likely to impact the quality of care their child receives down the road.

Next Steps

Further analysis of the rich data sources provided by the Ounce Research Project, as well as replication with other research samples are logical next steps in further exploring professional development of child care providers. Though few studies have measured both provider characteristics such as knowledge, attitudes, and beliefs *and* direct observations of caregiving quality, there are some existing datasets that include both of these components. The Quality Interventions in Early Care and Education (QUINCE) study collected observational quality ratings (ECERS, FDCRS, and CIS scores) on providers of preschool children in both family- and center-based settings, as well as many of the same attitude and belief measures used in the current study (Bryant et al., 2009). The NICHD Study of Early Child Care similarly measured caregiving quality observationally along with a multitude of measures assessing child and some provider characteristics. Secondary analyses of both of these datasets would provide valuable information regarding the reliability of the findings described herein.

Further conceptual and theoretical work is needed regarding how to best apply this information. Are we able to somehow tailor professional development offerings to providers with certain beliefs or attitudes? Is there education we can provide that might shift underlying attitudes and beliefs about caregiving? Should individuals be encouraged to pursue a career in early education and caregiving if they are found to possess characteristics that are associated with particularly high quality caregiving? Or,

conversely, should individuals with characteristics associated with low quality caregiving be discouraged from pursuing work in the field of early care and education?

References

- Barnett, W.S., Epstein, D.J., Carolan, M.E., Fitzgerald, J., Ackerman, D.J., & Friedman, A.H. (2010). *The state of preschool 2010: State preschool yearbook*. National Institute for Early Education Research. Retrieved from NIEER website: http://nieer.org/yearbook/pdf/yearbook_appendices.pdf
- Belsky, J., Vandell, D.L., Burchinal, M., Clarke-Stewart, K.A., McCartney, K., Tresch Owen, M., & NICHD ECCRN (2007). Are there long-term effects of early child care? *Child Development, 78*, 681-701. doi: 10.1111/j.1467-8624.2007.01021.x
- Biringen, Z. (2008). The Emotional Availability (EA) Scales, 4th edition. Boulder, CO: emotionalavailability.com.
- Biringen, Z., Moorlag, A., Meyer, B., Wood, J., Aberle, J., Altenhofen, S., & Bennett, S. (2008). The Emotional Availability (EA) Intervention with child care professionals. *Journal of Early Childhood and Infant Psychology, 4*, 39-51.
- Bordin, Machida, & Varnell (2000). The relation of quality indicators to provider knowledge of child development in family child care homes. *Child and Youth Care Forum, 29*, 323-341. doi: 10.1023/A:1016662011920
- Brandon, R. N., & Martinez-Beck, I. (2006). Estimating the size and characteristics of the United States early care and education workforce. In M. Zaslow & I. Martinez-Beck (Eds.), *Critical issues in early childhood professional development* (pp. 49-76). Baltimore: Paul H. Brookes.
- Bromer, J., Van Haitsma, M., Daley, K., & Modigliani, K. (2009). *Staffed support networks and quality in family child care: Findings from the family child care*

network impact study. Chicago, IL: Herr Research Center for Children and Social Policy.

Bryant, D., Wesley, P., Burchinal, M., Sideris, J., Taylor, K., Fenson, C., & Iruka, I. (September, 2009). The QUINCE-PFI Study: An evaluation of a promising model of child care provider training. Frank Porter Graham Child Development Institute, University of North Carolina at Chapel Hill.

Burchinal, M. R., Cryer, D., Clifford, R. M., & Howes, C. (2002). Caregiver training and classroom quality in child care centers. *Applied Developmental Science*, 6(1), 2-11.

Burchinal, M., Howes, C., Pianta, R., Bryant, D., Early, D., Clifford, R., & Barbarin, O. (2008). Predicting child outcomes at the end of kindergarten from the quality of pre-kindergarten teacher-child interactions and instruction. *Applied Developmental Science*, 12(3), 140-153. doi: 10.1080/10888690802199418

Burchinal, P., Kainz, K., Cai, K., Tout, K., Zaslow, M., Martinez-Beck, I., & Rathgeb, C. (2009, May). *Early Care and Education Quality and Child Outcomes* (OPRE Research-to-Policy Brief #1, Publication #2009-15). Washington, DC: ChildTrends.

Burchinal, M. R., Roberts, J. E., Nabors, L. A., & Bryant, D. M. (1996). Quality of center child care and infant cognitive and language development. *Child Development*, 67, 606-620.

- Burchinal, M., Howes, C., & Kontos, S. (2002). Structural predictors of child care quality in child care homes. *Early Childhood Research Quarterly, 17*(1), 87-105.
- Campbell, P.H. & Milbourne, S.A. (2005). Improving the quality of infant-toddler care through professional development. *Topics in Early Childhood Special Education, 25*, 3-14. doi: 10.1177/02711214050250010101
- Campbell, F. A., Ramey, C. T., Pungello, E. P., Sparling, J., & Miller-Johnson, S. (2002). Early childhood education: Young adult outcomes from the Abecedarian Project. *Applied Developmental Science, 6*, 42-57.
- DeBord, K., & Sawyers, J. (1996). The effects of training on the quality of family child care for those associated with and not associated with professional child care organizations. *Child & Youth Care Forum, 25*(1), 7-15.
- Doherty, G., Forer, B., Lero, D.S., Goelman, H., & LaGrange, A. (2006). Predictors of quality in family child care. *Early Childhood Research Quarterly, 21*, 296-312.
- Fiene, R. (2002). Improving child care quality through an infant caregiver mentoring project. *Child & Youth Care Forum, 31*(2), 79-87.
- Fitzmaurice, G. M., Laird, N. M., & Ware, J. H. (2004). Applied longitudinal analysis. New York: Wiley.
- Franyo, G., & Hyson, M. (1999). Temperament training for early childhood caregivers: A study of the effectiveness of training. *Child & Youth Care Forum, 28*(5), 329-349.

- Fukkink, R.G. & Lont, A. (2007). Does training matter? A meta-analysis and review of caregiver training studies. *Early Childhood Research Quarterly, 22*, 294-311.
doi: 10.1016/j.ecresq.2007.04.005
- Gallagher, J. J., Rooney, R., & Campbell, S. (1999). Child care licensing regulations and child care quality in four states. *Early Childhood Research Quarterly, 14*(3), 313-333.
- Harper, C. J., & Parry, C. F. (1999). The Family Activities Inventory: A tool for assessing family strengths. In *Twelfth National Roundtable on Child Protective Services Risk Assessment: Summary of Proceedings, San Francisco, CA, July 8-10, 1998* (pp. 81-85). Englewood, CO: American Humane Association, Children's Div.
- Howes, C., Phillips, D. A., & Whitebook, M. (1992). Thresholds of quality: Implications for the social development of children in center-based child care. *Child Development, 63*, 449-460.
- Howes, C., Galinsky, E., and Kontos, S. (1998). Child care caregiver sensitivity and attachment. *Social Development, 7*, 25-36.
- Hyson, M., & Biggar, H. (2006). NAEYC's standards for early childhood preparation: Getting from here to there. In M. Zaslow & I. Martinez-Beck (Eds.), *Critical Issues in Early Childhood Professional Development*. Baltimore: Paul H. Brookes.
- Jaeger, E.A., Shlay, A.B., & Weinraub, M. (2000). Child care improvement on a shoestring: Evaluating a low-cost approach to improving the availability of

quality child care. *Evaluation Review*, 24, 484-515. doi:

10.1177/0193841X0002400503

Kagan, S. L., Kauerz, K., & Tarrant, K. (2008). *The early care and education teaching workforce at the fulcrum: An agenda for reform*. New York: Teachers College Press.

Kontos, S., Howes, C., & Galinsky, E. (1996). Does training make a difference to quality in family child care? *Early Childhood Research Quarterly*, 11(4), 427-445.

Kontos, S., Howes, C., Shinn, M., & Galinsky, E. (1995). *Quality in family child care and relative care*. New York: Teachers College Press.

Kreader, J.L., Ferguson, D. & Lawrence, S. (2005, August). *Infant and toddler child care quality* (Research-to-Policy Connections #2). Columbia, NY: National Center for Children in Poverty.

LoCasale-Crouch, J., Konold, T., Pianta, R. C., Howes, C., Burchinal, M. R., Bryant, D. M., et al. (2007). Observed classroom quality profiles in state-funded pre-kindergarten programs and associations with teacher, program, and classroom characteristics. *Early Childhood Research Quarterly*, 22, 3-17.

Loeb, S., Fuller, B., Kagan, S.L., & Carrol, B. (2004). Child care in poor communities: Early learning effects of type, quality, and stability. *Child Development*, 75, 47-65.

- Luster, T. (1985). *Influences on maternal behavior: Child-rearing beliefs, social support, and infant temperament*. Unpublished doctoral dissertation, Cornell University.
- MacPhee, D. (1983). *Manual: Knowledge of Infant Development Inventory*. Unpublished manuscript, University of North Carolina at Chapel Hill.
- Marshall, N. L., Creps, C. L., Burnstein, N. R., Glantz, F. B., Robeson, W. W., Barnett, W. S., et al. (2002). *Early care and education in Massachusetts public schools preschool classrooms*. Wellesley, MA: Wellesley Center for Women and Abt Associates.
- Martinez-Beck, I., & Zaslow, M. (2006). Introduction: The context for critical issues in early childhood professional development. In M. Zaslow & I. Martinez-Beck (Eds.), *Critical Issues in Early Childhood Professional Development*. Baltimore: Paul H. Brookes.
- Mashburn, A. J., Pianta, R. C., Downer, J., & Hamre, B. (2007). *Effects of a web-based intervention to improve teacher quality*. Presented at the Biennial Meeting of the Society for Research in Child Development, Boston, MA.
- Mathews, Thornburg, Espinosa, & Ispa (2000). Project REACH: Training rural child care providers. *Young Children*, 55(3), 82-87.
- Maxwell, K. L., Feild, C. C., & Clifford, R. M. (2006). Defining and measuring professional development in early childhood research. In M. Zaslow & I. Martinez-Beck (Eds.), *Critical Issues in Early Childhood Professional Development* (pp. 21-48). Baltimore: Paul H. Brookes.

- Meisels, S. J., & Atkins-Burnett, S. (2006). Evaluating early childhood assessments: A differential analysis. In K. McCartney & D. A. Phillips (Eds.), *The Blackwell Handbook of Early Childhood Development* (pp. 533-549). Oxford: Blackwell Publishing.
- Meisels, S. J., & Beachy-Quick, K. (2008). *Final report of the Ounce Scale validation study*. Chicago: Erikson Institute.
- Meisels, S. J., Dombro, A. L., Marsden, D. B., Weston, D. R., & Jewkes, A. M. (2003). *The Ounce Scale*. New York: Pearson Early Learning.
- Meisels, S., Wen, X. & Beachy-Quick, K. (2010). Authentic assessment for infants and toddlers: Exploring the reliability and validity of the Ounce Scale. *Applied Developmental Science, 14*(2), 55-71. doi: 10.1080/10888691003697911
- Moon, R., & Oden, R. (2003). Back to sleep: Can we influence child care providers? *Pediatrics, 112*(4), 878-882.
- Mueller, C., & Orimoto, L. (1995). Factors related to the recruitment, training, and retention of family child care providers. *Child Welfare, 74*(6), 1205-1221.
- Naber, M.B. (1995). *Increasing application of developmentally appropriate practices by childcare and Head Start staff following training* (Doctoral dissertation). Retrieved from Education Resources Information Center (ERIC) Database (#ED389465).
- NARA, & NCCIC. (2005). *The 2005 Child Care Licensing Study: Executive Summary*: National Association for Regulatory Administration and National Child Care Information and Technical Assistance Center.

- Neisworth, J.T. & Bagnato, S.J. (2004). The mismeasure of young children: The authentic assessment alternative. *Infants and Young Children, 17*, 198-212.
- Neuman, S.B. & Cunningham, L. (2009). The impact of professional development and coaching on early language and literacy instructional practices. *American Educational Research Journal, 46*, 532-66. doi: 10.3102/0002831208328088
- NICHD ECCRN (1994). Child Care and Child Development: The NICHD Study of Early Child Care. In Friedman, S.L. and H.C. Haywood (Eds.), *Developmental Follow-Up: Concepts, Domains and Methods*, (pp. 377-396). New York: Academic Press.
- NICHD ECCRN. (1999). Child outcomes when child care center classes meet recommended standards for quality. *American Journal of Public Health, 89*(7), 1072-1077.
- NICHD-ECCRN. (2001). Nonmaternal care and family factors in early development: An overview of the NICHD Study of Early Child Care. *Applied Developmental Psychology, 22*, 457-492.
- NICHD-ECCRN. (2002a). Child-care structure > process > outcome: Direct and indirect effects of child-care quality on young children's development. *Psychological Science, 13*(3), 199-206.
- NICHD-ECCRN. (2002b). Early child care and children's development prior to school entry: Results from the NICHD Study of Early Child Care. *American Educational Research Journal, 39*(1), 133-164.

