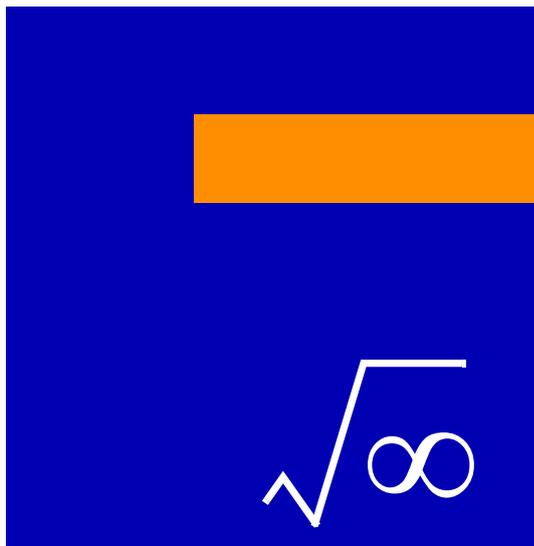




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für Wirtschaftsforschung

Data Documentation 25



Lisa A. McCabe
Debra J. Ackerman

**Child Care Center Quality:
Measurement Issues and Links to Child
Developmental Outcomes**

IMPRESSUM

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DIW Berlin
Deutsches Institut für Wirtschaftsforschung
Mohrenstr. 58
10117 Berlin
Tel. +49 (30) 897 89-0
Fax +49 (30) 897 89-200
www.diw.de

ISSN 1861-1532

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Lisa A. McCabe *

Debra J. Ackerman **

Child Care Center Quality: Measurement Issues and Links to Child Developmental Outcomes

Berlin, October 2007

* Cornell Early Childhood Program, Department of Human Development, Cornell University, USA;
lam4@cornell.edu

** National Institute for Early Education Research, Rutgers, The State University of New Jersey

This paper is based upon an expertise on behalf of the German Socio-Economic Panel Study (SOEP)

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1 Introduction

Questions regarding how early care and education (ECE) experiences affect child development have long been a topic of interest for researchers and policy makers alike. Does participation in ECE affect later cognitive and social skills? If so, what skills in particular? And how do particular features of ECE settings relate to these later outcomes? Such questions can not be answered without examining the ECE settings serving young children. Yet, challenges in operationalizing “quality” and which inputs contribute to it have led to a broad research base with findings that are often contradictory. Furthermore, while the field has produced more than a few instruments designed to assess the quality of ECE settings, these instruments mainly rely on direct observations by trained observers. As a result, gaining a sense of the quality of a large number of ECE programs across an equally large geographic area can be a cost- and time-prohibitive endeavor.

In this paper, we review recent research on the quality of center-based programs serving pre-school-aged children in order to address the following two questions:

- 1) What do we know about the link between ECE quality and children’s early learning and developmental outcomes?
- 2) Can quality be validly measured using surveys or interviews in the absence of direct observations?

We begin by providing more detail about how quality is typically defined in the early childhood field. Next we outline what the literature says about quality of ECE and later cognitive and social outcomes in children. We also review the extensive literature examining how particular features of quality relate to one another. In addition, we highlight some existing measures of quality, including some recent attempts to assess quality using survey techniques. Finally we conclude with some measurement issues to consider and recommendations for examining quality in large-scale studies where direct observations are not feasible.

2 What is Quality?

Long-term studies of preschool programs suggest quality relies on several common elements (Frede, 1995). Consensus seems to have emerged that these elements can be categorized into two main components of quality: process and structural. To set the stage for this paper, in this section we provide definitions for both process and structural quality in early education settings.

Process quality is typically defined as the interactions and activities that happen on a day-to-day basis that have the potential to enhance children's cognitive, physical, and social-emotional development. Much of the early childhood field associates process quality variables with those falling under the umbrella term of "developmentally appropriate practice." High-quality, developmentally appropriate classrooms feature many meaningful interactions between children and teachers and their peers, whether working one-on-one with a teacher, or within small-group or large-group activities. Children also have the opportunity to participate in a wide variety of age-appropriate activities, which are responsive to their individual interests, developmental abilities, curiosity, and home language and culture (Bredekamp & Copple, 1997; Espinosa, 2002; Ferrar, 1996; Peisner-Feinberg et al., 1999). Using a slightly more narrow definition, Cassidy and her colleagues contend that process quality requires human interaction (Cassidy, Hestenes, Hansen, Hegde, Shim, & Hestenes, 2005). This definition differs somewhat from others who include interactions with materials as part of process quality. However, the field agrees that process quality must include *interactions* of some kind and thus represent more "proximal" characteristics for which children come in direct contact (Dunn, 1993).

Structural quality encompasses the environmental features of a program. One way to characterize structural features is as dimensions of the environment independent of human interaction (Cassidy, Hestenes, Hansen et al., 2005). These more "distal" features set the stage for interactions to occur (Dunn, 1993). Examples of structural quality indicators include child to teacher ratio, group size, teacher education, program enrollment, and teacher salaries and benefits. Structural quality indicators are typically easier to measure than are those representing process quality. Additionally, structural variables are often subject to regulatory agencies that set guidelines and limits for what constitutes an appropriate caregiving environment.

3 What Do We Know about Quality Inputs, Program Quality, and Children's Outcomes?

Family variables, such as socioeconomic status, maternal education levels, and the quality of maternal caregiving, play a large role in children's outcomes (Kontos, 1991; Kontos & Fiene, 1987; NICHD ECCRN, 2002a). However, a significant literature base documents the additional effects on children's outcomes of high-quality early care and education programs, especially for children at risk for poor outcomes because of factors such as poverty (Duncan & Brooks-Gunn, 2000; Hungerford & Cox, 2006). Much of this research focuses on experimental, university-based interventions for disadvantaged children (Barnett, 1998). Other research has examined the quality of more typically accessed, community child care, and just as importantly, documents that quality matters for middle-class families, too.

3.1 Cognitive Development

A primary emphasis in many investigations of child care quality and child outcomes is children's cognitive development. For example, an earlier study of nine child care centers in Bermuda found that children's language development and verbal skills could be predicted by their centers' quality scores (Phillips, Scarr, & McCartney, 1987). A five-year study of over 500 3- and 4-year-olds' school readiness in North Carolina showed that as their child care quality improved, so did their early language, literacy, and math skills (Bryant et al., 2003). The landmark Cost, Quality, and Outcomes study (Peisner-Feinberg & Burchinal, 1997) also found a correlation between preschoolers' vocabulary and academic skills and child care quality. Secondary analysis of large datasets, including that from the CQO Study, also found that quality modestly predicts children's language, and math, (Burchinal & Cryer, 2003; Burchinal, Peisner-Feinberg, Bryant, & Clifford, 2000). Data from the large-scale NICHD study (NICHD ECCRN, 2000b; 2002b; 2003) also demonstrated that children's cognitive and language development at age 3 and 4 ½ is related to the overall quality (and especially teacher's sensitivity and responsiveness) of their child care experiences. In fact, quality is so important to these cognitive outcomes, that Duncan's work with the NICHD data set (NICHD ECCRN & Duncan, 2003) suggests that by the time children are 4 ½, a 1 Standard Deviation increase in child care quality increases their cognitive scores 2.6 points on a composite of four Woodcock-Johnson language and memory subtests, resulting in an effect size of approximately .17.

While such an effect size is small, it is consistent with what one would expect from early education initiatives.

Evidence suggests that caregiver education may be a particularly important feature of quality when considering child outcomes. In an early study using an experimental design, children who were assigned to classrooms in which teachers had more education and training demonstrated greater gains in school readiness and task persistence (as well as cooperative behavior) when compared to children in classrooms in which teachers had less education and training (Ruopp, Travers, Glantz, & Coelen, 1979). More recent work also supports a link between teacher education and child outcomes. When caregivers had post-high school certification or a college degree related to early childhood, statistically significant differences in three-year olds' school readiness and language comprehension emerged (NICHD ECCRN, 1999). The academic outcomes of 4 ½ year olds was also associated with teachers' education levels (NICHD ECCRN & Duncan, 2003). Other studies also show a relationship between caregiver education and children's development. For example, preschoolers who were cared for in family child care homes with better-educated caregivers also had better language test scores (Clarke-Stewart, Vandell, Burchinal, O'Brien, & McCartney, 2002). Similar findings have been seen in international studies. In a study of 10 countries¹, language development at age 7 was consistently higher when preschool teachers had more schooling (Montie, Xiang, & Schweihart, 2006).

Despite these consistent findings, a recent analysis of seven preschool studies failed to find a consistent relationship between teacher education and child outcomes (Early et al., 2007). These researchers conclude, however, not that education does not matter, but rather that the educational system is complex and requires further study. For example, the quality of teacher preparation programs varies and was not considered in this study. Also, market forces may be driving who teaches in public preschools (where salaries are typically higher) versus child care programs, thus limiting educational variability in the sample for this study. These complex relationships have yet to be empirically teased apart.