- Palsha, S. A., & Wesley, P. W. (1998). Improving quality in early childhood environments through on-site consultation. *Topics in Early Childhood Special Education, 18*(4), 243.
- Peisner-Feinberg, E. S., Burchinal, M. R., Clifford, R. M., Culkin, M. L., Howes, C., Kagan, S. L., et al. (2001). The relation of preschool child-care quality to children's cognitive and social developmental trajectories through second grade. *Child Development, 72*(5), 1534-1553.
- Peters, H. E., & Bristow, B. (2006). Early childhood professional development programs: Accounting for spillover effects and market interventions. In M. Zaslow & I. Martinez-Beck (Eds.), *Critical Issues in Early Childhood Professional Development*. Baltimore: Paul H. Brookes.
- Phillipsen, L. C., Burchinal, M. R., Howes, C., & Cryer, D. (1997). The prediction of process quality from structural features of child care. *Early Childhood Research Quarterly, 12*, 281-303.
- Pianta, R. C. (2006). Standardized observation and professional development: A focus on individualized implementation and practices. In M. Zaslow & I. Martinez-Beck (Eds.), *Critical Issues in Early Childhood Professional Development* (pp. 231-254). Baltimore: Paul H. Brookes.
- Pianta, R. C., Mashburn, A. J., Downer, J. T., Hamre, B. K., & Justice, L. (2008). Effects of web-mediated professional development resources on teacher-child interactions in pre-kindergarten classrooms. *Early Childhood Research Quarterly, 23*(4), 431-451.

- Pleuss, J., Susman-Stillman, A. & Shkolnik, A. (2009, April). *Coding speech samples: Combining qualitative and quantitative methods*. Poster presented at the meeting of the Society for Research in Child Development, Denver, CO.
- Raikes, H. A., Raikes, H. H., & Wilcox, B. (2005). Regulation, subsidy receipt and provider characteristics: What predicts quality in child care homes? *Early Childhood Research Quarterly*, 20, 164-184. doi: 10.1016/j.ecresq.2005.04.006
- Ramey, C. T., Campbell, F. A., Burchinal, M. R., Skinner, M. L., Gardner, D. M., & Ramey, S. L. (2000). Persistent effects of early childhood education on high-risk children and their mothers. *Applied Developmental Science*, 41(1), 2-14.
- Ramey, S. L., Ramey, C. T., Grace, C., & Davis, L. (2007). *Right from Birth: A model of professional development that builds on the science of early child brain and behavior development*. Presented at the Child Care Policy Research Consortium Meeting, Washington, D.C.
- Ramey, S. L., Ramey, C. T., Grace, C., Davis, L., & Timraz, N. (2008). *The "Right from Birth" study: An evidence-informed training model to improve the quality of early child care and education*. Presented at the Child Care Policy Research Consortium Meeting, Washington, D.C.
- Reynolds, A. J., Temple, J. A., Ou, S., Robertson, D. L., Mersky, J. P., Topitzes, J. W., et al. (2007). Effects of a school-based, early childhood intervention on adult health and well being: A 19-year follow up of low-income families. *Archives of Pediatrics & Adolescent Medicine*, 161(8), 730-739.

- Rolnick, A., & Grunewald, R. (2003, December). Early childhood development: Economic development with a high public return. *The Region*, 6-12.
- Scarr, S., & Eisenberg, M. (1993). Child care research: Issues, perspectives, and results. *Annual Review of Psychology*, 44, 613-644.
- Schaefer, E., & Edgerton, M. (1985). Parental and child correlates of parental modernity. In I. E. Sigel (Ed.), *Parental belief systems: The psychological consequences for children*. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Schweinhart, L. J., Montie, J., Xiang, Z., Barnett, W. S., Belfield, C. R., & Nores, M. (2005). Lifetime effects: The High/Scope Perry Preschool study through age 40. In *Monographs of the High/Scope Educational Research Foundation*, 14. Ypsilanti: High/Scope Press.
- Sheridan, S.M., Edwards, C.P., Marvin, C.A., & Knoche, L.L. (2009). Professional development in early childhood programs: Process issues and research needs. *Early Education and Development*, 20, 377-401. doi: 10.1080/10409280802582795
- Shivers, E. (2008). Using the Emotional Availability Scales along the child care continuum. *Journal of Early Childhood and Infant Psychology*, 4, 27-37.
- Temple, J. A., & Reynolds, A. J. (2007). Benefits and costs of investments in preschool education: Evidence from the Child-Parent Centers and related programs. *Economics of Education Review*, 26(1), 126-144.
- Thomas, R. G., & Englund, M. (1990). *Instructional design for facilitating higher order thinking. Vol. II: Instructional design model*. Saint Paul: University of

Minnesota, Minnesota Research and Development Center for Vocational Education.

Tout, K., Zaslow, M., & Berry, D. (2006). Quality and qualifications: Links between professional development and quality in early care and education settings. In M. Zaslow & I. Martinez-Beck (Eds.), *Critical Issues in Early Childhood Professional Development* (pp. 77-110). Baltimore: Paul H. Brookes.

US Dept of Health & Human Services Administration for Children & Families Office of Child Care (2010). *Pathways and Partnerships for Child Care Excellence*.

Vandell, D. (2004). Early child care: The known and the unknown. *Merrill-Palmer Quarterly*, 50(3), 387-414.

Vandell, D., & Wolfe, B. (2000). *Child care quality: Does it matter and does it need to be improved?* Washington, D.C.

Votruba-Drzal, E., Coley, R. L., & Chase-Landale, P. L. (2004). Child care and low-income children's development: Direct and moderated effects. *Child Development*, 75(1), 296-312.

Zaslow, M., Tout, K., Halle, T., Vick, J., & Lavelle, B. (2010). *Towards the identification of features of effective professional development for early childhood educators: A review of the literature*. Report prepared for the U.S. Department of Education.

Zigler, E., Gilliam, W.S., Barnett, S.W., (Eds). (2011). *The Pre-K Debates: Current Controversies and Issues*. Baltimore: Brookes Publishing.

Zimmerman, I. L., Steiner, V. G., & Pond, R. E. (2002). *Preschool Language Scale (4th ed.)*. San Antonio, TX: Harcourt Assessment, Inc.

Appendix A

Tables

Table 1

*Demographic Characteristics of Whole Sample and by Intervention Group Status**(Categorical Variables)*

Variable	Whole Sample		Intervention Group		Control Group	
	N	%	N	%	N	%
Education (highest level)						
High school/GED	10	10.4	6	11.5	4	9.1
Some college	11	11.5	6	11.5	5	11.4
One year technical degree	2	2.1	0	0.0	2	4.5
One year child dev. program	5	4.2	1	1.9	3	6.8
Two year college degree	28	29.2	17	32.7	11	25.0
BA/BS degree or higher	35	36.5	21	40.4	14	31.8
MA/MS degree or higher	6	6.3	1	1.9	5	11.4
Age of focal child						
Infant (< 12 months)	27	27.8	19	35.8	8	18.2
Toddler (12-30 months)	70	72.2	34	64.2	36	81.8
Racial/ethnic background						
White or Caucasian	93	96.9	50	96.2	43	97.7
Black or African American	3	3.1	2	3.8	1	2.3
Provider type						
Center-based	39	39.8	20	37.7	19	42.2
Family-based	59	60.2	33	62.3	26	57.8
Intention to remain in field						
< 1 year	1	1.1	0	0.0	1	2.4
1-2 years	7	7.6	3	6.0	4	9.5
3-4 years	15	16.3	7	14.0	8	19.0
5-10 years	39	42.4	20	40.0	19	45.2
> 10 years	30	32.6	20	40.0	10	23.8
Household income						
< \$20,000	8	9.0	4	8.3	4	9.8
\$20-39,999	23	25.8	14	29.2	9	22.0
\$40-59,999	20	22.5	12	25.0	8	19.5
\$60-79,999	21	23.6	12	25.0	9	22.0
\$80-99,999	11	12.4	4	8.3	7	17.1
≥ \$100,000	6	6.7	2	4.2	4	9.8
Regular, paid assistant						
Yes	41	42.7	24	46.2	17	38.6
No	55	57.3	28	53.8	27	61.4

Table 2

Demographic Characteristics of Whole Sample and by Intervention Group Status (Scale Variables)

Variable	Whole Sample				Intervention Group				Control Group			
	<i>N</i>	<i>M</i>	<i>SD</i>	Range	<i>N</i>	<i>M</i>	<i>SD</i>	Range	<i>N</i>	<i>M</i>	<i>SD</i>	Range
Age of provider	96	39.47	11.35	21 - 65	52	38.52	11.25	21 - 63	44	40.59	11.48	22 - 65
Group size	84	9.46	3.72	2 - 20	45	9.16	3.55	2 - 16	39	9.80	3.90	3 - 20
Hours infant/toddler training	96	22.67	41.80	0 - 280	52	25.52	44.80	0 - 280	44	19.30	38.19	0 - 210
Types infant/toddler training	92	3.15	1.79	0 - 8	52	3.33	1.86	0 - 8	40	2.93	1.69	1 - 7
Experience in child care (mos.)	98	134.94	113.45	0 - 552	53	126.92	100.36	0 - 351	45	144.38	127.68	0 - 552
Sources of support	96	3.04	1.29	1 - 7	52	2.96	1.25	1 - 5	44	3.14	1.34	1 - 7
Memberships in prof. orgs.	96	1.10	1.25	0 - 4	52	1.00	1.27	0 - 4	44	1.23	1.24	0 - 4
Knowledge of infant dev.	95	.83	.08	.40 - .93	52	.83	.08	.40 - .93	43	.83	.08	.52 - .97

Table 3

Descriptive Statistics for Whole Sample and by Intervention Group Status

Variable	Whole Sample				Intervention Group				Control Group			
	N	M	SD	Range	N	M	SD	Range	N	M	SD	Range
Attitudes and Beliefs about Caregiving (T1)												
Modernity (child-rearing beliefs)	91	37.1	9.7	17.0 - 67.0	49	38.4	10.2	23.0 - 67.0	42	35.5	8.8	17.0 - 57.0
Intrinsic motivation	94	30.9	3.4	18.0 - 35.0	51	30.8	3.6	18.0 - 35.0	43	30.9	3.1	22.0 - 35.0
Dissatisfaction	95	7.4	2.9	4.0 - 18.0	52	8.0	3.2	4.0 - 18.0	43	6.6	2.2	4.0 - 12.0
Perceived caregiving skill	94	2.6	0.3	1.7 - 3.0	51	2.6	0.3	1.7 - 3.0	43	2.5	0.3	1.9 - 3.0
Beliefs re: spoiling the child	92	12.2	6.0	7.0 - 39.0	51	12.6	6.6	7.0 - 39.0	41	11.7	5.3	7.0 - 27.0
Beliefs re: freedom to explore	92	27.6	4.5	18.0 - 36.0	50	27.0	4.2	18.0 - 36.0	42	28.3	4.9	18.0 - 36.0
Beliefs re: discipline & control	91	8.9	3.5	4.0 - 19.0	49	9.3	4.0	4.0 - 19.0	42	8.4	2.9	4.0 - 15.0
Perceived influence	91	42.5	4.0	28.0 - 48.0	50	42.7	4.4	28.0 - 48.0	41	42.3	3.5	34.0 - 48.0
Perceived competence	93	18.4	3.3	7.0 - 24.0	51	18.7	3.5	7.0 - 24.0	42	17.9	3.1	12.0 - 24.0
Complexity of thought re: child behavior												
T1	87	91.5	37.5	5.0 - 208.0	47	90.3	37.6	5.0 - 196.0	40	93.0	37.8	27.0 - 208.0
T2	73	87.8	37.4	17.0 - 227.0	40	80.4	31.5	17.0 - 154.0	33	96.8	42.4	30.0 - 227.0
T3	54	79.3	37.5	22.0 - 188.0	28	82.0	37.3	22.0 - 169.0	26	76.4	38.3	24.0 - 188.0
Caregiving Behavior												
Emotional Availability Total Score												
T1	70	150.9	17.4	98.5 - 170.0	40	150.0	18.2	98.5 - 168.5	30	152.1	16.5	105.0 - 170.0
T2	73	152.5	19.0	74.0 - 171.5	40	152.6	20.7	74.0 - 171.5	33	152.4	17.1	92.5 - 170.0
T3	51	151.4	19.4	85.0 - 172.5	28	149.8	23.1	85.0 - 172.5	23	153.3	13.9	116.5 - 168.0
Adult sensitivity												
T1	70	25.7	3.6	14.0 - 29.0	40	25.6	3.7	14.0 - 29.0	30	25.8	3.5	16.0 - 29.0
T2	73	25.6	4.1	11.0 - 29.0	40	25.5	4.6	11.0 - 29.0	33	25.8	3.4	15.0 - 29.0
T3	51	25.3	3.8	12.0 - 29.0	28	25.0	4.2	12.0 - 29.0	23	25.7	3.3	17.0 - 29.0

Variable	Whole Sample				Intervention Group				Control Group			
	<i>N</i>	<i>M</i>	<i>SD</i>	Range	<i>N</i>	<i>M</i>	<i>SD</i>	Range	<i>N</i>	<i>M</i>	<i>SD</i>	Range
Adult structuring												
T1	70	25.7	3.2	16.0 - 29.0	40	25.5	3.1	16.0 - 29.0	30	25.9	3.3	16.0 - 29.0
T2	73	25.6	3.8	11.0 - 29.0	40	25.6	4.1	11.0 - 29.0	33	25.6	3.5	14.0 - 29.0
T3	51	25.6	3.6	7.0 - 29.0	28	25.1	4.5	7.0 - 29.0	23	26.3	1.8	23.0 - 29.0
Adult nonintrusiveness												
T1	70	24.7	3.7	13.0 - 29.0	40	24.7	3.7	13.0 - 29.0	30	24.6	3.8	13.5 - 29.0
T2	73	24.6	3.9	9.0 - 29.0	40	24.6	4.3	9.0 - 29.0	33	24.6	3.5	15.0 - 29.0
T3	51	25.0	3.6	14.5 - 29.0	28	25.1	3.7	14.5 - 29.0	23	24.8	3.5	18.0 - 29.0
Adult nonhostility												
T1	70	27.0	2.5	18.0 - 29.0	40	27.0	2.9	18.0 - 29.0	30	27.1	1.9	21.5 - 29.0
T2	73	27.0	2.7	14.0 - 29.0	40	27.1	3.0	14.0 - 29.0	33	26.9	2.3	19.0 - 29.0
T3	51	26.5	2.8	17.0 - 29.0	28	26.5	3.3	17.0 - 29.0	23	26.5	2.2	21.0 - 29.0
Child responsiveness												
T1	70	25.8	3.4	14.0 - 29.0	40	25.6	3.8	14.0 - 29.0	30	26.1	3.0	18.0 - 29.0
T2	73	26.6	3.2	13.0 - 29.0	40	27.0	2.7	17.0 - 29.0	33	26.2	3.7	13.0 - 29.0
T3	51	26.0	3.8	15.0 - 29.0	28	25.5	4.6	15.0 - 29.0	23	26.6	2.4	19.0 - 29.0
Child involvement												
T1	70	22.1	3.7	12.0 - 29.0	40	21.7	3.8	13.0 - 29.0	30	22.7	3.5	12.0 - 27.0
T2	73	23.1	3.7	12.0 - 28.0	40	22.9	3.9	12.0 - 28.0	33	23.3	3.6	13.0 - 28.0
T3	51	23.0	4.7	9.0 - 29.0	28	22.6	5.7	9.0 - 29.0	23	23.5	3.1	15.5 - 28.0

Table 4

Correlations of Provider Knowledge, Attitudes, Beliefs, and Complexity of Thought with Caregiving Behavior at Time 1

Provider Characteristic	Emotional availability overall	Adult sensitivity	Adult structuring	Adult nonintrusiveness	Adult nonhostility	Child responsiveness	Child involvement
Knowledge of infant development	.394**	.362**	.382**	.433**	.320**	.242*	.297*
Modernity (child-rearing beliefs)	ns	ns	ns	ns	ns	ns	ns
Intrinsic motivation	ns	ns	ns	ns	ns	ns	ns
Dissatisfaction	ns	ns	ns	ns	ns	ns	ns
Perceived caregiving skill	ns	ns	ns	ns	ns	ns	ns
Beliefs re: spoiling the child	ns	ns	-.398**	-.334**	ns	ns	-.275*
Beliefs re: freedom to explore	ns	ns	ns	ns	ns	ns	ns
Beliefs re: discipline & control	ns	ns	ns	ns	ns	ns	ns
Perceived influence	ns	ns	ns	.333**	ns	ns	ns
Perceived competence	ns	ns	ns	ns	ns	ns	ns
Complexity of thought re: child behavior	.351**	.344**	.337**	.286*	.305*	.324*	.378**

Note. ns = not statistically significant; * = $p < .05$; ** = $p < .01$

Table 5

Hierarchical Linear Regression Analyses for Emotional Availability Scores Having Multiple Significant Predictors

Variable	EA total				Sensitivity				Structuring				Nonintrusiveness			
	B	SE B	β	ΔR^2	B	SE B	β	ΔR^2	B	SE B	β	ΔR^2	B	SE B	β	ΔR^2
Step 1				0.16**				.13**				.15**				.19***
(constant)	79.74	21.70			12.13	4.56			12.83	4.02			7.94	4.55		
Knowledge	85.87	26.06	.39**		16.34	5.48	.36**		15.48	4.83	.39**		20.18	5.46	.43***	
Step 2				0.09*				.08*				.07*				.07*
(constant)	77.89	20.66			11.77	4.38			12.53	3.88			7.61	4.40		
Knowledge	72.17	25.32	.33**		13.70	5.37	.30*		13.23	4.75	.33**		17.73	5.40	.38**	
Thought	0.14	0.05	.31*		0.03	0.01	.29*		0.02	0.01	.28*		0.03	0.01	.26*	
Step 3																.07*
(constant)													14.44	5.10		
Knowledge													11.85	5.74	.25*	
Thought													0.03	0.01	.28*	
Spoiling													-0.18	0.07	-.29*	

Note. Knowledge = knowledge of infant development (KIDI score). Thought = complexity of thought regarding child behavior (speech sample score). Spoiling = beliefs regarding spoiling the child (subscale of Luster Parent Opinion Survey). N = 61. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 6

Non-Intervention Findings: Prediction of Caregiving Behavior from Provider Characteristics

Predictor	Complexity of thought re: child behavior ^a	Emotional availability overall	Adult sensitivity	Adult structuring	Adult nonintrusiveness	Adult nonhostility	Child responsiveness	Child involvement
(no predictor: unconditional models)	L	-	-	-	-	-	-	-
Provider type (family/center)	Q, I	L	L	L	-	-	L, I	L, I
Knowledge of infant development		C, I	C, I	C	C, I	C, I	I	I
Modernity (child-rearing beliefs)		-	-	-	I	-	-	-
Intrinsic motivation		-	-	-	-	-	-	-
Dissatisfaction		-	-	-	-	L	-	-
Perceived caregiving skill		-	-	-	-	-	-	-
Beliefs re: spoiling the child		-	-	-	C, L, I	L	-	-
Beliefs re: freedom to explore		-	-	-	-	-	-	-
Beliefs re: discipline & control		-	-	-	-	-	-	-
Perceived influence		-	-	-	-	-	-	-
Perceived competence		-	-	-	-	-	-	-
Complexity of thought re: child behavior ^a		C, L, I	C, I	C, I	C, L, I	-	C, L, I	C, L, I

Note. C = significantly predicted concurrent caregiving behavior; Q = significant effect on quadratic change over time; L = significant effect on linear change over time; I = significant effect on intercept; - = no significant effect.

^aComplexity of thought regarding child behavior was an intermediate outcome in the logic model, therefore it is sometimes used as an outcome and sometimes as a predictor in analyses

Table 7

Intervention Findings: Main and Interaction Effects of the Intervention on Caregiving Behavior

Predictor	Complexity of thought re: child behavior ^a	Emotional availability overall	Adult sensitivity	Adult structuring	Adult nonintrusiveness	Adult nonhostility	Child responsiveness	Child involvement
Intervention main effects	-	-	-	-	-	-	Q	-
Intervention by provider characteristic interaction effects								
Provider type (family/center)		L	L	-	-	L	L	L
Knowledge of infant development		-	-	L	-	-	-	-
Modernity (child-rearing beliefs)		-	-	-	-	-	-	-
Intrinsic motivation		-	-	-	-	-	-	-
Dissatisfaction		-	-	-	-	-	-	-
Perceived caregiving skill		-	-	-	-	-	-	-
Beliefs re: spoiling the child		-	-	Q	-	-	-	-
Beliefs re: freedom to explore		-	-	-	L, I	-	-	L
Beliefs re: discipline & control		-	-	-	-	-	-	-
Perceived influence		I	L, I	Q, I	L, I	I	-	-
Perceived competence		-	-	-	-	-	-	-
Complexity of thought re: child behavior ^a		-	-	-	-	-	-	-

Note. Q = significant effect on quadratic change over time; L = significant effect on linear change over time; I = significant effect on intercept; - = no significant effect.

^aComplexity of thought regarding child behavior was an intermediate outcome in the logic model, therefore it is sometimes used as an outcome and sometimes as a predictor in analyses.

Appendix B

Figures

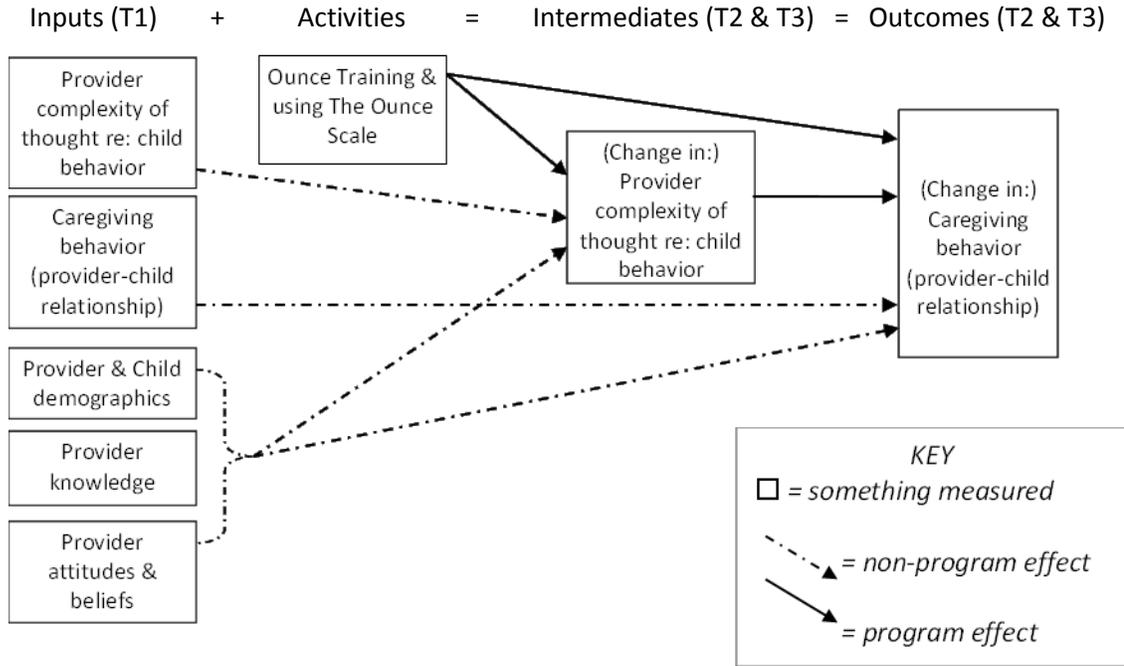


Figure 1. Ounce Research Project provider effects logic model. Constructs included in the current study are shown.

(Levels)	Child Descriptions	Adult Practice with Child	Goals	Priorities
1	•			
2	••••• ••••• •••••	••—•• ••—•• ••—••		
3	••••• •••••			•

(Levels)	Child Descriptions	Adult Practice with Child	Goals	Priorities
1	•••			
2	••••••	••		
3	•••••••••• •••••••••• •	••		

KEY:
 • (dot) = thought unit
 — (link) = connection/relation between thought units

Figure 2. Examples of speech sample charts showing complexity of thought regarding child behavior; top example shows less complexity (total score = 62), bottom example shows more complexity (total score = 190).

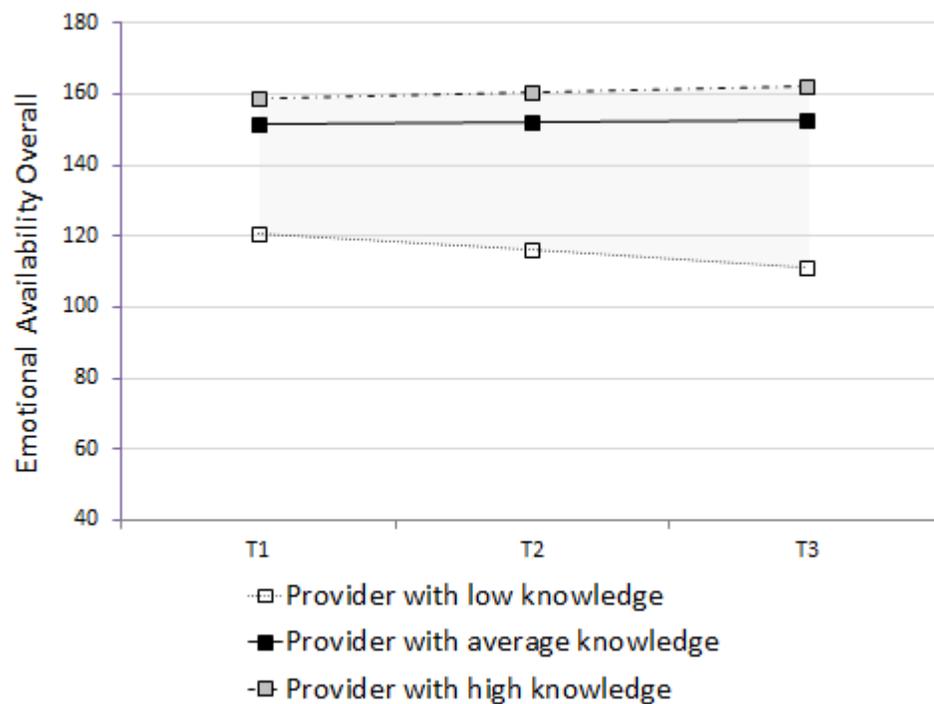


Figure 3. Change in emotional availability overall scores over time as predicted by Time 1 knowledge of infant development. Intercept is significantly affected by knowledge ($p = .002$), and disparity remains over time. Lines represent hypothetical individual trajectories of overall emotional availability for providers with the sample minimum, mean, and maximum KIDI scores; shading represents the range of predicted individual trajectories in this sample.