Most studies that focus on early care and education experiences for young children include some measure of staff-children ratio and classroom group size. In fact, while staff-child ratio has been characterized as "the most commonly measured structural variable" (Love, Scho-

chet, & Meckstroth, 1996, p. 27) and was also a key component of model preschool programs (Ackerman & Barnett, 2006), studies that examine its relationship to quality and children's outcomes are not free of contradiction. Nor are the findings consistent for group size and quality. For example, NICHD data show that staff-child ratio influences quality (NICHD ECCRN 2002a), but do not show a consistent association between children's cognitive development and academic achievement at age 4 ½. However, group size did matter, albeit modestly (NICHD ECCRN & Duncan, 2003). In Dunn's (1993) study, staff-child ratio and group size did not predict children's outcomes. The National Day Care Study, a large-scale randomized trial, found only a minimal relationship between teacher-child ratio and preschoolers' developmental outcomes. However, smaller class sizes played a larger role in predicting classroom processes, such as teacher-child interactions, children's involvement in activities, cooperation, and persistence at completing tasks (Roupp et al., 1979). Finally, in a study of 89 economically disadvantaged African-American 3-year olds, expressive and receptive language skills were better when preschool classrooms met recommended teacher-child ratios (Burchinal, Roberts, Riggins, Seisel, Neebe, & Bryant, 2000).

Of course, these conflicting results may be related to possible teacher-child ratios that were not aligned with those recommended for quality in the first place. Other factors may also bring down overall quality ratings. In addition, studies do not always define and measure quality or child outcome variables in the same way, making cross-study comparisons difficult. It should also be noted that there is a paucity of data suggesting that more lax teacher-child ratios or higher group sizes are correlated with higher quality programming.

Program philosophy, that is the teaching strategies employed in a preschool classroom, also seems to be important when it comes to child outcomes. In a study of 10 countries, researchers found that children had higher language skills at age 7 when their early childhood education experiences were in classrooms with more free choice time as opposed to pre-academic and whole-group activities (Montie et al., 2006). Further evidence for the benefit of child-centered curricula comes from Marcon's (1999) work comparing child outcomes in classrooms using one of three different teaching approaches. Children in classrooms emphasizing a child-centered approach to learning showed more gains in basic math, verbal and social skills when compared to children in adult directed classrooms or classrooms using a com-

¹ Countries included: Finland, Greece, Hong Kong, Indonesia, Ireland, Italy, Poland, Spain, Thailand, & the

bined approach. Finally, research on Head Start also suggests that children in classrooms using integrated curricula (such as the child-focused High/Scope curriculum) demonstrate greater gains in cognitive skills (as well as social behavior; Zill, 2003).

3.2 Social Development

In addition to cognitive development, many studies have also examined the relationship between child care quality and social outcomes in children. The data here are less clear than they are for cognitive outcomes (see McCabe & Frede, 2007 for a review focused on behavioral challenges). On the one hand, some researchers have found that quality of care predicts social development. Secondary analysis of large datasets, including data from the CQO Study, found that quality modestly predicts social development (Burchinal & Cryer, 2003; Burchinal, Peisner-Feinberg, et al., 2000). Similarly, in a review of data from 3 studies, including two outside the U.S. (Early Head Start; Sydney Family Development Project; Haifa-NICHD merged data), researchers concluded that quality of care is an important factor in children's social development (Love et al., 2003). Further, classrooms in southern California and Atlanta rated as "very good" on the Early Childhood Environment Rating Scale (ECERS; Harms, Clifford, & Cryer, 1998) tended to have children who experienced a greater incidence of receiving appropriate caregiving and participating in developmentally appropriate activities. These variables led to more secure and attached relationships among students and their child care teachers, which in turn created preschoolers who were more socially competent with their peers (Howes, Phillips, & Whitebook, 1992).

In contrast, other investigations have found that quality is not related to social outcomes such as behavioral problems. For example, the NICHD study found that quantity of center-based child care, and not quality, was a significant predictor of behavioral problems at age 4.5 (Belsky, 2001). This relationship persisted through sixth grade (Belsky et al., 2007), although it was not evident when the same children were in third grade (NICHD ECCRN 2005). Furthermore some have questioned the generalizability of the NICHD findings because of concerns about the range of quality assessed (Love et al., 2003).

Teachers' behavior and interactions with children seem to be especially relevant when examining child care quality and child social outcomes, although, here again, research results can

be contradictory. In a study of 251 preschoolers enrolled in 120 child care centers in three metropolitan areas, teacher-child interactions as measured by items from the Infant-Toddler Environment Rating Scale (ITERS; Harms, Cryer, & Clifford, 2003), ECERS (Harms, Clifford, & Cryer, 1998), and the Assessment Profile for Early Childhood Programs (Abbott-Shim, Lambert, & McCarty, 2000) were significantly correlated with teacher-child ratio, teacher income, and teacher education. Yet, after controlling for mother's education, there was "no association between teacher-child interaction and child outcomes" (McCartney et al., 1997, p. 440). However, this study's findings may be due to low inter-rater reliability on measures that were pieced together from the above-named instruments.

Conversely, in the Bermuda Study (McCartney, 1984; Phillips, McCartney, & Scarr, 1987; Phillips, Scarr et al., 1987), more verbally-stimulating classrooms, characterized by caregivers talking frequently with preschoolers, predicted higher caregiver ratings of children's considerateness and sociability. The amount of verbal interactions also predicted children's ability to communicate and their adaptive language. In another early study (Holloway & Reichart-Erickson, 1988), researchers found a correlation between an engaged and responsive teaching style and middle-class preschoolers' prosocial problem solving abilities. Additionally, in a study of 451 low-income 4-year old children living in four areas of the U.S., researchers used the Arnett Scale of Caregiver Behavior (Arnett, 1989), which measures caregivers' attentiveness, responsiveness, and warmth towards children, as well as their ability to reason and explain misbehavior. When children's preschool classrooms had higher Arnett scores, they also had fewer social problems and higher levels of reading readiness (Loeb, Fuller, Kagan, & Carrol, 2004).

3.3 Long Term Effects

Programs that have been considered to be models of high quality have demonstrated impacts beyond preschool, as well. In the CQO study, quality of child care mattered for children's cognitive outcomes in kindergarten (Peisner-Feinberg et al., 2001). Children's Grade 2 language and math skills were better when they had attended preschool programs exhibiting higher quality practices (Peisner-Feinberg et al., 1999). Longitudinal studies of the small-scale Carolina Abecedarian and Perry Preschool projects and the large-scale Child-Parent Center program, all considered to be high quality programs, demonstrated large impacts on young adults' social and academic outcomes. These include lower rates of teenage pregnancy and higher high

school graduation rates, job earnings, and rates of home ownership (Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002; Reynolds, Temple, Robertson, & Mann, 2001; Schweinhart & Weikart, 1997).

3.4 Conclusions about Child Care Quality and Children's Outcomes

Most policymakers and early childhood stakeholders would agree that “the preponderance of evidence supports the conclusion of a substantial positive relationship between child care quality and child well-being” (Love et al., 1996, p. 3). However, this conclusion should be considered in light of a few cautionary notes. First, with the exception of a few notable studies (Carolina Abecedarian, Perry Preschool), much of the work cited here relies on non-experimental data, making it difficult to establish causality. In addition, selection bias, omitted variables, attrition, and small effect sizes pose significant challenges to generalizing the results of this research. Future research would benefit from inclusion of additional variables, use of change or sibling models, and use of propensity scores (Duncan & Gibson-Davis, 2006).

Second, research to date tends to focus on broad, rather than specific, models of child care quality and child outcomes. Further research is needed to better understand how specific quality elements relate to particular child outcomes, including outcomes often not measured such as physical well-being and approaches to learning (Vandell, 2004; Zaslow et al., 2006).

Finally, one of the biggest challenges to examining the links between early childcare experiences and long-term child outcomes is teasing apart the role that subsequent educational experiences have on children's development. Both common sense and research efforts suggest that what happens to children during their elementary school years also plays a major role and contributes to “fade out” effects often seen over time (Barnett & Hustedt, 2005). A recent study explored specifically how elementary experiences contribute to the academic gains (or lack thereof) related to early childhood education experiences. Using data from the large-scale, nationally representative Early Childhood Longitudinal Study Kindergarten cohort, researchers found that although children without preschool experience entered Kindergarten with lower academic skills, these differences tended to level out when elementary classrooms were small and included high level of reading instruction. Conversely, the differences persisted when children attended larger elementary classes that lacked specific reading instruction (Magnuson, Ruhm, & Waldfogel, 2007).

4 Relationship between Process and Structural Quality

There is general consensus in the early childhood field that process quality is especially important in influencing child outcomes. However, due to the costs and time involved in administering any of the observer-reliant process quality assessment tools available (Ponder, 2001), ascertaining the level of quality of preschool classrooms can be daunting, particularly if stakeholders are interested in multiple programs within a specific geographic area and/or across a large-scale system. In addition, ascertaining how “good” classrooms are in any preschool-aged setting also requires “interpretation and judgment by experts” (Howes, Phillips et al., 1992, p. 450). For these reasons, researchers and policy makers alike often rely on structural variables to serve as a proxy for quality measures.

But what is the evidence that using structural indicators as a proxy for process quality is a valid practice? Numerous studies have looked directly at the relationship between process and structural child care quality indicators. Therefore, as a means for generating ideas about some possible non-observable ways to assess quality, this section of the paper highlights studies that have examined relationships between specific quality components and overall quality. We begin with an examination of staff education, training, and experience. Next we outline factors related to program structure and finances. Finally, we briefly describe research specifically focused on comparisons across different regulatory contexts.

4.1 Staff Education, Experience, & Training

Teacher Education and Training. In the United States, no state requires those who are in charge of a group of children in a privately funded child care setting to have a four-year college degree (NARA & NCCITAC, 2006). The qualifications necessary to be hired as a teacher in state funded-preschool programs varies enormously from one state to the next, as well. For example, teachers working as part of Florida’s Voluntary Pre-K program need to attain a Child Development Associate credential or equivalent. This credential involves completing 120 clock hours of training. In Georgia, which offers preschool for all 4-year-olds, teachers need to have a two-year Associate’s degree. Teachers in New York’s state preschool programs eventually must attain a graduate-level master’s degree. Those in Oklahoma and New Jersey are required to have a four-year bachelor’s degree and specialized certification (Barnett, Hustedt, Hawkinson, & Robin, 2007).