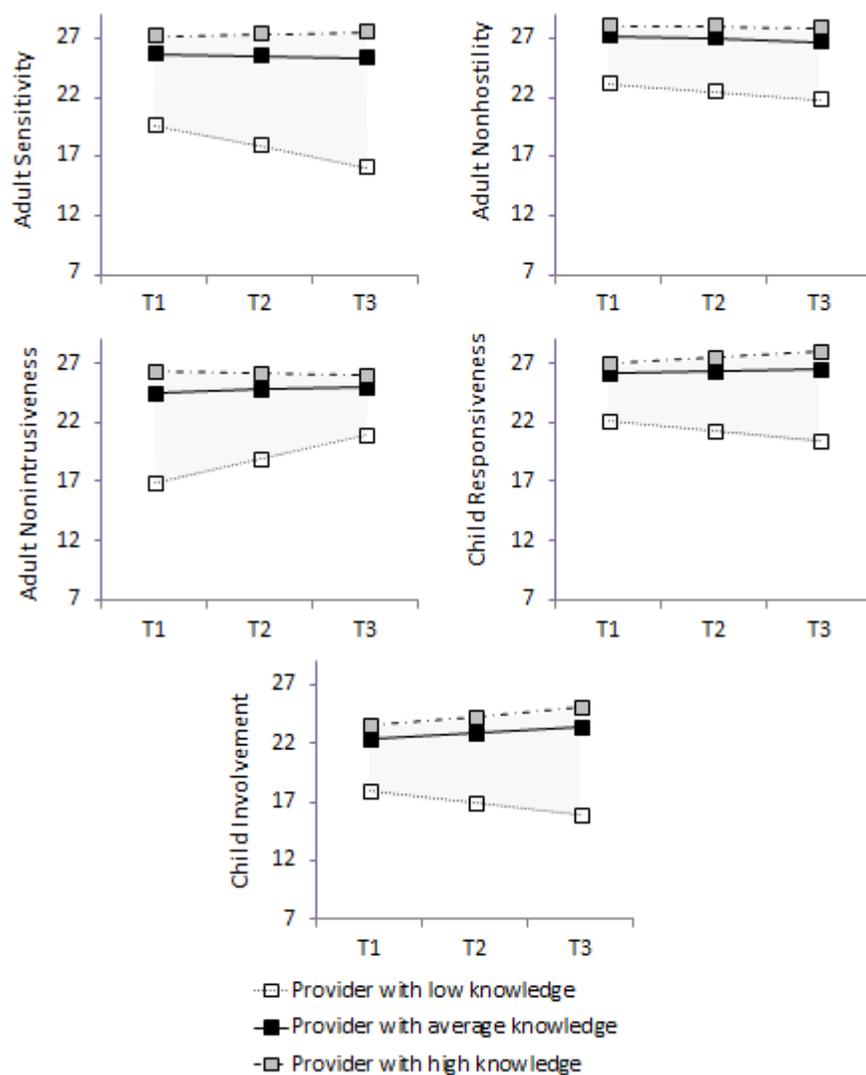


Figure 4. Change in five emotional availability subscales over time as predicted by provider's Time 1 knowledge of infant development. Intercept is significantly affected by knowledge (all $p < .05$), and disparity remains over time. Lines represent hypothetical individual trajectories of child involvement for providers with the sample minimum, mean, and maximum KIDI scores; shading represents the range of predicted individual trajectories in this sample.

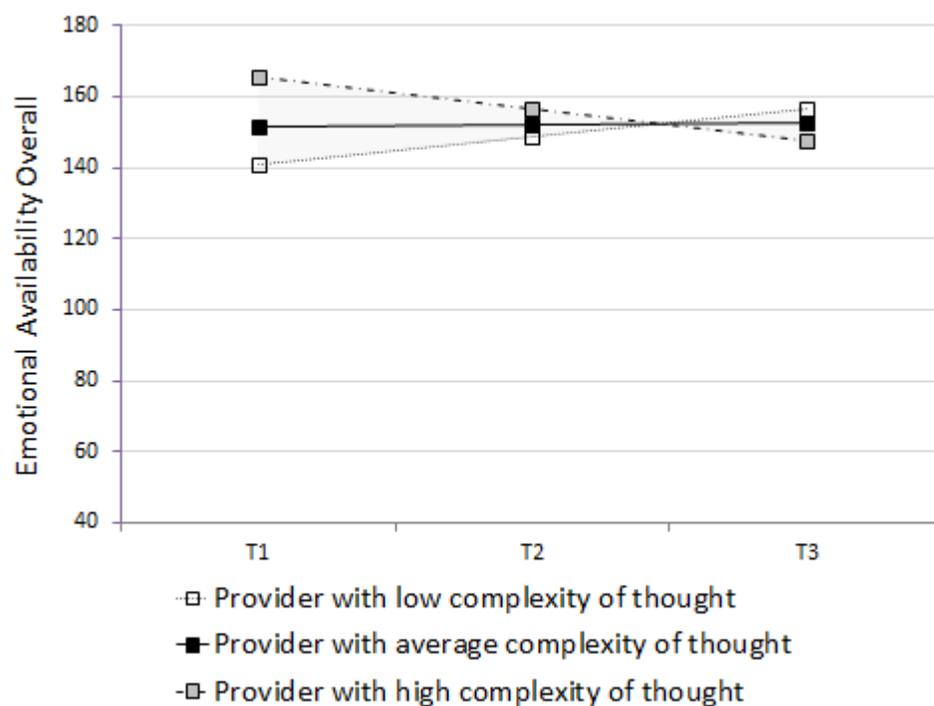


Figure 5. Change in emotional availability overall scores over time as predicted by Time 1 complexity of thought regarding child behavior. Intercept is significantly affected by complexity of thought ($p = .011$), as well as linear trajectory ($p = .036$). Lines represent hypothetical individual trajectories of overall emotional availability for providers with the sample minimum, mean, and maximum complexity of thought scores; shading represents the range of predicted individual trajectories in this sample.

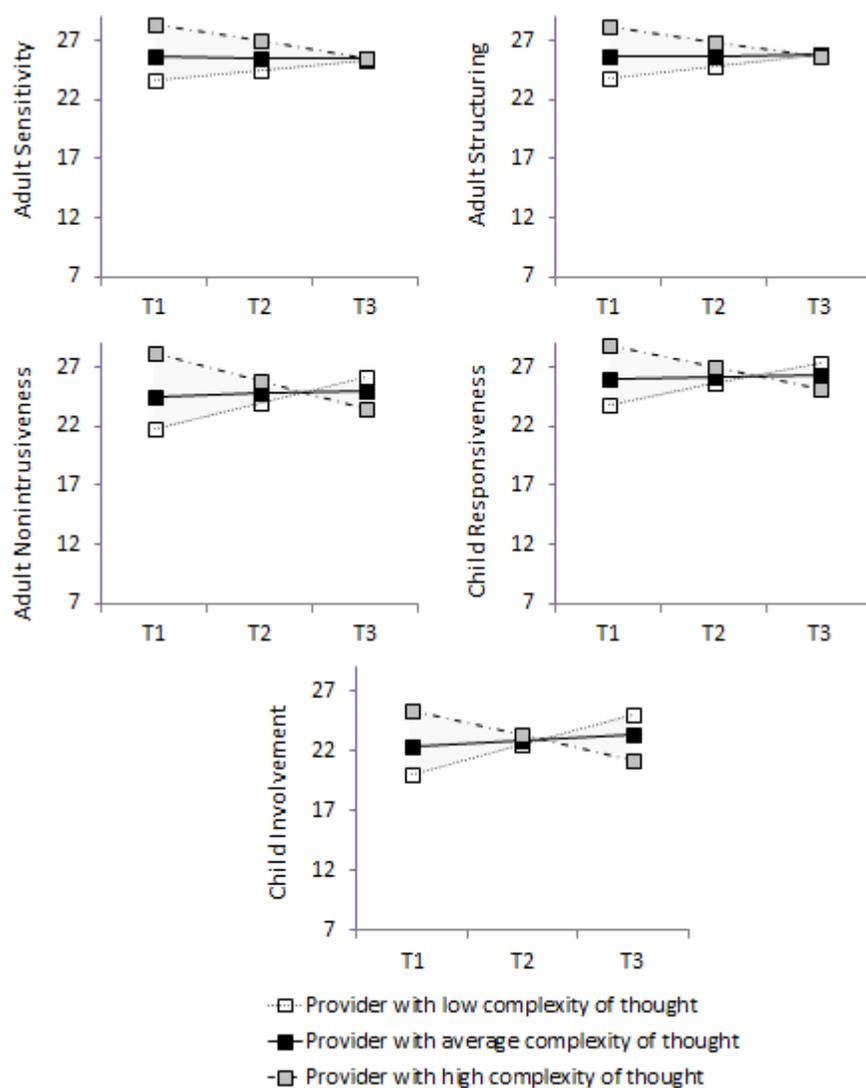


Figure 6. Change in caregiving behavior over time as predicted by Time 1 complexity of thought regarding child behavior. Intercept and linear slope were significant ($p < .05$) for adult nonintrusiveness, child responsiveness, and child involvement. Intercept only was significant for adult sensitivity and adult structuring ($p < .05$). Lines represent hypothetical individual trajectories of caregiving behavior for providers with the sample minimum, mean, and maximum complexity of thought scores; shading represents the range of predicted individual trajectories in this sample.

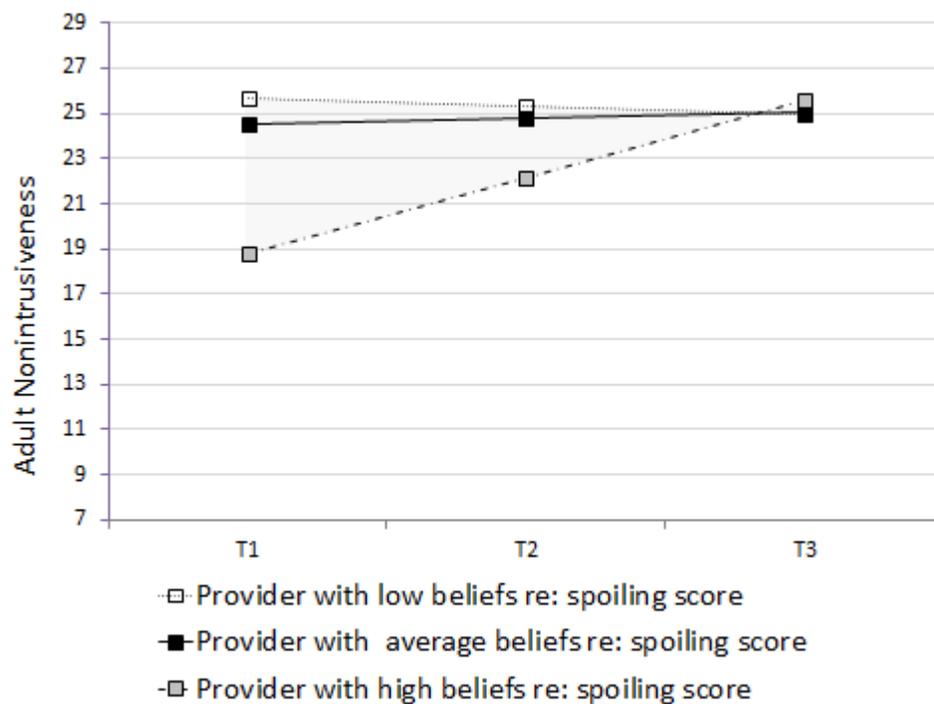


Figure 7. Change in adult nonintrusiveness over time as predicted by Time 1 beliefs about spoiling. Intercept and linear trajectories of nonintrusiveness are significantly affected by beliefs about spoiling scores at Time 1 ($p = .002, .005$, respectively). Lines represent hypothetical individual trajectories of nonintrusiveness for providers with the sample minimum, mean, and maximum beliefs about spoiling scores; shading represents the range of predicted individual trajectories in this sample.

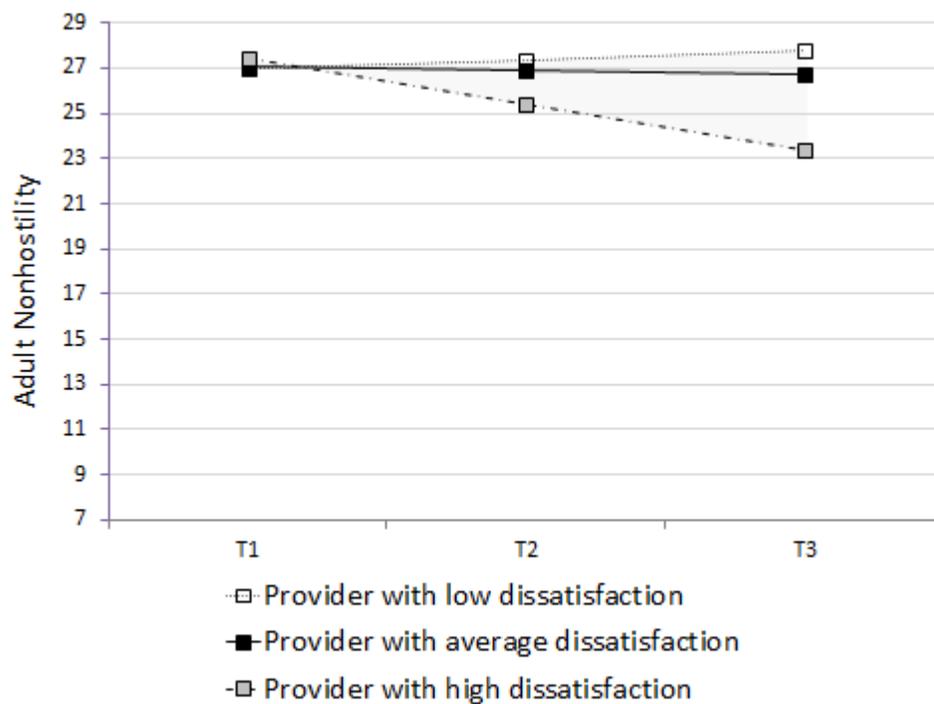


Figure 8. Change in adult nonhostility over time as predicted by Time 1 dissatisfaction with caregiving. Linear trajectories of nonhostility are significantly affected by dissatisfaction scores at Time 1 ($p = .004$). Lines represent hypothetical individual trajectories of nonhostility for providers with the sample minimum, mean, and maximum dissatisfaction scores; shading represents the range of predicted individual trajectories in this sample.

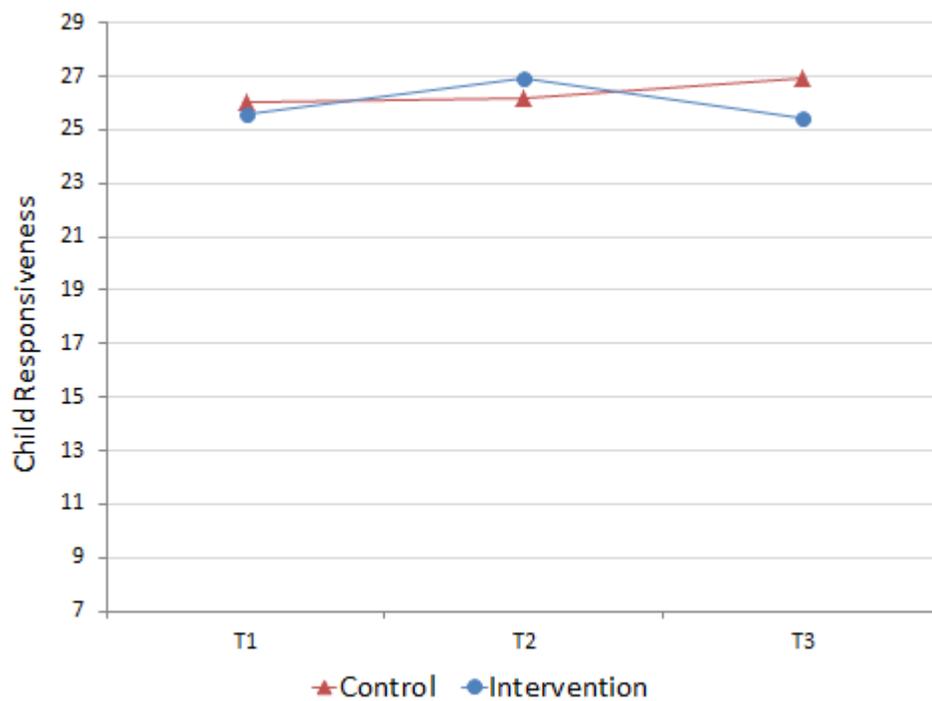


Figure 9. Change in child responsiveness over time as a function of intervention group status. Intervention and control groups had significantly different quadratic trajectories ($p = .014$). Each line represents a group mean.

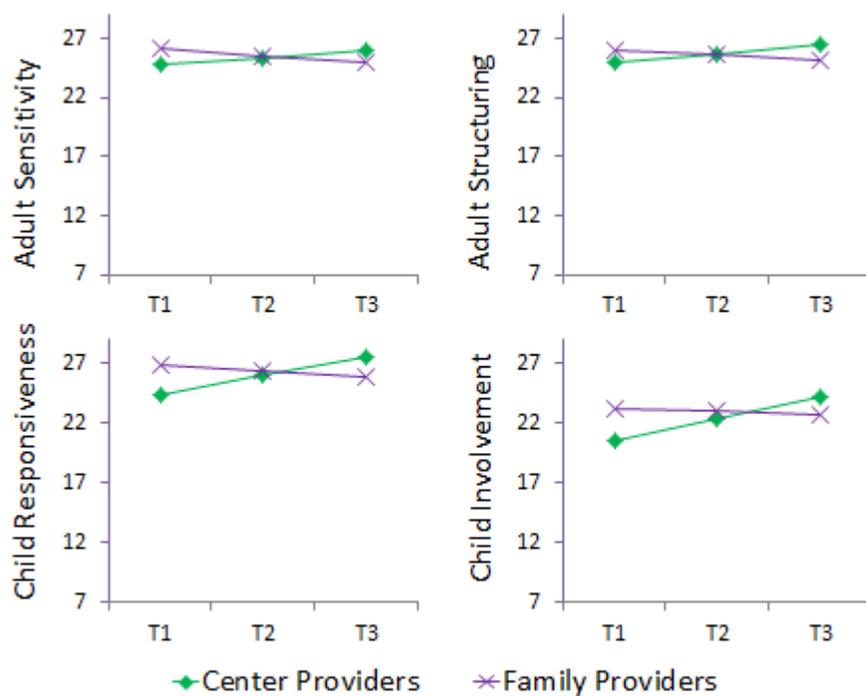


Figure 10. Change in four emotional availability subscales over time as predicted by provider type. Significant difference between group linear trajectories for adult sensitivity, adult structuring, child responsiveness, and child involvement (all $p < .05$); significant difference between group intercepts for child responsiveness and child involvement (both $p < .01$). Each line represents a group mean.

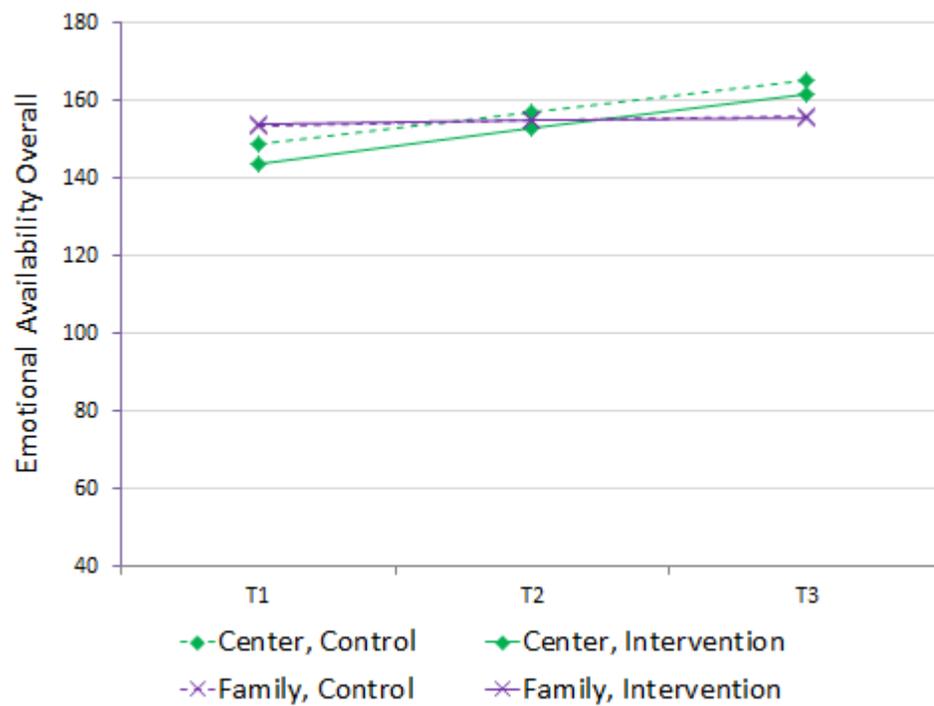


Figure 11. Change in emotional availability overall scores over time as predicted by the interaction of intervention status with provider type. Significant difference between groups in linear trajectory ($p = .018$). Each line represents a group mean.

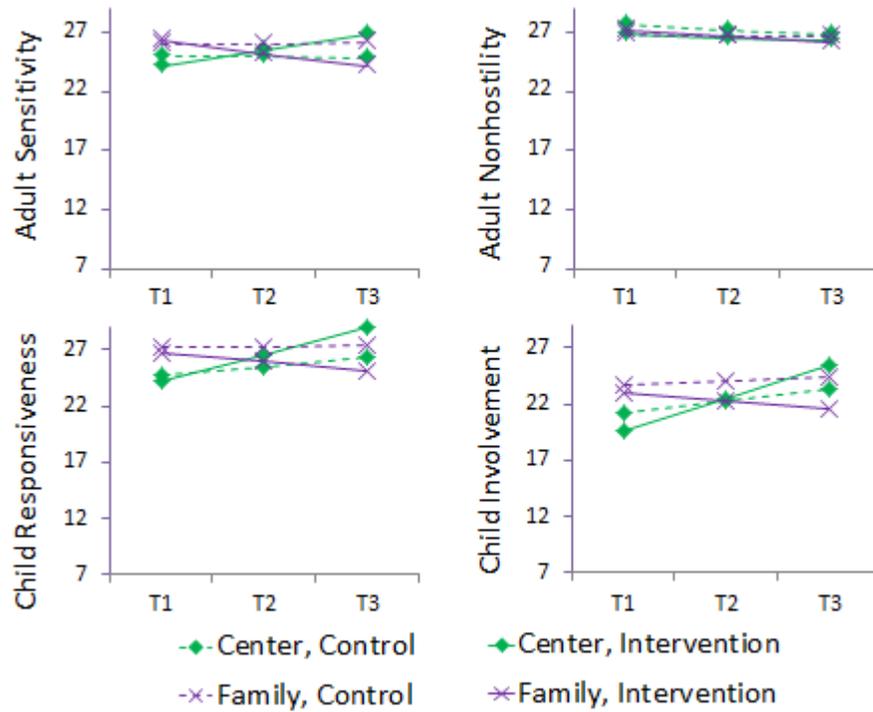


Figure 12. Change in four emotional availability subscales over time as predicted by the interaction of intervention group status with provider type. Significant difference between group linear trajectories for adult sensitivity, adult nonhostility, child responsiveness, and child involvement (all $p < .05$). Each line represents a group mean.

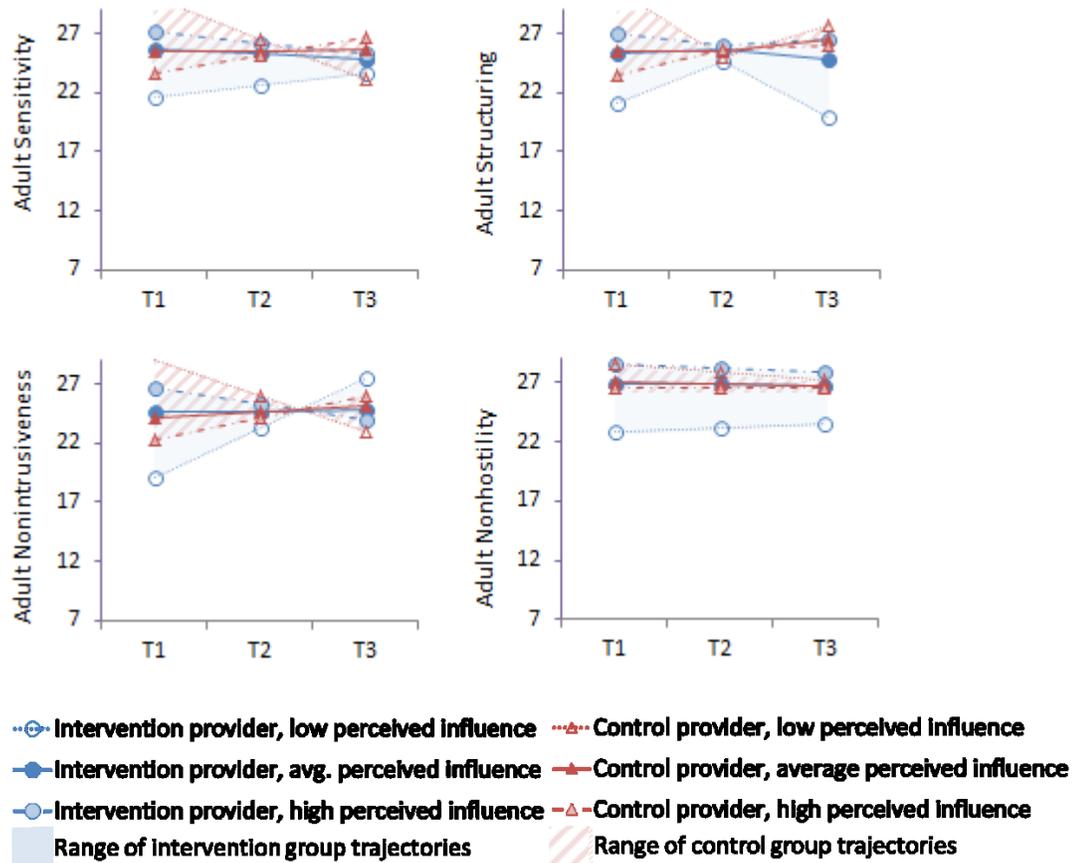


Figure 13. Interaction effects of providers' perceived influence with intervention group status on sensitivity, structuring, nonintrusiveness, and nonhostility over time. Linear slope was significantly affected by the interaction of perceived influence with the intervention for adult sensitivity ($p < .05$), adult nonintrusiveness ($p < .01$), and adult nonhostility ($p < .05$). Adult structuring showed a significant interaction effect on quadratic slope ($p < .05$). Lines represent hypothetical individual trajectories of emotional availability for providers with the sample minimum, mean, and maximum perceived influence scores in either the intervention (blue circle) or control group (red triangle); shading represents the range of predicted individual trajectories in this sample for either the intervention (blue solid) or control group (red stripes).