The variation in these regulations reflects a traditional emphasis on custodial care, rather than early education, as well as a less-than-definitive research base. On the one hand, teacher training has not always predicted preschool child care quality (e.g. Phillips, Mekos, Scarr, McCartney, & Abbott-Shim, 2000), although such results may be more reflective of state-regulated training levels that are too low to expect quality to be impacted. Furthermore, the precise type, amount, and content of pre- and in-service training that can predict high quality has not yet been determined (Blau, 2000). As a result, the issue of what type of pre-service credential is needed in publicly funded preschool education initiatives is also a source of contention in the field (e.g. Fuller, Livas, & Bridges, 2005). This issue has been further muddied by recent large-scale studies of such initiatives (e.g. National Center for Early Development and Learning Multi-State Study of Pre-Kindergarten and the State-Wide Early Education Programs Study) that found no relationship between preschool classroom quality and any level of teachers' credentials or training (Early et al., 2006; Early et al., 2007; LoCasale-Crouch et al., 2007).

It may be that specific education or training is necessary, but not enough to ensure high quality (a finding that would be consistent with research on elementary teachers and classroom quality; Early et al., 2006; NICHD ECCRN 2002c). Without randomized studies specifically examining teachers' credentials and training, these relationships are difficult to fully understand. In addition, most studies also fail to address the question of teacher salary, including the significant differences in teacher salaries in child care versus preschool settings, a point to which we return below.

Yet, we do not have data supporting a hypothesis that *less* training is predictive of high quality programming or gains in children's outcomes. Instead, the field has different strands of research on teacher credentials and training, most of which is interwoven with other areas of interest. Some studies have looked for correlations between a concentration in early childhood coursework and teacher practices. Such coursework has been positively correlated with teachers' beliefs regarding providing instruction and experiences that are more developmentally appropriate for young children (Vartuli, 1999). Teachers who received specialized training in early childhood also displayed more interactions of the type found to facilitate young children's language, cognitive, and social skills (Honig & Hirallal, 1998). Similarly, in a study of 101 Midwestern preschool child care programs, teachers who earned their Child Development Associate Credential worked in higher quality classrooms (Torquati, Raikes, Huddleston-

Casas, 2007). In addition, a study of 227 child care centers across the U.S found that preschool teachers' sensitivity was higher when they had either a BA degree or college-level training in early childhood education (Howes, Whitebook, & Phillips, 1992). Teachers with BA degrees and a certificate in early childhood education created a more positive emotional climate and cognitively stimulating environment than those teachers who had no formal training in early childhood (Pianta, Howes, et. al., 2005). In these studies, "more knowledge in early childhood education does appear to influence beliefs, attitudes, and practices of teachers" (Vartuli, 1999, p. 510), which in turn influences the classroom quality of preschools.

Additional studies have examined the role differing amounts of college coursework can play in children's outcomes and classroom quality. Dunn's (1993) exploratory study of 30 preschool caregivers, half of whom had completed one or two years of college in a child-related major, found a correlation between this training and children's cognitive development. Epstein's (1999) study of preschool classrooms found that in public school settings, "years of formal education were positively and significantly correlated with program quality" (p. 111) as measured by the High/Scope Program Quality Assessment (High/Scope Educational Research Foundation, 1998). Secondary analysis of data from studies of over 300 family child care homes (Burchinal, Howes et al., 2002) found that workshop-type training was a better predictor of quality than caregiver-child ratio.

Similarly, the original Cost, Quality, and Outcomes Study (CQO Study Team, 1995) showed that center quality levels rose when a higher percentage of staff had more education. Burchinal, Cryer, Clifford, & Howes (2002) later examined the effects of different types of training on preschool-aged child care classroom quality using the CQO data set. Teachers who had a 4-year bachelor's degree and also attended workshops had, on average, higher quality classrooms than those who did not. Furthermore, children's receptive language was highest when their teachers had a 4-year degree, as well. The correlation of a bachelor's degree to higher ECERS scores in the CQO data was also confirmed in another analysis (Phillipsen, Burchinal, Howes, & Cryer, 1997). Other studies have found similar results. For example, positive caregiving with three-year olds occurred more frequently when caregivers had greater amounts of formal education (NICHD ECCRN, 2000a). Similar findings in Canada also suggest the importance of early childhood education for providing high quality care (Goelman et al., 2006).

Experience. In addition to education, experience also seems to matter to quality in early education settings. Specifically, evidence from various studies has shown that more experienced teachers tend to provide higher quality care (LoCasale-Crouch et al., 2007; Phillipsen et al., 1997; Pianta, Howes et al., 2005).

Director education. In some research neither director education nor experience related to quality indicators (Phillipsen et al., 1997). However, a study in Wisconsin showed that director education was positively associated with teacher education, wages, and beliefs about children and quality of interaction (Adams, Roach, Riley, & Edie, 2002).

4.2 Center Structure

Staff-Child Ratio & Group Size. No matter how much training teachers receive, common sense suggests that their efforts in the classroom can be enhanced—or constrained—by the number of children for whom they are responsible. Even with two teachers in a preschool classroom, if each has more children to care for and educate, each child on average will receive less individualization. Teachers may also feel too overwhelmed to provide the kind of developmentally appropriate activities that engage children and promote both learning and cooperative behavior. Indeed, the large-scale NICHD study (NICHD ECCRN, 2000a) of children up to 36 months old has shown that “caregivers provided more sensitive, frequent, and positive care when they were responsible for fewer children” (p. 131). Meeting state teacher-child ratios also predicted preschool classroom quality in a study of 104 child care centers in Atlanta, Boston, and central Virginia and 521 centers in 4 states (California, Colorado, Connecticut, and North Carolina; Phillipsen et al., 1997).

In contrast, Blau’s (2000) reanalysis of data from the Cost, Quality, and Outcomes study (CQO Study Team, 1995) found that despite the findings of the original study, teacher-child ratios had only a small effect on classroom quality. Combined data from 2 large-scale studies of preschool programs found no relationship between ratios and quality (LoCasale-Crouch et al., 2007). It is possible, however, that preschool programs have less variability in staff to child ratios (when compared to child care programs) making a relationship between ratios and quality difficult to detect.

While the evidence that ratios are important features of child care quality is clear, research on group size seems to show that it is not significantly related to overall quality (although it is

related to child outcomes as pointed out earlier in this paper). The lack of a relationship between group size and overall quality has been replicated in numerous studies (Blau, 2000; LoCasale-Crouch et al., 2007; Phillips et al., 2000).

Half vs. Full Day. In the United States, most state-run preschool programs operate for a half day of 4 hours or less (Barnett et al., 2007). Similarly, Head Start programs are also often only offered as part day programs during the school year. In contrast, child care programs often operate on a full-year basis for 10-12 hours each day. Because of these differences, researchers have begun to tease apart the impact of more hours in an early childhood education setting on quality of care and children's development. Data from the National Center for Early Development and Learning Multi-State Pre-Kindergarten Study suggest that half-day programs were more likely to have lower scores on the "Provisions for Learning" items on the ECERS-R, but not overall ECERS-R score (Pianta, Howes et al., 2005). Although it focuses on 5-year olds, rather than preschoolers, research on half- versus full-day Kindergarten programs is also relevant here. In a study of a nationally representative sample of Kindergarten-ers (more than 8000 children) from the Early Childhood Longitudinal Study-Kindergarten sample, researchers found that children in full-day Kindergarten showed more gains in cognitive skills in literacy and math (Lee, Burkam, Ready, Honigman, & Meisels, 2006).

Ages of Children Served and Enrollment. Whether a child care program for 3- and 4-year-old children also serves younger and/or older children may also be related to program quality. For example, in their study of 509 classrooms in 4 states, Phillipsen and her colleagues (1997) found that centers serving fewer infants and toddlers tended to have higher overall quality (as measured by the ECERS) than did centers with a greater number of young children.

Program Location. Because of the growth in public preschool programs, which often hold classes in public school buildings, recent research has explored whether program location (i.e. school or child care program) is related to quality of care. Evidence to date suggests that program location does not play a role (LoCasale-Crouch et al., 2007; Pianta, Howes et al., 2005).

Staffing Choices. Researchers have also examined characteristics of teaching staff such as teaching roles and number of teachers in a classroom. This research suggests that both matter to quality of care. For example, in a study of 72 teachers from 44 preschool classrooms, Shim, Hestenes, & Cassidy (2004) found that a co-teacher structure (i.e. two lead teachers) was related to higher quality care and more positive teacher behaviors than hierarchical

teacher classrooms (i.e. lead and assistant teacher) or single teacher classrooms. Research also indicates that the number of staff in a classroom directly predicts quality of care provided with higher quality occurring in classrooms with more than 1 teacher (Goelman, Forer, Kershaw, Doherty, Lero, & LaGrange, 2006).

4.3 Financial Factors

Teacher Wages. Some quality inputs may not be regulated by state laws, but instead may be specific to individual preschool centers. One such input is teacher wages, which in the U.S. only need to meet federal minimum wage requirements. They also tend to be less than those found in many other low-skill occupations (Ackerman, 2006). Along with teacher-child ratios, teachers' salaries were "the most significant" (p. 285) input for predicting classroom quality in the CQO study (Mocan, Burchinal, Morris, & Helburn, 1995). Higher wages have predicted the quality of classrooms serving preschool-aged children in other studies as well, even after accounting for other structural indicators (Phillips, Mekos, Scarr, McCartney, and Abbott-Shim, 2000; Phillipsen, Burchinal, Howes, & Cryer, 1997; Whitebook, Howes, & Phillips, 1989). The positive relationship between wages is not limited to studies conducted in the United States. Similar findings have been reported for toddler child care classrooms in Portugal (Pessanha, Aguiar, & Bairrão, 2007) and preschool classrooms in Canada (Goelman et al., 2006). Based on this work, some researchers contend that teacher wages are among the strongest correlates of classroom quality (Phillips et al., 2000; Phillipsen et al., 1997; Scarr, Eisenberg, & Deater-Deckard, 1994).

Only one recent study has not supported this consistent finding. In the Multi-State Pre-Kindergarten Study, as wages went up, overall quality tended to drop (Pianta, Howes et al., 2005). However, these discrepant findings may be due to the fact that the focus here was on state-run pre-kindergarten programs, in which salaries tend to be closer to those of public school teachers, and not child care programs where wages are notoriously low.

When considering teacher wages, it is also important to note their relationship to parent fees. In Phillips et al's work (2000) examining typical child care in 3 states, they found that parent fees were the strongest correlate of wages. Similarly, parent fees were a significant predictor of quality themselves for infant and toddler classrooms, even after controlling for many other structural quality indicators. Thus parent fees in unsubsidized child care settings may be another proxy for center classroom quality.

Finally, some recent evidence suggests that wages may serve as a mediator between teacher education level and classroom quality. Such a relationship was documented in a study of more than 100 preschool classrooms from 4 Midwestern states (Iowa, Kansas, Nebraska, & Missouri; Torquati et al., 2007).

Total operating expenses. Not surprisingly, when programs have more money available to them, quality tends to increase. Specifically, research demonstrates a positive relationship between overall ECERS scores and total operating costs (Phillipsen, Burchinal, Howes, & Cryer, 1997). Further, when programs are able to tap into streams of public funding, quality tends to be higher (Goelman et al., 2006; Fuller, Holloway, Bozzi, Burr, Cohen, & Suzuki, 2003).

For-profit/not-for-profit status. The relationship between quality and profit status of a child care center is not clear. In a study of 4 states, the relationship was different depending on the state. Specifically, the North Carolina, non-profit centers tended to be of higher quality than for-profit centers. However, the reverse was true in Connecticut (Phillipsen et al., 1997). In Canada, evidence suggests that auspice of a center plays an indirect role in predicting quality of care. More specifically, for profit centers tend to pay lower wages which in turn are related to lower quality care (Goelman et al., 2006).

4.4 Child Care Regulations

In the United States, most child care centers must meet the regulations of their respective state licensing agencies. These regulations cover both staff qualifications (such as pre-service credentials and the amount of in-service training) and program characteristics (e.g. teacher-child ratio, group size, number of children enrolled, length of day, and program location; Morgan, 2003). No matter if directed towards staff, individual classrooms, or entire programs, these inputs are often referred to as the structural characteristics of quality (Espinosa, 2002). Because they can be controlled through government regulations, all are verifiable through direct observation and/or documentation, as well (Howes, Phillips et al., 1992).

A wealth of research has looked at the relationship between child care regulations in the US and process quality. Evidence for a positive relationship between stricter state child care regulations and higher center quality comes from studies such as the CQO work in four states (Phillipsen et al., 1997), and Goelman and colleagues' (2006) comparison of quality in Cana-

dian provinces. In addition, Phillips and her colleagues have also examined this issue in three additional states. Although their work showed that centers in states with more stringent child care regulations offer higher quality care, on average, than do centers in states with more lax regulations (Phillips et al., 2000), the findings also suggest that the relationship is not simple or straightforward. In particular, this study found that quality was lower in a state with more stringent regulations (Virginia) compared to one with less stringent regulations (Georgia). This particular finding may be due to poorer enforcement of regulations, or other factors that vary across states such as state funding for child care programs and professional development (Phillips et al., 2000).

4.5 Conclusions about the Relationship between Structural and Process Variables

Most of the evidence suggests that easily measurable, structural variables are at least modestly predictive of process quality. More specifically, it is often suggested that structural variables set the stage for high quality interactions, but that it is these interactions that really affect quality of care and are reflective of developmentally beneficial experiences for young children (Cassidy, Hestenes, Hansen et al., 2005; Phillips et al., 2000). Cassidy and her colleagues (Cassidy, Hestenes, Hansen et al., 2005) provide a useful analogy for understanding this relationship:

To a child riding in the backseat of a car, given that the vehicle is in reasonable operating order, it does not really make a significant difference whether or not that car was purchased for \$14,000 or \$50,000. The relative safety and well-being of the child can be provided for in both cars-the basic structure for their well-being is provided in either case. It can be easily regulated that the automobiles meet minimum safety requirements, including the type of car seat needed. However, once that vehicle begins to move, the skill of the driver is most critical in determining the quality of a child's experience in the vehicle. Although the driver must have the basic components present in the car in order to ensure safety (e.g. the brakes and windshield wipers must work), the driver's ability to navigate the vehicle with other cars on the road and in adverse weather conditions, as well as the interaction with the child, dif-

ferentiates the quality of the ride for the child. It is likely that most parents would probably prefer to have their child in an economy car with a well-qualified driver than in a luxury car with a driver with a revoked license. In the same manner, although structural quality (reasonable amounts of materials and equipment; a safe and clean facility) is necessary and in fact can influence the morale of the staff, process quality—the skill of the teacher and the relationships among human beings in the structural environment—is most critical to truly differentiate quality in child care (p.516).

Thus, structural variables are believed to play a key role in teachers' capacity to offer these types of interactions and experiences (Lamb, 1998, Vandell & Wolfe, 2000). For example, if centers have unmanageable teacher-child ratios and inexperienced and untrained staff, they can be hard-pressed to offer children the kinds of interactions and activities that enhance their development (Espinosa, 2002). In addition, higher teacher to child ratios allow for better supervision that may help to reduce childhood injuries (Colbert, 2005). Similarly, it is theorized that higher wages lead to higher quality in a three-step, interrelated process. First, teacher wages are highly correlated with teacher retention and turnover (Whitebook, Howes, & Phillips, 1998). Centers that pay more are able to selectively recruit (and retain) better qualified and experienced teachers. Lower turnover rates also lead to stable care, which in turn enhances children's attachments to their teachers and provides the opportunity for higher quality interactions (Phillips et al., 2000).

These theories have only recently received empirical support. While research has indicated that the relationship between structural quality indicators and child outcomes is mediated through process quality (NICHD 2002a) and also supports a link between the two types of quality (Cryer, Tietze, Burchinal, Leal, & Palacios, 1999), the specific findings from various studies are not always consistent. The inconsistencies are, in large part, likely due to key differences in the studies. For example, much recent work has come from an 11 state study of pre-kindergarten programs (LoCasale-Crouch et al., 2007). In the US, state-run pre-kindergarten programs are often quite different than child care for preschool-aged children. Pre-kindergarten programs tend to be part-day programs, have different requirements for teacher education and training, and tend to pay teachers higher salaries than is typical in child care settings. Because of these differences, it is likely that the variability in these classrooms

on structural quality indicators is smaller in range than child care in general and that relationships seen in child care (e.g. between education and quality) will not be as apparent in pre-kindergarten settings.

5 Existing Measures of Quality

As documented above, the past 20 years has seen a wealth of research examining child care quality. At the same time, quality of care has been measured in numerous ways. In this section we first review the more commonly used observational measures. As the focus of this paper is to determine whether and how to measure child care quality in large-scale survey work, we follow with a discussion of the survey and interview techniques for gathering information about quality. We also include an analysis of the pros and cons of this latter method for assessing quality.

5.1 Observational measures

Almost all large-scale studies examining early care and education quality over the past 10 years have used observational measures. Furthermore, the growth in the number of instruments available and their specific focus corresponds with the increasing interest in the U.S. on improving preschoolers' early learning and kindergarten readiness, as well.

The Early Childhood Environment Rating Scale-Revised (ECERS-R; Harms et al., 1998) is the most widely used instrument for measuring quality based on observations of center classrooms. It is scored on a scale of 1 to 7, with 1 equaling inadequate, 3 equaling minimal, 5 equaling good, and 7 equaling excellent. The ECERS is composed of seven subscales: space and furnishing, personal care routines, language and reasoning, activities, interactions, program structure, and parents and staff.

Researchers often employ factor analyses techniques to determine how many factors are being measured (usually factors do not match the seven subscales of the instrument). Typically, the scale breaks into one global factor (Perlman, Zellman, & Le, 2004; Holloway, Kagan, Fuller, Tsou, & Carroll, 2001) or two factors representing teaching and interactions and provisions for learning (Cassidy, Hestenes, Hegde, Hestenes, & Mims, 2005; Pianta, Howes, Burchinal, Bryant, Clifford, Early, & Barbarin, 2005; Sakai, Whitebook, Wishard, & Howes, 2003). In fact, precisely because the items on the ECERS-R are often highly correlated with each other,

some researchers have suggested that a subset of items can predict quality equally as well as the full scale (Scarr, Eisenberg, & Deater-Deckard, 1994; Perlman et al., 2004).