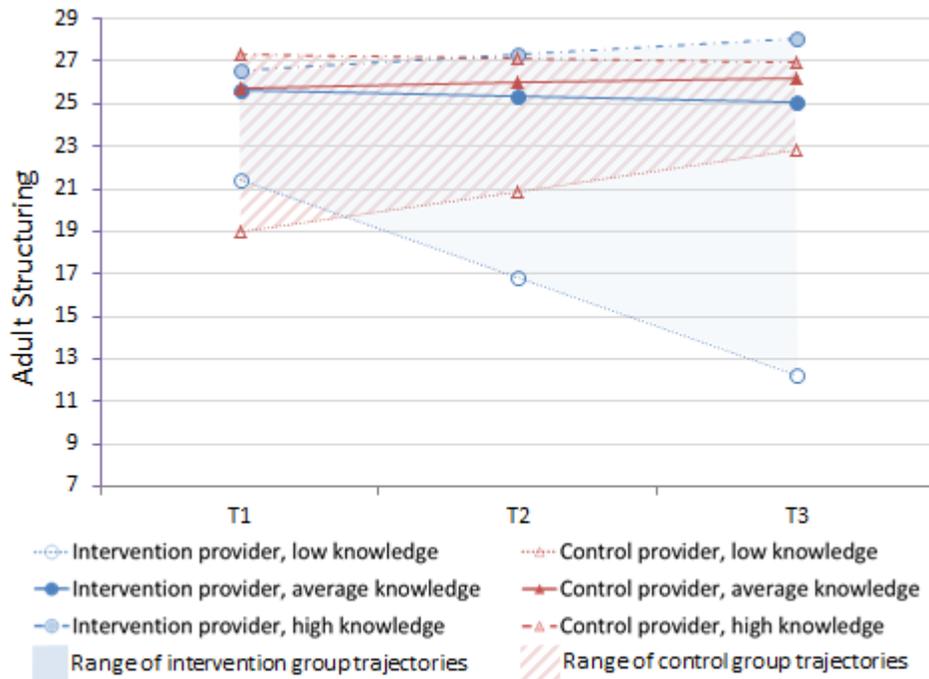


Figure 14. Interaction effect of Time 1 knowledge of infant development with intervention group status on structuring over time (significant difference in linear slope, $p < .05$). Lines represent hypothetical individual trajectories of structuring for providers with the sample minimum, mean, and maximum knowledge of infant development scores in either the intervention (blue circle) or control group (red triangle); shading represents the range of predicted individual trajectories in this sample for either the intervention (blue solid) or control group (red stripes).

Appendix C

Detailed Description of Measures of Attitudes and Beliefs about Caregiving¹⁹

The Parent Modernity Scale (Schaefer & Edgerton, 1985) is a 16-item scale that measures providers' "traditional" (or authoritarian) and "progressive" (or child-centered) views regarding the care of children on a response scale ranging from 1 (strongly disagree) to 5 (strongly agree). Examples of traditional beliefs are "Children will not do the right thing unless they are told what to do." Examples of progressive beliefs are "Children have a right to their own point of view and should be allowed to express it." After reverse-scoring the progressive subscale and adding it to the traditional subscale, a higher total score represents more traditional, adult-centered child rearing beliefs. Potential range on this scale was 16 to 80; Cronbach's alpha was .81 for the total score.

Intrinsic motivation for caregiving and dissatisfaction with caregiving was measured with several items adapted from a questionnaire used with early childhood providers in a study by Kontos, Howes, Shinn, and Galinsky (1995). This scale consists of eleven items related to job perceptions. Items include whether the provider perceives his/her job as a paycheck or a career, feels s/he is making a difference with their work, and how respected s/he feels. Providers rated each item on a 5-point scale, ranging from 1 (not at all the way that I feel) to 5 (exactly the way that I feel). In our analytic sample, the Cronbach's alpha was .72 for the seven items comprising Intrinsic Motivation and

¹⁹ Sample size for analysis of these measures ranged from 67 to 95, depending on the subscale and time point (see Table 3).

.58 for the four items comprising Dissatisfaction. Scores on each subscale were totaled, with a potential range of 7 to 35 for intrinsic motivation (higher scores indicating more motivation to be a child care provider) and 4 to 20 for dissatisfaction (higher scores indicating more dissatisfaction with being a child care provider).

The Family Activities Inventory (Harper & Parry, 1999) is a self-report questionnaire measuring perceived caregiving skills, beliefs, and practices from a strength-based perspective. One section, measuring perceived caregiving skill, was used in the current study. This scale assesses how the provider perceives their caregiving skill in relation to others, by rating each item on a scale of 1 (less than average) to 3 (better than average). We calculated the average of responses to 12 items, such as “Rate how well you: Interpret children’s signals (such as know when he or she is hungry, sick, hurt or upset),” and “Rate how well you: Help children learn through play.” Scores range from 1 to 3, with higher scores indicating that the provider perceives her/himself to be more skilled than the average caregiver.

The Luster Parent Opinion Survey (Luster, 1985), a self-report questionnaire measuring beliefs about children and caregiving, was used to measure a variety of attitudes and beliefs about caregiving. A subset including 33 of the original 60 items was used, with some wording adaptations made to make the measure applicable to providers (e.g., the term “parent” was changed to “caregiver”) and to update terms that have fallen out of use (e.g., “playpen” was changed to “pack’n’play”). We used five of the six subscales on the Luster: beliefs about spoiling ($\alpha = .86$), freedom to explore ($\alpha = .44$), discipline and control ($\alpha = .56$), perceived influence ($\alpha = .41$) and perceived

competence ($\alpha = .56$). Each item is rated from 1 (strongly disagree) to 6 (strongly agree), with certain items reverse coded. “Beliefs about spoiling” consists of seven items, such as “It is likely that you will spoil a baby if you respond to most of his/her cries.” Scores can range from 7 to 42, with higher scores indicating a strong belief that children can be spoiled by too much attention and affection. “Beliefs about freedom to explore” consists of six items such as “As long as the infant is safe and the object will not be damaged, he/she should be allowed to play with almost any object in the home that interests him/her.” Scores can range from 6 to 36, with higher scores indicating the belief that infants should be free to explore their environment. “Beliefs about discipline and control” consists of four items, such as “One of the best ways to prepare a child to be a good student is to teach him/her to be obedient.” Scores can range from 4 to 24, with higher scores indicating belief in the importance of strict discipline and self-control. “Perceived influence” consists of eight items, measuring whether the provider perceives caregiving to have much influence over a child (versus inborn characteristics or chance). Items include “The way children turn out often has little to do with how caregivers raise them” and “The most important difference between children who are good students and children who do poorly in school is the amount of ability they are born with” (reverse-coded). Scores can range from 8 to 48, with higher scores indicating the perception that caregivers do influence children’s development and outcomes. “Perceived competence” consists of four items, such as “I am a more competent caregiver than most other caregivers I know.” Scores can range from 4 to 24

with higher scores indicating that the provider perceives her/himself to be competent and knowledgeable.

Appendix D

Detailed Description of Speech Sample Coding

The purpose of this coding system is to capture aspects of adult thoughts and attitudes that underlie the adult-child relationship and adult-child interaction, and the extent to which those thoughts and attitudes reflect a continuum of complexity of adult thinking in relation to infant and toddler development. To code speech samples, transcripts are analyzed and broken down into thought units—statements or parts of statements conveying a single thought or idea—which are coded as falling within a category (child description, adult practices with the child, goal, or priority) and level (1, 2, or 3), and may be connected to each other.

Child descriptions are thought units regarding the focal child's features, qualities, behaviors, skills, or attributes. At level 1 (most concrete), these are physical descriptors or surface level factual statements, such as “she is two years old” or “she is small in stature.” Level 2 child descriptions include behaviors, skills, and abilities of the child (e.g., “she is able to communicate very clearly”), developmental milestones they have reached (e.g., “he just started to move from the sitting to the prone position and to scoot around”), and the child's likes and dislikes if they refer to fairly concrete objects or activities (e.g., “he likes to be outside”). At level 3 (most abstract), child descriptions are conceptual in nature, such as describing the child's personality, disposition, or temperament. Statements about likes and dislikes are included here if they refer to more abstract ideas or a whole class of behaviors. Examples of level 3 child descriptions include “she kind of knows her own mind” and “she's kind of cranky in the morning.”

Adult practices are defined as descriptions of actions, behaviors, and intentions of the adult toward the focal child. Level 1 includes specific, concrete instances of behavior, such as “just today, I gave her a spoon.” Level 2 includes categories of behavior, general practice and typical routines the adult carries out with this particular child, for example “we take him over to see his sister in the toddler room.” The most abstract and complex level for adult descriptions, level 3, includes statements indicating that the adult is monitoring and reflecting on their interactions with the child, such as “I feel like time is moving on, and we need to progress a little bit more.”

Any statement that indicates intention or motivation that is behind an action or practice is coded as a goal. Goals indicate clear desired outcomes, and range from level 1 (adult-centered) to level 3 (child-centered). At level 1, goals focus on the adult’s needs or wants rather than the child, family, or group’s needs or wants. No indication is given that the child’s perspective has been taken into consideration, for example “I just don’t want him to have it [his pacifier] during the day anymore.” Level 2 goals focus on the children’s needs, wants, or development as a group, or on the family’s needs and wants. They may be goals for the individual child, but they are motivated by meeting family or group needs. “I know all kids do need boundaries as far as [*sic*] for safety reasons” is an example of a level 2 goal. Goals focusing on the focal child’s individual needs, wants, or development are coded at level 3, such as “I mean he definitely needs structured play time and structured rest time because if he gets too much of play time...”

Priorities indicate a potential conflict between two or more competing goals, or a hierarchy of goals. Similar to coding of goals, they range from level 1 (adult-centered) to level 3 (child-centered). Adult-centered refers to the adult-centered goal taking priority over the child- or group-centered goal. For instance, this caregiver indicates that her desire not to feel manipulated takes priority over the child's desire to be picked up: "she will try to manipulate you by making you chase her or pick her up and carry her. That is the main thing she wants is to be picked up and carried. So just don't let her play that game." Level 2 indicates a balance of priorities, where either an adult-centered or group-centered goal is balanced with a child-centered goal, such as "I guess it kind of just depends on what I have going on for the rest of the family and what will work as far as giving him time to play and time to rest." Level 3 indicates a child-centered goal taking priority over an adult-centered goal, such as "Even though we want to have all of the children participate in large group, we've been working on developing his large motor skills and he was really making progress today, so we let him and a few of the other children stay in the gym during group time."

A chart of each speech sample is created which diagrams the thoughts and connections, and quantitative scores are also assigned. If the speaker connects or relates one thought unit to another, this is considered a connection or "link." On each chart, dots indicate each thought unit and lines between dots indicate connections, as shown in Figure 2. Scores are assigned based on the number of thought units (1 point each) and connections (5 points if the link is across levels but within one category, 10 points if the link is across categories), with higher scores indicating more complexity of thought.

Speech samples were collected from 87 providers at Time 1, 73 providers at Time 2, and 54 providers at Time 3. In our sample, scores ranged from 5 to 227, with overall means of 91.5, 87.8, and 79.3 at Time 1, 2, and 3, respectively.

Complexity of Adult Thought Underlying Caregiver-Child Relationships:

A Speech Sample Coding Scheme

Created and piloted 2006-2009, for use in the Ounce Research Project, by:

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Thomas, R. G., & Englund, M. (1990). *Instructional design for facilitating higher order thinking. Vol. II: Instructional design model*. Saint Paul: University of Minnesota, Minnesota Research and Development Center for Vocational Education.