Despite its wide-scale use in the field, the ECERS-R is not without its critics. In a qualitative analysis of the individual indicators on the ECERS-R, Cassidy and her colleagues (Cassidy, Hestenes, Hansen et al., 2005) used constant comparative method to identify whether each of the 469 indicators (across 43 items) measured structure or process quality. They determined that over half (56%) of the indicators measured structural quality. These researchers thus conclude that it is inappropriate to use ECERS-R scores solely as a measure of “process quality”. In addition, the ECERS-R has also been critiqued because it fails to capture individual children’s experiences with a teacher, focuses on independent play at the expense of teacher-child interactions during play, has potential reliability issues and questionable psychometric properties (Layzer & Goodson, 2006).

Recently there have been some new measures designed to complement or extend the ECERS. These measures are similar in structure to the ECERS in that they typically involve scoring on multiple items using a 5- to 7-point scale. But, they are also designed to examine more closely particular quality indicators such as the physical environment (Maxwell, 2006), curriculum (Sylva et al., 2006), program administration (Talan & Bloom, 2004), and classroom supports for enhancing children’s early math skills (Frede, Weber, Hornbeck, Stevenson-Boyd, & Colon, 2005), or early literacy (Smith, Davidson, Weisenfeld, & Katsaros, 2001).

One particularly complementary measure is the *Classroom Assessment Scoring System* (CLASS; Pianta, La Paro, & Hamre, 2005). The CLASS is an observational system that assesses the quality of classroom practices in preschool through third grade by measuring the interactions between students and adults. Similar to the ECERS-R, a rating of 1 or 2 indicates low range quality, a 3 to 5 indicates mid-range, and a 6 or 7 indicates high-range. The measure uses eleven different dimensions to capture four domains of the classroom environment in 20-minute time segments; namely emotional and instructional support, classroom organization, and student outcomes. It has recently been used in the National Center for Early Development and Learning’s Multi-State Pre-Kindergarten Study (see LoCasale-Crouch et al., 2007; Pianta, Howes et al., 2005).

The *Arnett Caregiver Interaction Scale* (CIS; Arnett, 1989) is another common observational instrument often used in combination with the ECERS-R. The CIS is a process quality measure that focuses on teacher-child interactions. The scale taps three dimensions: teacher sensi-

tivity, harshness, and detachment. It has been widely used in studies such as the CQO (Burchinal, Cryer, Clifford, & Howes, 2002) and an extensive study of Canadian child care centers (Goelman et al., 2006).

Assessment Profile for Early Childhood Programs (Abbott-Shim et al., 2000). This observational assessment tool includes 75 items that are scored dichotomously (yes or no). The items break into 5 subscales: Learning Environment, Scheduling, Curriculum, Interacting, and Individualizing. It has been used in large-scale research such as the multi-site study conducted in Massachusetts, Virginia and Georgia (Phillips et al., 2000).

Observational Record of the Caregiving Environment (ORCE; NICHD ECCRN 2000a). The ORCE was developed specifically for use in the NICHD Study of Early Child Care. It assesses quality of care through time-sampled counts of caregiver behaviors, peer interactions, and child activities. It also includes qualitative ratings of caregivers' behaviors and assessments of structural characteristics such as child-adult ratios and teacher training. Versions are available for multiple age groups.

5.2 Surveys

To date, many studies have utilized surveys to gather information about the quality of care (e.g. large-scale studies such as the National Child Care Staffing Study [Whitebook, Howes, & Phillips, 1990]; Fuller and colleagues' work interviewing center directors in California [Fuller, Holloway, Bozzi, Burr, Cohen, & Suzuki, 2003]; director interviews in the NICHD SECC [NICHD 2000a & 2000b]). As will be discussed, some of the surveys were conducted over the telephone while others were written surveys completed by respondents and mailed back to researchers. Only a few have developed systematic scales designed specifically to be a proxy for overall, or more specifically, process quality. Their level of success in approximating process quality varies.

Berkeley Yale Telephone Interview. The Berkeley Yale Telephone Interview (BYTI; Holloway et al., 2001) is a recently developed measure based on the widely used Environmental Rating Scales. For child care centers, the phone interview includes 22 items. A shorter, 13-item version is also available. The areas of focus contained in the longer version are similar to those found in the ECERS-R.

The BYTI is the one of only a few phone survey quality assessment tools for which direct comparisons have been made with observational quality. In the first test of whether this instrument could adequately predict center quality, the developers compared results from the BYTI to observed scores using the ECERS-R. Observed scores and BYTI interviews were conducted independently in 92 center classrooms. Results indicated that 51% of the variance in total ECERS-R score was explained by the BYTI. The most powerful predictors of overall ECERS-R score were small group size, experience, staff education requirements (i.e. whether staff with less than an associates degree are required to continue their formal education), less time in whole group activities, less time using worksheets, having more fine motor materials, availability of sand and water play, and number of parent conferences.

As further evidence of its validity, the researchers examined whether the phone interview could correctly classify classrooms into one of three quality categories: poor, mediocre, or developmentally appropriate. Using this trichotomized version, 89% of classrooms were correctly classified using the 22-item version (fewer were correctly classified using the 13-item survey). Of those that were classified incorrectly, the BYTI tended to underestimate quality. Despite this high success rate, the creators of the BYTI recommend “particularly when the association of child care quality to child outcomes is being assessed, it seems highly desirable to use the longer [22 item] form, and to compute the continuous total score” (Holloway et al., p.186).

To date, the BYTI has not been widely used. In fact, no other published studies were identified in which this new telephone survey was used to gather information about child care center quality.

Midwest Child Care Consortium “Breadbasket”. The Midwest Child Care Consortium consists of a group of researchers, practitioners and policy makers from 4 Midwestern states (Iowa, Kansas, Missouri, and Nebraska). Their research involved phone surveys with more than 2000 child care providers (Raikes et al., 2006). The survey included 28 items focusing on teacher training and program partnerships and took an average of 12.5 minutes to conduct.

A sub-sample of 365 providers was also observed using the ECERS-R and Caregiver Interaction Scale. Findings suggest that 14 provider characteristics (each coded dichotomously) were significantly associated with observed center quality. These “best bets” form a “breadbasket” of good quality and include: 1) provider education; 2) Child Development Associate Credential; 3) training hours; 4) first aid/CPR training; 5) intense training; 6) attendance at a

conference; 7) use of a particular curriculum; 8) holding parent conferences; 9) earnings; 10) accreditation; 11) partnering with Early Head Start or Head Start; 12) participation in the Child and Adult Care Food Program; 13) health benefits; and 14) staff receive input about progress from supervisors.

These 14 indicators were used to determine how well they could predict observed quality. First, the 14 item index was categorized into three indicators using the following criteria: 3 or fewer items equaled low quality, 4- to 7 items indicated medium quality, and high quality included programs with 8 or more indicators. The researchers then used classification on this 3-point scale to compare to observed quality. Results indicated that this approach had high levels of sensitivity in predicting observed quality. Specifically, 63% of the programs with 8 or more indicators were correctly classified as high quality when compared to observed quality (Raikes et al., 2006).

Wisconsin Child Care Quality Survey. As is the trend in many states, Wisconsin is in the process of developing a state-wide system for rating child care quality. In the early stages of this process a group of researchers from the University of Wisconsin tested whether a cost-effective and easy to implement assessment of structural quality could be used to substitute for observational measures of quality (Riley, Roach, Adams, & Edie, 2005). In this work, the researchers conducted a written survey with 253 randomly selected child care directors. The survey included 5 items: teacher characteristics (e.g. education, wages, experience), director qualifications (whether or not director had at least a bachelor's degree), and national accreditation status. For each of the teacher characteristics, a dichotomous variable was created based upon whether at least 50% of the teachers at a center met a theoretically- and research-based criterion (e.g. if 50% of teachers exceeded the state median wage for child care providers). For each criterion met, centers received one star. Thus all centers were rated as having between zero and five stars.

Results from the survey were compared to observations of quality using the ECERS-R in a subset of 52 child care centers. Although none of the individual criterion for the star quality rating were significantly related to observed quality, analyses using total number of stars were more useful. Specifically, findings suggest that total number of stars was predictive of high and low quality centers (centers that met more quality indicators also had higher ECERS-R scores), but not sensitive enough to predict programs in the mid-quality range (Riley et al., 2005).

6 Survey Measurement Issues

In this section, we highlight specific issues related to measuring quality of care, especially in large-scale, survey research. These issues involve data collection techniques, challenges, and cautions.

Perhaps the most significant consideration when attempting to measure quality solely through interview or surveys techniques is, because of the reliance on self-report, there is a potential for the data to be biased. As the developers of the BYTI point out, it is possible, and perhaps even likely, that respondents would be reluctant to reveal information about a teacher or program that demonstrates less-than ideal care (e.g. safety issues or that staff-child ratios are not maintained; Holloway et al., 2001). To do so would be an admission of potentially serious violations that, when documented, can have serious repercussions for a licensed child care program. Caregivers may also differ from trained observers in their ability to judge the adequacy of some quality indicators such as the availability of learning materials for children. Further, just as evidence has documented that parent and trained observer ratings of quality often do not match (Ceglowski, 2004; Cryer, Tietze, & Wessels, 2002; Helburn, & Bergmann, 2002; Morris, 1999; Tran, Shlay, Weinraub, & Harmon, 2004), it is likely that providers may have different understandings of what makes a high quality child care program.