Overview/Introduction

Largely unstructured speech samples were obtained via phone conversations with parents and providers participating in the Ounce Research Project. Parents and providers were asked to speak for up to 5 minutes about the focal infant or toddler so that we could “get to know the child.” Parents and providers were encouraged to say as much as they wanted to, or could, and then a standard set of probes was used. (NOTE: There was variation in the use of the standard probes across community researchers, although attempts were made to standardize as much as possible). These speech samples were audiotaped and then transcribed for coding.

The purpose of this coding scheme is to capture aspects of adult thoughts and attitudes that underlie the adult-child relationship and adult-child interaction, and the extent to which those thoughts and attitudes reflect a continuum of complexity of adult thinking in relation to infant and toddler development.

We plan to use this coding system to understand how adult thoughts and attitudes may change over time, to see how parents and child care providers from their perspectives describe infants and toddlers and their development, to see if these attitudes and thoughts are linked to provider behavior with the focal children, and to see if providers who used the Ounce Scale are more attuned to the development of their focal children.

The chart below shows, in brief, what each box of the coding system represents. See “Category & Level Descriptions” for full definition and examples of what might be coded in each box. Coding a speech sample transcript includes four basic steps: 1) read the transcript, 2) code statements in the transcript based on the coding scheme, 3) chart your codes, and 4) score the transcript based on your chart. See the “Coding Process” section for a more detailed description of each step.

(Levels)	Child Descriptions	Adult Practices with Child	Goals	Priorities
1 (concrete/ lower order)	Physical descriptions	Concrete instances	Adult-centered	Adult-centered
2	Behaviors, skills	Categories	Group/family-centered	Balance
3 (abstract/ higher order)	Conceptual descriptions	Reflection on Practices	Individual, child-centered	Child-centered

Category & Level Descriptions

Child Description

- Definition: A description of the focal child only, which does not include other children in the environment or children in general, except if the other children are the focal child's sibling(s), especially when talking to a parent. Also, as long as the child is specifically referred to even if they are a part of a group, this could be coded as a child description. The description may be regarding the child's features, qualities, behaviors, skills, or attributes.
- Note: Age can be a physical description if it is not mentioned in relation to a developmental milestone. Birthdate is equivalent to age.
 - Level 1: Physical Descriptions
 - Physical descriptions of the child, concrete observations of appearance, physical attributes, etc. Level 1 also includes statements that describe the child in an indirect way, e.g. if a provider states that “she has a great family, two parents who just love her to death!” this would be coded here, as it does give us “factual” information about the child.
 - Examples:
 - “She is small in stature”*
 - “She has the cutest little smile and she has the sweetest little voice”*
 - “She just has a giggle that’s very charming”*
 - “She is two years old”*
 - Level 2: Behaviors, Skills
 - Behaviors or skills the child is actually doing at home or in care; milestones the child has reached in development.
 - “Likes,” as in, “He likes _____.” Those likes (the direct object) are things that are concrete, physical manifestations of things; for example, toys, coloring, an activity. (The same rule can be applied to: “She dislikes _____.” or “He loves _____.”)
 - Examples:
 - “His speech has just really taken off”*
 - “He just started to move from the sitting to prone position and to scoot around”*
 - “She does a lot of self stimulating behaviors”*
 - “He has great climbing skills”*
 - “She is able to communicate very clearly”*
 - “Or if you have a scarf or something, that makes him giggle and laugh and he wants to do it over and over again.”*
 - “She is quiet.”*

“He likes to be outside.”

“She likes dinosaurs.”

“She is normally a very active little girl”

○ Level 3: Conceptual Descriptions

- Observations that describe the child conceptually, such as describing the child’s personality, disposition, or temperament.
- “Likes,” as in “She likes _____.” Those likes (the direct object) are things that are more abstract like freedom or boundaries. If the like includes a whole class of behaviors it is more conceptual and is coded as a level three child description. (This same rule can be applied to: “She dislikes _____.” or “He loves _____.”)
- Examples:
 - “She’s kind of cranky in the morning”*
 - “She’s just so smiley and sweet and loving”*
 - “She seems sad a lot”*
 - “She kind of knows her own mind”*
 - “He is not a real active baby.”*
 - “And the other thing socially is that he likes games a lot more now, like playing peek-a-boo, and like ‘Where are you?’”*
 - “He likes the freedom of being outside.”*

Adult Practices with Child

- Definition: The type of involvement the adult has with the focal child, what the adult(s) does with the focal child (or children as a group as long as it includes the focal child). Descriptions or reports of actions, behaviors, intentions by the adult toward the focal child. In general, what is done with the focal child or what the teacher or parent does with the focal child. A self-reflective description of why an action was carried out or implemented is also included here, as are recommendations by the parent or provider about what works with that child (this is especially common after the substitute caregiver prompt).
 - Do not code as adult practice: policy and procedures that are in place at child care programs, such as when adults are interacting with each other about the children in care, i.e. “I have posted them in the room, all the routines for all the babies.” “They’re all being asked to start feeding him with bottles now.”
- Level 1: Concrete Instance
- A concrete, specific instance of adult behavior/action that an adult has with the child. An example of adult practice with a child that may include a specific time or day when the instance occurred.

- Examples:
 - "He literally jumped in the deep end of the pool in six feet of water and I jumped in and got him."*
 - "Just today, **I gave her a spoon** so she could practice feeding herself."*
 - (the second half of this would be coded as G1, and they would be linked)*
- Level 2: Categories
 - Categories of behaviors or actions; general practice; routines. Most statements of adult practice fall in this category.
 - Examples:
 - "You know, the other things, we just kind of do with all of the babies, like the language you know **talking to him and doing things, and routines and repeating sound** [A2] something like that but we tend to do with everybody."*
 - "And as far as language, we are just, he is doing a lot of babbling[C2], and we are, you know, **helping the babbling** [A2] {C2-A2} and...just saying words, and **we've started doing signs in the room for all the babies, just a few basic signs.** [The signs are] **eat, drink, more, all done.**" [A2]*
 - "You know, and just the things we're doing with development and **make sure he has tummy time.**"[A2]*
 - "**We are working on him pulling himself up** [A2]; you know helping him to try to give him opportunities and having things of that height in the room so he can pull himself up to standing. [G3]"*
 - "...But um, I would say it's just the timing of how we're doing food, I guess it's like the other development he's doing a lot of finger food [C2] and **we're doing more into the cooked vegetables** [A2] that are kind of a more chewy, and stuff like that." {C2-A2}*
 - "Um...kind of a highlight of his day, **we take him over to see his sister in the toddler room** [A2] ...and you know, he always, like makes a really big smile and some gesture that shows he is happy to see her [C2]. {A2-C2}*
 - "Anyone can pick him up and play with him." [A2]*
- Level 3: Reflection on Practices
 - Thoughts about what the adult needs to do, what they should be doing or something they are glad they are doing; a thought unit that shows the adult is monitoring and reflecting on his/her own practice with the child.

- Examples:
 - “***And we started kind of timing things a little differently [A3], and now he loves the bottles [C2] {A3-C2}, so now they’re all being asked to start feeding him with the bottles.***”
 - “***...But um, I would say it’s just the timing of how we’re doing food,[A3] I guess it’s like the other development he’s doing a lot of finger food [C2] and we’re doing more into the cooked vegetables that are kind of a more chewy, and stuff like that.***”
 - [A2] {A2-C2}
 - “***Let’s see... yeah, the movement, that’s the thing that stands out because I feel like time is moving on, and we need to progress a little bit more.***”

Goals

- **Definition:** Purposes, intentions, or outcomes desired. Statements indicating that the parent/provider is trying (or has tried, is going to try) to achieve something relating to the current child—not merely a statement of action taken by the adult, but a statement indicating motivation, that there is a goal behind the action. Statements are coded based on the reasoning or motivation (the goal), not on the action/behavior/end result/etc. There is a clear desired outcome.
- **Coding Note:** If you are having difficulty deciding if something should be coded as a goal, it may help to remember that goals often have a phrase indicating a purpose to the action, or desired outcome, such as “he needs to,” “we try to,” “we are working on,” etc. In many cases one statement will include either an adult action or child description *and* a goal, with a link between them. When this occurs in the examples below, the section indicating a goal is in bold type.
- **Note:** Goals may not necessarily link to anything. They may be mentioned separate from anything else.
 - **Level 1: Adult-Centered**
 - These goals focus on the adults’ needs or wants, rather than on the child, children, or family’s needs or wants.
 - Examples:
 - “***...we just like to keep her busy and occupied because idle hands can create a little bit of a monster sometimes.***”
 - “***I don’t really want him to have it [his pacifier] during the day anymore.***”
 - **Level 2: Group/Family-Centered**
 - These goals focus on the children’s needs, wants, or development as a group, or the whole family’s. They may be goals for the individual child but that are motivated by meeting group/family needs, rather than that child’s individual needs (e.g. keeping on a schedule in order to meet multiple people’s needs, not for the

good of that particular child). They may be specific to this group of children or may be goals about children in general.

- Examples:
 - “And he dislikes boundaries **but I know all kids do need boundaries as far as for safety reasons**”*
 - “I guess it kind of just depends on what I have going on for the rest of the family”*

○ Level 3: Individual, Child-Centered

- These goals focus on the individual child’s needs, wants, or development.
- Examples:
 - “She's not shy around strangers **which is something we are starting to work on a little bit just to protect her a little bit.**”*
 - “I mean he definitely needs structured play time and structured rest time because if he gets too much of play time...”*
 - “And we'll ask her if she wants to do use the flashcards or play with the toys or read books- **we try to give her some choices.**”*
 - “so the thing we are working on developmentally, is movement [referring to this particular child].”*
 - “We are working on him pulling himself up, you know helping him to try to give him opportunities and having things of that height in the room so he can pull himself up to standing.”*

Priorities

- Definition: Priorities indicate a potential conflict between two or more competing goals, or a hierarchy of goals (needs, wants, child’s development) where at least one of the goals is explicitly stated as a goal of the adult (this could include adult goals for the child). A priority would identify what goal the adult thinks is more important in relation to another competing goal. The focus is on what goal or goals take priority over other goals. Whose needs and what outcomes are important are also considered as part of this category.
- Coding Note: Goals that are stated as a child’s goal (e.g. “she really wants to be able to use the big-kid climber”), rather than as an adult goal for the child, would not be coded *as a goal*, but could be considered when coding priorities.

○ Level 1: Adult-centered

- Adult-centered goals have priority over child-centered goals. Adult-centered goals need to be stated as goals of the adult, child-centered goals may be either the child’s goals or the adult’s goals for the child.
- Examples:
 - “Every now and then when he wants like he sees his pacifier, and I don’t really want him to have it during the day anymore, he’ll*

see that and he'll have a little bit of a fit over that."

"She will try to manipulate you by making you chase her or pick her up and carry her. That is the main thing she wants is to be picked up and carried. So just don't let her play that game."

○ Level 2: Balance

- Balance between adult and child-centered goals or a balance between group-centered goals and child-centered goals. There needs to be an adult recognition of the child's perspective that is explicitly stated.

- Examples:

"Just having freedom I think to explore. He loves that. And he dislikes boundaries but I know all kids do need boundaries as far as for safety reasons."

"I guess it kind of just depends on what I have going on for the rest of the family and what will work as far as giving him time to play and time to rest."

"We pretty much have a curriculum that is all set, where we actually have it planned out ahead of time. So we follow the curriculum, but then there is plenty of free playtime throughout the day. And there is, the shelves are just open, so she can make her own choices or we are outside and again she can make her own choices."

○ Level 3: Child-centered

- Child-centered goals have priority over adult-centered goals. As in level 2, there needs to be adult recognition of the child's perspective that is explicitly stated. Child-centered goals need to be stated as goals of the adult for the child, adult-centered goals can be either a goal for the adult or an adult-centered goal for the child.

- Examples:

"Although I need some time to myself to relax right after work, I also think it is really important to spend time with him right after I pick him up from daycare so that he feels connected with me. So, I usually spend that time with him, maybe reading to him or just hanging out before I make dinner."

"Even though we want to have all of the children participate in large group, we've been working on developing his large motor skills and he was really making progress today, so we let him and a few of the other children stay in the gym during group time."

The Coding Process

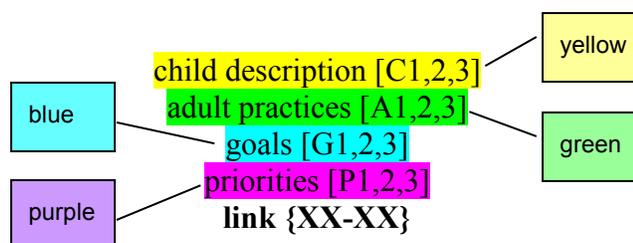
Coding a speech sample transcript includes four basic steps: 1) read the transcript, 2) code statements in the transcript based on the coding scheme, 3) chart your codes, and 4) score the transcript based on your chart. Here we explain these steps in more detail.