A second challenge to measurement of quality through easily identified indicators is the possibility for non-normal distributions (Raikes et al., 2006). Some potentially key indicators, such as accreditation with a national professional organization, have little variability within a sample of child care programs (as the vast majority of programs are not accredited). Exploring differences using an indicator with little variability then becomes problematic in statistical analyses. Evidence for such potential problems comes from work examining quality in family child care homes. Only recently has it been documented that ratios, an oft cited quality indicator for center-based child care, is not predictive of quality in family child care homes as the variability in this dimension is smaller in home settings (Burchinal, Howes, & Kontos, 2002).

Although structural variables are typically posited to be easier to measure than process quality indicators, the potential for less than valid assessments does exist. For example, although staff to child ratio appears to be a simple measurement, in fact ratios often change throughout the day with higher and lower ratios depending on staffing needs and actual child attendance at a program. Recent work documents how teacher-child ratios are not static in many pro-

grams and can vary dramatically given different measurement strategies (e.g. observed ratios at one point in time versus actual ratios recorded by staff and child attendance sheets; Le, Perlman, Zellman, & Hamilton, 2006). These issues need to be considered when designing appropriate survey/interview questions. For instance, when asking about ratios, should the question focus on the highest staff to child ratio during the day? Or is it more valid to inquire about the most typical or average ratio? These issues are also important for cross-study comparisons which may conceptualize particular indicators in significantly different ways.

As has been suggested throughout this paper, early childhood researchers and policy makers often contend that observational data are key to accurately assessing quality of care. However, these same stakeholders also acknowledge the logistical and financial challenges in conducting observations in many programs. Triangulation represents one possible approach to strengthening the quality of non-observational data in these types of situations. Such an approach was used in a study of child care quality of Minnesota in which data were gathered from county Child Care Resource and Referral agencies, interviews with center directors, and parent focus groups (Ceglowski & Davis, 2004). Using multiple sources to verify data strengthens the quality of data gathered.

Lastly, child care quality indicators should always be considered within the cultural context of the programs being studied. As Lee and Walsh point out, “Without understanding cultural assumptions and beliefs about childhood and education, presupposing that structural variables are universally true indicators of high quality leads to culturally biased views of program quality” (2005, p. 465). As an example, they point out that in Japan, small group size and low child-teacher ratios are not valued and are even seen as detrimental given the emphasis place on whole group instruction. Thus, appropriate structural indicators may vary from culture to culture.

7 Implications for Gauging ECE Quality within the German Socio Economic Panel Study (SOEP)

The literature on ECE quality has demonstrated its importance for children’s short- and long-term cognitive and social development. Quality itself is reliant on a variety of interrelated inputs. These inputs can be characterized as structural indicators (e.g. caregiver education, staff-child ratio, and group size), and process indicators, which include the kinds of experiences and interactions children have when participating in a program.

A great deal of research has investigated the link between structural and process inputs. Although the relationships are often modest, structural variables are related to process quality in meaningful ways and would seem to serve as a reasonable proxy for process quality in classrooms. Based on the research summarized here, the structural variables most likely to be related to process quality and long-term child outcomes include teacher's formal education and specialized training in early education, teacher's wages, staff-child ratios, and use of a child centered curriculum (see Table 1).

Table 1. **Structural Inputs Linked to Process Quality in Research and Surveys**

Structural Input	Found to be Salient in:			
	Research	WI Survey	Breadbasket Survey	BYTI Survey
Child Variables				
Group size				X
Ages of children served				
Total enrollment				
Staff Variables				
Teacher education & training	X	X	X	X
Teacher experience		X		
Teachers' wages and/or benefits	X	X	X	
Staffing choices				
Director education or experience		X		
Program Variables				
Staff-child ratio	X			
Use of a child-centered approach to learning	X		X	X
Schedule (half- vs. full-day)				
For-profit status				
Physical location				
Community Variables				
More stringent child care regulations	X			

Two groups (Wisconsin and the Midwestern Child Care Consortium) have used short surveys that focus on dichotomous responses with some success (Raikes et al., 2006; Riley et al., 2005). With additional resources, the Berkeley Yale Telephone Interview offers another slightly longer set of variables that provides a more nuanced assessment of quality. This measure includes multiple choice questions based on the widely used ECERS-R observational instrument.

Additionally, numerous large-scale studies have included interviews or surveys in their data collection efforts (e.g. National Child Care Staffing Study; NICHD SECC). The instruments from this work would also serve as a potential source of survey questions appropriate (with minor adapting) for use in Germany. For example, the NICHD SECC selected 4 key indicators that met standards set forth by professional organizations (the American Public Health Association and the American Academy of Pediatrics) in order to examine how these particular factors related to child outcomes. The index was comprised of data gathered through observations and interviews and included: observed child-staff ratio, observed group size, caregiver training, and caregiver education. They found a linear relationship between this 4-point index and child outcomes such as school readiness, language comprehension, and behavior problems (NICHD ECCRN 1999). A similar index could be useful in other large-scale research.

We once again caution that in order to serve as accurate proxies within a particular culture, the structural variables being measured must represent a wide enough range to capture variability in process quality. For example, although teacher-child ratios have long been a key quality indicator in the United States, recent evidence suggests that there may be a threshold for these indicators. In family child care programs, researchers found that these indicators are not related to quality, likely because the range of ratios is much smaller in family child care homes than it is in child care centers (Burchinal, Howes, & Kontos, 2002). Similarly, some quality indicators such as accreditation status (as was measured in both the Wisconsin and Midwestern Child Care Consortium surveys) may be meaningful indicators of the highest quality programs, but because of the low variability, not particularly useful for predicting observed quality across many child care settings.

In conclusion, while gathering data on structural quality indicators in the SOEP would most likely serve as only a rough proxy for observed child care quality, the literature on quality ECE suggests that certain inputs are “must haves” and thus are worthy of investigation. In addition, several pre-existing surveys could be modified for use in Germany. However, given the potential for respondent bias, possible misperceptions about the quality of programs, and cultural issues, we also urge careful analysis of any pilot survey’s reliability through comparison with more widely used observational assessments.

References

- Abbott-Shim, M. Lambert, R. & McCarty, F. (2000). Structural model of Head Start classroom quality. *Early Childhood Research Quarterly, 15*, 115-134.
- Ackerman, D. J. (2006). The costs of being a child care teacher: Revisiting the problem of low wages. *Educational Policy, 20*, 85-112.
- Ackerman, D. J., & Barnett, W. S. (2006). *Increasing the effectiveness of preschool*. New Brunswick, NJ: NIEER.
- Adams, D. B., Roach, M. A., Riley, D. A., & Edie, D. (2002). What is the relationship between child care directors and quality?. *Wisconsin Child Care Research Partnership Issue Brief #9*. Madison WI: University of Wisconsin-Extension.
- Arnett, J. (1989). Caregivers in day-care centers: Does training matter? *Journal of Applied Developmental Psychology, 10*, 541-552.
- Barnett, W. S. (1998). Long-term effects on cognitive development and school success. In W. S. Barnett & S. S. Boocock (Eds.), *Early care and education for children in poverty: Promises, programs, and long-term results* (pp. 11-44). Albany: State University of New York Press.
- Barnett, W. S. & Hustedt, J. T. (2005). Head Start's lasting benefits. *Infants and Young Children, 18*, 16-24.
- Barnett, W. S., Hustedt, J. T., Hawkinson, L., & Robin, K. B. (2007). *The state of preschool: 2006 state preschool yearbook*. New Brunswick, NJ: NIEER.
- Belsky, J., Vandell, D. L., Burchinal, M., Clarke-Stewart, K. A., McCartney, K., Owen, M.T., & the NICHD Early Child Care Research Network. (2007). Are there long-term effects of early child care? *Child Development, 78*(2), 681-701.
- Belsky, J. (2001). Emanuel Miller Lecture: Developmental risks (still) associated with early child care. *Journal of Child Psychology and Psychiatry, 42*(7), 845-859.
- Blau, D. M. (2000). The production of quality in child-care centers: Another look. *Applied Developmental Science, 4*, 136-148.
- Bredekamp, S., & Copple, C. (Eds.). (1997). *Developmentally appropriate practice in early childhood programs* (Revised ed.). Washington, DC: National Association for the Education of Young Children.
- Bryant, D., Maxwell, K., Taylor, K., Poe, M., Peisner-Feinberg, E., & Bernier, K. (2003). *Smart Start and preschool child quality in NC: Change over time and relation to children's readiness*. Chapel Hill, NC: FPG Child Development Institute.
- Burchinal, M. R., & Cryer, D. (2003). Diversity, child care quality, and developmental outcomes. *Early Childhood Research Quarterly, 18*, 401-426.
- Burchinal, M. R., Cryer, D., Clifford, R. M., & Howes, C. (2002). Caregiver training and classroom quality in child care centers. *Applied Developmental Science, 6*, 2-11.
- Burchinal, M., Howes, C., & Kontos, S. (2002). Structural predictors of child care quality in child care homes. *Early Childhood Research Quarterly, 17*, 87-105.
- Burchinal, M. R., Peisner-Feinberg, E., Bryant, D. M., & Clifford, R. (2000). Children's social and cognitive development and child-care quality: Testing for differential associations related to poverty, gender, or ethnicity. *Applied Developmental Science, 4*, 149-165.

- Burchinal, M. R., Roberts, J. E., Riggins, R. Jr., Seisel, S. A., Neebe, E., & Bryant, D. (2000). Relating quality of center-based child care to early cognitive and language development longitudinally. *Child Development, 71*, 339-357.
- Campbell, F. A., Ramey, C. T., Pungello, E., Sparling, J., & Miller-Johnson, S. (2002). Early childhood education: Young adult outcomes from the Abecedarian Project. *Applied Developmental Science, 6*, 42-57.
- Cassidy, D. J., Hestenes, L. L., Hansen, J. K., Hedge, A., Shim, J., & Hestenes, S. (2005). Revisiting the two faces of child care quality: Structure and process. *Early Education and Development, 16*(4), 505-520.
- Cassidy, D. J., Hestenes, L. L., Hegde, A., Hestenes, S., & Mims, S. (2005). Measurement of quality in preschool child care classrooms: An exploratory and confirmatory factor analysis of the Early Childhood Environment Rating Scale-Revised. *Early Childhood Research Quarterly, 20*, 345-360.
- Ceglowski, D. (2004). How stake holder groups define quality in child care. *Early Childhood Education Journal, 32*, 101-111.
- Ceglowski, D. A. & Davis, E. E. (2004). Assessing structural indicators of child care quality at the local level: Lessons from Four Minnesota Counties. *Child & Youth Care Forum, 33*(2), 71-93.
- Clarke-Stewart, K., Vandell, D., Burchinal, M., Brien, M., & McCartney, K. (2002). Do regulable features of child-care homes affect children's development? *Early Childhood Research Quarterly, 17*, 52-86.
- Colbert, J. A. (2005). Minimizing risks to children in licensed child care settings: A literature review and state survey. WA: Division of Child Care and Early Learning. Retrieved from www.del.wa.gov/pdf/ccel/0511colbert-report.pdf.
- Cost, Quality, & Child Outcomes Study Team. (1995). *Cost, quality and child outcomes in child care centers (Executive summary)*. Denver: University of Colorado at Denver.
- Cryer, D., Tietze, W., Burchinal, M. R., Leal, T., & Palacios, J. (1999). Predicting process quality from structural quality in preschool programs: A cross-country comparison. *Early Childhood Research Quarterly, 14*, 339-361?
- Cryer, D., Tietze, W., & Wessels, H. (2002). Parents' perceptions of their children's child care: A cross-national comparison. *Early Childhood Research Quarterly, 17*, 259-277.
- Duncan, G.J. & Brooks-Gunn, J. (2000). Family poverty, welfare reform, and child development. *Child Development, 71*, 188-196.
- Duncan, G. J. & Gibson-Davis, C. M. (2006). Connecting child care quality to child outcomes: Drawing policy lessons from nonexperimental data. *Evaluation Review, 30*, 611-630.
- Dunn, L. (1993). Proximal and distal features of day care quality and children's development. *Early Childhood Research Quarterly, 8*, 167-192.
- Early, D. M., Bryant, D. M., Pianta, R. C., Clifford, R. M., Burchinal, M. R., Ritchie, S., Howes, C., & Barbarin, O. (2006). Are teachers' education, major, and credentials related to classroom quality and children's academic gains in pre-kindergarten? *Early Childhood Research Quarterly, 21*, 174-195.
- Early, D. M., Maxwell, K. M., Burchinal, M., Alva, S. Bender, R. H., Bryant, D. et al. (2007). Teachers' education, classroom quality and young children's academic skills: Results from seven studies of preschool programs. *Child Development, 78*, 558-580.
- Epstein, A. S. (1999). Pathways to quality in Head Start, public school, and private nonprofit early childhood programs. *Journal of Research in Early Childhood Education, 13*, 101-119.

- Espinosa, L. M. (2002). High-quality preschool: Why we need it and what it looks like. In *Preschool Policy Matters*. New Brunswick, NJ: National Institute for Early Education Research.
- Ferrar, H. M. (1996). *Place for growing: How to improve your child care center*. Princeton: Mathematica Policy Research, Inc.
- Frede, E. C. (1995). The role of program quality in producing early childhood program benefits. *The Future of Children*, 5(3), 115-132.
- Frede, E. C., Weber, M., Hornbeck, A., Stevenson-Boyd, J., & Colon, A., (2005). *Preschool Classroom Mathematics Inventory*. Unpublished instrument.
- Fuller, B., Holloway, S. D., Bozzi, L., Burr, E., Cohen, N., & Suzuki, S. (2003). Explaining local variability in child care quality: State funding and regulation in California. *Early Education and Development*, 14(1), 47-66.
- Fuller, B., Livas, A., & Bridges, M. (2005). *How to expand and improve preschool in California: Ideals, evidence, and policy options (Working paper 05-1)*. Berkeley, CA: Policy Analysis for California Education, University of California, Berkeley.
- Goelman, H., Forer, B., Kershaw, P., Doherty, G., Lero, D., & LaGrange, A. (2006). Towards a predictive model of quality in Canadian child care centers. *Early Childhood Research Quarterly*, 21, 280-295.
- Harms, T., Clifford, R. M., & Cryer, D. (1998). *Early childhood environment rating scale* (Revised ed.). New York: Teachers College Press.
- Harms, T., Cryer, D., & Clifford, R. M. (2003). *Infant/toddler environment rating scale* (Revised ed.). New York: Teachers College Press.
- Helburn, S. W., & Bergmann, B. R. (2002). *America's child care problem: The way out*. New York: Palgrave for St. Martin's Press.
- High/Scope Educational Research Foundation. (1998). *High/Scope program quality assessment*. Ypsilanti, MI: High/Scope Press.
- Holloway, S. D., Kagan, S. L., Fuller, B., Tsou, L., & Carroll, J. (2001). Assessing child-care quality with a telephone interview. *Early Childhood Research Quarterly*, 16, 165-189.
- Holloway, S. D., & Reichhart-Erickson, M. (1988). The relationship of day care quality to children's free play behavior and social problem solving skills. *Early Childhood Research Quarterly*, 3, 39-53.
- Honig, A. S., & Hirallal, A. (1998). Which counts more for excellence in childcare staff -- years in service, education level or ECE coursework? *Early Child Development and Care*, 145, 31-46.
- 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., Whitebook, M., & Phillips, D. (1992). Teacher characteristics and effective teaching in child care: Findings from the National Child Care Staffing Study. *Child & Youth Care Forum*, 21, 399-414.
- Hungerford, A., & Cox, M. J. (2006). Family factors in child care research. *Evaluation-Review*, 30(5), 631-655.
- Kontos, S. J. (1991). Child care quality, family background, and children's development. *Early Childhood Research Quarterly*, 6, 249-262.
- Kontos, S., & Fiene, R. (1987). Child care quality, compliance with regulations, and children's development: The Pennsylvania study. In D. Phillips (Ed.), *Quality in child care: What does research tell us?* (pp. 57-79). Washington, DC: National Association for the Education of Young Children.

- Lamb, M. E. (1998). Nonparental child care: Context, quality, correlates, and consequences. In I. Sigel & K. A. Renninger (Eds.), *Child psychology in practice* (5th ed., pp. 73-133). New York: Wiley.
- Layzer, J. I., & Goodson, B. D. (2006). The “quality” of early care and education settings: Definitional and measurement issues. *Evaluation Review*, 30, 556-576.
- Le, V., Perlman, M., Zellman, G. L., & Hamilton, L. S. (2006). Measuring child-staff ratios in child care centers: Balancing effort and representativeness. *Early Childhood Research Quarterly*, 21, 267-279.
- Lee, J., & Walsh, D. (2005). Quality in early childhood programs? Underlying values. *Early Education and Development*, 16(4), 449-468.
- Lee, V., Burkam, D. T., Ready, D. D., Honigman, J., & Meisels, S. (2006). Full-day versus half-day Kindergarten: In which program do children learn more? *American Journal of Education*, 112, 163-208.
- LoCasale-Crouch, J., Konold, T., Pianta, R., Howes, C., Burchinal, M., Bryant, D., Clifford, R., Early, D., & Barbarin, O. (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.
- Love, J. M., Harrison, L., Sagi-Schwartz, A., vanIjzendoorn, M. H., Ross, C., Ungerer, J. A., et al. (2003). Child care quality matters: How conclusions may vary with context. *Child Development*, 74(4), 1021-1033.
- Love, J. M., Schochet, P. Z., & Meckstroth, A. L. (1996). *Are they in any real danger? What research does--and doesn't--tell us about child care quality and children's well-being*. Princeton: Mathematica Policy Research, Inc.
- Magnusson, K. A., Rum, C., & Waldfogel, J. (2007). The persistence of preschool effects: Do subsequent classroom experiences matter? *Early Childhood Research Quarterly*, 22, 18-38.
- Marcon, R. A. (1999). Differential impact of preschool models on development and early learning of inner-city children: A three cohort study. *Developmental Psychology*, 35(2), 358-375.
- Maxwell, L. (2006). Competency in child care settings: *The role of the physical environment*. *Environment and Behavior*, 20(10), 1-17.
- McCabe, L. A. & Frede, E. (2007). Challenging Behaviors: Preschool as a Contributing or Ameliorating Factor? Working Paper available on-line at <http://nieer.org/docs/index.php?DocID=163>. New Brunswick, NJ: NIEER.
- McCartney, K. (1984). The effect of quality of day care environment upon children's language development. *Developmental Psychology*, 20, 244-260.
- McCartney, K., Scarr, S., Rocheleau, A., Phillips, D., Abbott-Shim, M., Eisenberg, M. Keefe, N., Rosenthal, S., & Ruh, J. (1997). Teacher-child interaction and child-care auspices as predictors of social outcomes in infants, toddlers, and preschoolers. *Merrill-Palmer Quarterly*, 43, 426-450.
- Mocan, H. N., Burchinal, M., Morris, J. R., & Helburn, S. W. (1995). Models of quality in early childhood care and education. In S. W. Helburn (Ed.), *Cost, quality and child outcomes in child care centers: Technical report* (pp. 279-295). Denver: Department of Economics, Center for Research in Economic and Social Policy, University of Colorado at Denver.
- Montie, J. E., Xiang, Z., & Schweinhart, L. J. (2006). Preschool experience in 10 countries: Cognitive and language performance at age 7. *Early Childhood Research Quarterly*, 21, 313-331.