Step 1: Read Transcript

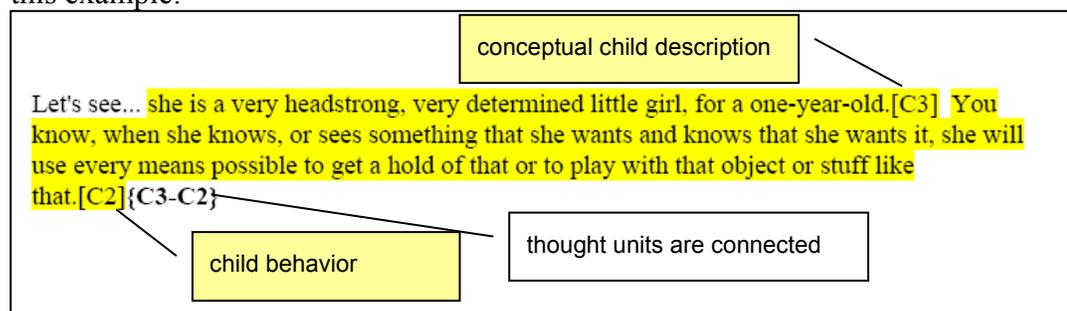
Read the transcript several times through to familiarize yourself with it, before assigning any codes. Make sure you understand the overall tone of the speaker, understand the context of each statement, etc. before attempting to code individual statements. Ask yourself “what is the person *really* saying here?”

Step 2: Coding

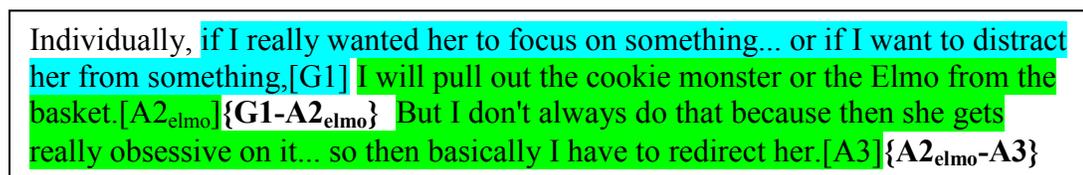
Using the “Category & Level Descriptions” section (above) as a guide, code statements in the transcript. We have found it useful to code in a Word document, indicating codes in brackets after the thought unit and highlighting the corresponding thought unit, using these conventions:



Links are indicated by different brackets and bold, connected with a dash, as shown in this example:



If there are multiple links to one thought unit, or multiple links in one sentence, it can be useful to add subscripts to clarify which thought units are linked. In this example, “elmo” is used to identify the A2 statement, and to clarify that both links are to that same A2 statement:



Step 3: Charting Codes

Each transcript's codes will be charted, and scores will be calculated based on the chart. (See appendix for a blank coding chart.) It is essential that everyone charts their coding in a uniform way, according to these basic principles:

- Each individual thought unit that is coded is indicated by a dot in the appropriate box. It is easiest if you copy and paste the dot (and later the linked dots) from the “key” section on the coding sheet. Place the dot in the appropriate box based on how you coded that thought/phrase/item from the speech sample.
- One sentence may contain multiple “thought units” and therefore may be coded in several places on a chart.
- If the speaker connects or relates one thought unit to another, indicate this on the chart by placing a line, or “link” between them. Links may occur across different levels of the same category, within the same level but across categories, or across different levels *and* different categories. They do not, however, occur within the same box, i.e. the same level and same category.
 - Example: Different Levels of Same Category
“...and we’ve started doing signs in the room for all the babies, just a few basic signs. [The signs are] eat, drink, more, all done.” The first mention here is of signs in general, so it would be coded as Adult Practices, level 2. Then specific examples of the signs they use are given, which would be coded as Adult Practices, level 1. Here is the chart:

(Levels)	Child Descriptions	Adult Practice with Child	Goals	Priorities
1		•		
2		•		
3				

- Example: Different Categories, Same Level
“Um...kind of a highlight of his day, we take him over to see his sister in the toddler room...and you know, he always, like makes a really big smile...” The first part of this sentence would be coded as Adult Practices, level 1; the second part is Child Description, level 1. The chart would look like this:

(Levels)	Child Descriptions	Adult Practice with Child	Goals	Priorities
1	•	•		
2				
3				

“She’s not shy around strangers which is something we are starting to work on a little bit just to protect her a little bit.” In this example, the first section would be coded as Child Description, level 3, and the second section as Goals, level 3. The chart would look like this:

(Levels)	Child Descriptions	Adult Practice with Child	Goals	Priorities
1				
2				
3	•		•	

○ Examples: Different Levels and Different Categories

“...we just like to keep her busy and occupied because idle hands can create a little bit of a monster sometimes.” The first half of this statement would be coded as Adult Practices, level 2; the second half as Goals, level 1, charted like this:

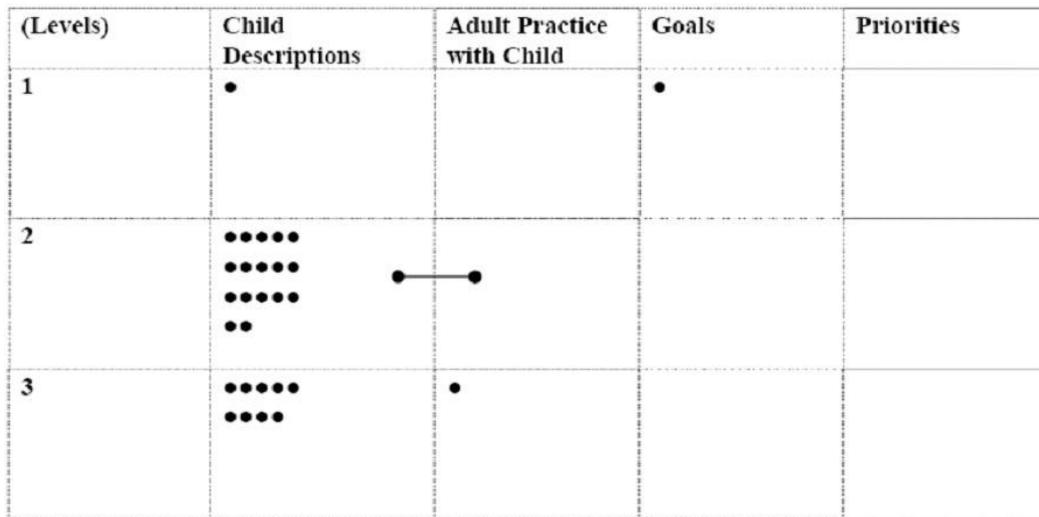
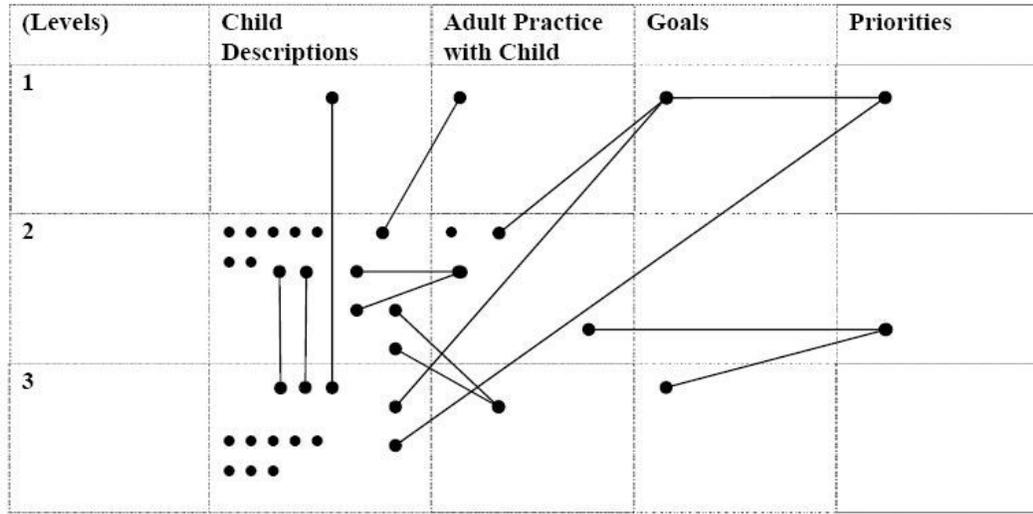
(Levels)	Child Descriptions	Adult Practice with Child	Goals	Priorities
1				
2				
3				

- Multiple Links—one statement may be coded with multiple dots *and* multiple links, as in the example below.
 - Example:

“Just having freedom I think to explore. He loves that. And he dislikes boundaries but I know all kids do need boundaries as far as for safety reasons.” This example contains two Child Description items, both level 3 (he loves freedom to explore, he dislikes boundaries), a Goal, level 2 (safety for all children), and a Priority, level 2 (balancing his dislike of boundaries with safety concerns). Multiple links would be drawn here, as shown:

(Levels)	Child Descriptions	Adult Practice with Child	Goals	Priorities
1				
2				
3				

- When you are finished charting your codes, *every* thought unit that you coded in the transcript should be represented by a dot on the chart. In addition, some *but not all* of those dots will be connected by links, indicating that two thought units were connected or related to each other by the speaker. For instance, a completed chart may look something like these examples:



Step 4: Scoring

- Scoring can be calculating based entirely on the chart (this is easier than going back through the transcript).
- Scoring is cumulative—you simply assign the following point values, and add up the total
 - thought unit (dot) = 1
 - within category link = 5
 - across category link = 10

- The following box is included on the coding chart for you to record scores:

SCORING

		#	pts each	points earned
dots	Child Descrip.		x1	
	Adult Practice		x1	
	Goals		x1	
	Priorities		x1	
<i>dot subtotal</i>				
links	w/in category		x5	
	across category		x10	
<i>link subtotal</i>				
TOTAL points				

- For example, here you can see how one sentence would be coded, charted, and scored:

Because she is so verbal[C3] I can tell her things like use your words, instead tell him it's my turn.[A2]{C3-A2}

SCORING

		#	pts each	points earned
dots	Child Descrip.		x1	1
	Adult Practice		x1	1
	Goals		x1	
	Priorities		x1	
<i>dot subtotal</i>				
links	w/in category		x5	
	across category		x10	10
<i>link subtotal</i>				
TOTAL points				

(Levels)	Child Descriptions	Adult Practice with Child	Goals	Priorities
1				
2				
3				



Guidelines & Reminders

The following are points to keep in mind when coding:

- Refer to the entire speech sample for context when you code a transcript.
- Err on the side of caution when debating between coding levels. This seems to be especially relevant when coding either a C2 or a C3. Unless the child description is overtly conceptual, code C2. If the adjective describing the child is more on the concrete side, code C2.
- If a statement is general and can apply to many behaviors, that is, if it is conceptual, code it C3.
- Chunk. “Talking to him and doing things and routines and repeating sounds” would be one thought unit, not two or three, because it is a “laundry list” of descriptors answering one question or meant to make one point. Another example: CR: “Does she have any favorite activities?” Parent: “painting, coloring” is one thought unit, not two.
- But don’t always chunk: “She’s a great kid. She’s an absolute delight” are considered two separate thought units, because the second elaborates and goes beyond what is stated in the first. “She loves to color. She loves to paint” are two separate thought units, because they are stated as though the speaker thought of one first, and then added the other as a separate thought.
- If a speaker repeats a concept one after another, “She is really quiet, a really quiet child. She seems sad a lot, really quiet.” “quiet” is only coded one time. If a descriptor (“quiet”) is used multiple times but spaced farther apart (other topics described in between), you would code it multiple times, within reason.
- When a speaker is answering a question and the response is a fragmented or incomplete sentence where the full meaning cannot be understood, the sentence is not coded. If the prompt was specific enough and you know what they mean by their response, then we will code that.
- It may help to think of links as modifiers. They *usually* appear when one statement is used to elaborate or modify an initial statement. It is a connection between the speaker’s thoughts. It allows for some explanation, allows for some finer grain understanding. The speaker clearly connects two ideas or thoughts – the thoughts do not necessarily need to be related ideas in the reader’s mind (the connection needs to be clear to the speaker). A link may enhance understanding of a topic or tell the reader about a process. In general, a link is used to document when the speaker reveals a deeper level of understanding and sophistication about how the speaker connects things in his/her mind. Use of the words, “because” “since” “so” often trigger a link.
- We generally don’t code routines unless it tells us about how it affects the child or how the child participates in the routine. (e.g. “Every morning we change diapers and then sit down for breakfast” would not be coded; “Every morning at diaper time he’s really cooperative” *would* be coded.)
- Names are not coded.

Ounce Speech Sample Coding Chart

Speech Sample # (blinded ID):

Coded by:

Date Coded:

(Levels)	Child Descriptions	Adult Practice with Child	Goals	Priorities
1				
2				
3				

KEY:

• (dot) = thought unit

— (link) = connection/relation between thought units

●—● (preformatted line for copying into above chart)

SCORING

		#	pts each	points earned
dots	Child Descrip.		x1	
	Adult Practice		x1	
	Goals		x1	
	Priorities		x1	
<i>dot subtotal</i>				
links	w/in category		x5	
	across category		x10	
<i>link subtotal</i>				
TOTAL points				

Parent/Provider sections of transcript, with coding notes as follows:

child description [C1,2,3]

adult practices [A1,2,3]

goals [G1,2,3]

priorities [P1,2,3]

link {XX-XX}

[text of transcript goes here]