- Morgan, G. G. (2003). Regulatory policy. In D. Cryer & R. M. Clifford (Eds.), *Early childhood education & care in the USA* (pp. 65-85). Baltimore: Paul H. Brookes Publishing Co.
- Morris, J. R. (1999). Market constraints on child care quality. *Annals of the American Academy of Political and Social Sciences*, 563, 130-145.
- National Association for Regulatory Administration (NARA) & The National Child Care Information and Technical Assistance Center. (2006). The 2005 child care licensing study. Conyers, GA: Author.
- NICHD ECCRN. (1999). Child outcomes when child care center classes meet recommended standards for quality. *American Journal of Public Health*, 89, 1072-1077.
- NICHD ECCRN. (2000a). Characteristics and quality of child care for toddlers and preschoolers. *Applied Developmental Science*, 4, 116-135.
- NICHD ECCRN. (2000b). The relation of child care to cognitive and language development. *Child Development*, 71, 960-980.
- NICHD ECCRN. (2002a). Child-care structure → process → outcome: Direct and indirect effects of child-care quality on young children's development. *Psychological Science*, 13, 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, 133-164.
- NICHD ECCRN. (2002c). The relation of global first-grade classroom environment to structural classroom features and teacher and student behaviors. *The Elementary School Journal*, 102(5), 367-387.
- NICHD ECCRN. (2003). Does quality of child care affect child outcomes at age 4 ½? *Developmental Psychology*, 39, 451-469.
- NICHD ECCRN. (2005). Early child care and children's development in the primary grades: Follow-up results from the NICHD Study of Early Child Care. *American Educational Research Journal*, 42(3), 537-570.
- NICHD ECCRN, & Duncan, G. (2003). Modeling the impacts of child care quality on children's preschool cognitive development. *Child Development*, 74, 1454-1475.
- Peisner-Feinberg, E. S., & Burchinal, M. R. (1997). Relations between preschool children's child-care experiences and concurrent development: The Cost, Quality, and Outcomes Study. *Merrill-Palmer-Quarterly*, 43(3), 451-477.
- Peisner-Feinberg, E. S., Burchinal, M. R., Clifford, R. M., Culkin, M. L., Howes, C., Kagan, S. L., Yazejian, N., Byler, P., Rustici, J., & Zelazo, J. (1999). *The children of the cost, quality, and outcomes study go to school: Technical report*. Chapel Hill: University of North Carolina at Chapel Hill, Frank Porter Graham Child Development Center.
- Peisner-Feinberg, E. S., Burchinal, M. R., Clifford, R. M., Culkin, M. L., Howes, C., Kagan, S. L., & Yazejian, N. (2001). The relation of preschool child-care quality to children's cognitive and social developmental trajectories through second grade. *Child Development*, 72, 1534-1553.
- Perlman, M., Zellman, G.L., & Le, V. (2004). Examining the psychometric properties of the Early Childhood Rating Scale-Revised (ECERS-R). *Early Childhood Research Quarterly*, 19(3), 398-412.
- Pessanha, M., Aguiar, C., Bairrão, J. (2007). Influence of structural features on Portuguese toddler child care quality. *Early Childhood Research Quarterly*, 22, 204-214.
- Phillips, D. A., McCartney, K., & Scarr, S. (1987). Child care quality and children's social development. *Developmental Psychology*, 23, 537-543.

- Phillips, D., Mekos, D., Scarr, S., McCartney, K., & Abbott-Shim, M. (2000). Within and beyond the classroom door: Assessing quality in child care centers. *Early Childhood Research Quarterly, 15*, 475-496.
- Phillips, D. A., Scarr, S., & McCartney, K. (1987). Dimensions and effects of child care quality: The Bermuda study. In D. Phillips (Ed.), *Quality in child care: What does research tell us?* (pp. 43-56). Washington, DC: National Association for the Education of Young Children.
- Phillipsen, L., Burchinal, M., Howes, C., & Cryer, D. (1997). The prediction of process quality from structural features of child care. *Early Childhood Research Quarterly, 12*, 281-304.
- Pianta, R., Howes, C., Burchinal, M., Bryant, D., Clifford, R., Early, D., & Barbarin, O. (2005). Features of pre-kindergarten programs, classrooms, and teachers: Do they predict observed classroom quality and child-teacher interactions? *Applied Developmental Science, 9*, 144-159.
- Pianta, R. C., La Paro, K. M., & Hamre, B. K. (2005). *Classroom assessment scoring system (CLASS)*. Charlottesville, VA: National Center for Early Development and Learning, University of Virginia.
- Raikes, H. H., Torquati, J. C., Hegland, S., Raikes, H. A., Scott, J., Messner, L., et al. (2006). Studying the culture of quality early education and care: A cumulative approach to measuring characteristics of the workforce and relations to quality in four Midwestern states. In M. Zaslow & I. Martinez-Beck (Eds.), *Critical Issues in Early Childhood Professional Development* (pp. 111-136). Baltimore, MD: Paul H. Brooks Publishing Co.
- Reynolds, A. J., Temple, J. A., Robertson, D. L., & Mann, E. A. (2001). Long-term effects of an early childhood intervention on educational achievement and juvenile arrest: A 15-year follow-up of low-income children in public schools. *Journal of the American Medical Association, 285*: 2339-2346.
- Riley, D. A., Roach, M. A., Adams, D., & Edie, D. (2005). From research to policy: In search of an affordable statewide system for rating child care quality. *Early Education and Development, 16*(4), 493-504.
- Ruopp, R., Travers, J., Glantz, F., & Coelen, G. (1979). *Children at the center: Summary findings and their implications*. Cambridge, MA: Abt Associates.
- Sakai, L., Whitebook, M., Wishard, A., & Howes, C. (2003). Evaluating the early childhood rating scale: Assessing differences between the first and revised edition. *Early Childhood Research Quarterly, 18*, 427-445.
- Scarr, S., Eisenberg, M., & Deater-Deckard, K. (1994). Measurement of quality in child care centers. *Early Childhood Research Quarterly, 9*, 131-151.
- Schweinhart, L. J., & Weikart, D. P. 1997. The High/Scope Perry preschool curriculum comparison study through age 23. *Early Childhood Research Quarterly, 12*, 117-143.
- Shim, J., Hestenes, L., & Cassidy, D. (2004). Teacher structure and child care quality in preschool classrooms. *Journal of Research in Childhood Education, 19*(2), 143-157.
- Smith S., Davidson, S., Weisenfeld, G. & Katsaros, S. (2001). *Supports for Early Literacy Assessment (SELA)*. New York: New York University.S
- Sylva, K., Siraj-Blatchford, I., Taggart, B., Sammons, P., Melhuish, E., Elliot, K., & Totsika, V. (2006). Capturing quality in early childhood through environment rating scales. *Early Childhood Research Quarterly, 21*, 76-92.
- Talan, T.N. & Bloom, P.J. (2004). *Program Administration Scale*. New York: Teachers College Press.

- Torquati, J. C., Raikes, H., Huddleston-Casas, C. A. (2007). Teacher education, motivation, compensation, workplace support, and links to quality of center-based child care and teachers' intention to stay in the early childhood profession. *Early Childhood Research Quarterly*, 22, 261-275.
- Tran, H., Shlay, A., Weinraub, M., & Harmon, M. (2004). *How low-income African American mothers evaluate child care arrangements: A factorial survey analysis of parent preferences, fair market value, and willingness to pay*. Philadelphia: Temple University.
- Vandell, D. (2004). Early child care: The known and the unknown. *Merrill-Palmer Quarterly*, 50, 387-414.
- Vandell, D. L., & Wolfe, B. (2000). *Child care quality: Does it matter and does it need to be improved?* Madison, WI: Institute for Research on Poverty, University of Wisconsin.
- Vartuli, S. (1999). How early childhood teacher beliefs vary across grade level. *Early Childhood Research Quarterly*, 14(4), 489-514.
- Whitebook, M., Howes, C., & Phillips, D. (1989). *Who cares? Child care teachers and the quality of care in America: Executive summary*. Washington, DC: Center for the Child Care Workforce.
- Whitebook, M., Howes, C., & Phillips, D. (1990). *Who cares? Child care teachers and the quality of care in America*. (Final report of the National Child Care Staffing Study). Oakland, CA: Child Care Employee Project.
- Whitebook, M., Howes, C., & Phillips, D. (1998). *Worthy work, unlivable wages: The National Child Care Staffing Study, 1988-1997*. Washington, DC: Center for the Child Care Workforce.
- Zaslow, M., Halle, T., Martin, L., Cabrera, N., Calkins, J., Pitzer, L., & Margie, G. (2006). Child outcome measures in the study of child care quality. *Evaluation Review*, 30, 577-610.
- Zill, N. (2003). *Relationship of program and classroom characteristics to children's cognitive gains and social development in Head Start*. Presented at the Biennial Meeting of the Society for Research in Child Development, Tampa, FL. And available online at http://www.acf.hhs.gov/programs/opre/hs/faces/pres_papers/relation_program/relation_program.pdf