

# Examining the Associations Between Infant/Toddler Workforce Preparation, Program Quality and Child Outcomes: A Review of the Research Evidence



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OPRE Research Brief #2016-15

March 2016

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U.S. Department of Health and Human Services

Contract number: HHSP23320095631WC

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Suggested citation: Epstein, D., Halle, T., Moodie, S., Sosinsky, L., & Zaslow, M. (2016). *Examining the association between infant/toddler workforce preparation, program quality and child outcomes: A review of the research evidence*. OPRE Report # 2016-15. Washington, DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services.

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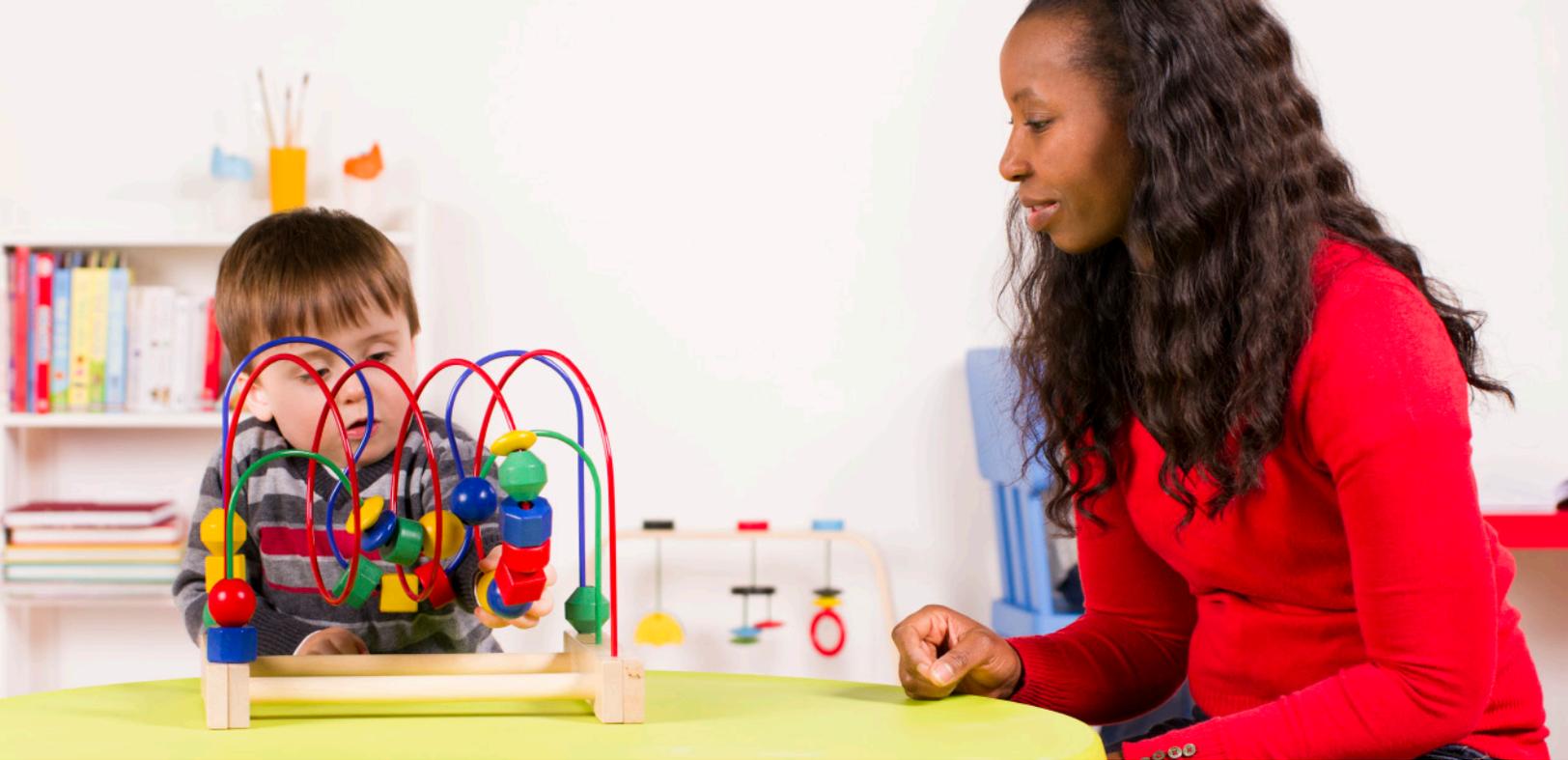
Acknowledgments: Child Trends is grateful for the input and support of Dr. Ivelisse Martinez-Beck of the Office of Planning, Research and Evaluation, who guided the production of this report. We also appreciate the contributions of Nadia Orfali from Child Trends.



## Abstract

One of the factors associated with high-quality early care and education is the qualifications of teachers and caregivers working with young children. However, due in part to the large variation in teacher and caregiver preparation pathways and requirements across states and settings, it can be difficult to determine the specific effects of teacher education and credentials on practice or child outcomes. This brief summarizes the findings from an evidence review conducted to address the research question: *What evidence do we have from the research literature about associations between infant/toddler teacher and caregiver preparation (e.g., education, credentials, etc.) and improvements in quality and child outcomes?*

A review of the recent literature (most published between 2005 and 2015) identified 31 studies that had relevant information to address the research question. The scant evidence that is available regarding associations between infant/toddler teacher and caregiver preparation and outcomes is generally positive, but still somewhat mixed. This is true regardless of whether the preparation is indicated by educational attainment, degree type (e.g., concentration or major in early childhood or a related field), or training. There is insufficient evidence to support conclusions on the associations between state infant/toddler credentials and observed quality or child outcomes in the studies reviewed. The broader literature focused on teachers and caregivers of children ages zero to 5 also reveals mixed findings. Much of the literature focuses on educational degrees without more refined assessment of individual competencies or the content of coursework or training. Also, current data sources do not make it easy to look for minimum or baseline levels of preparation associated with quality care and child outcomes. More research is needed examining the associations between state credentials and required core competencies within the credentials and observed quality and outcomes. Such research would help to inform policy priorities and practice, with the goal of improving outcomes for our very youngest children and their families.



# Examining the Associations Between Infant/Toddler Workforce Preparation, Program Quality and Child Outcomes: A Review of the Research Evidence

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## Introduction

Children who have high-quality early education experiences are more likely to be successful in a variety of areas later in life (Burchinal, Roberts, Riggins Zeisel, Neebe, & Bryant, 2000; NICHD Early Child Care Research Network, 2005). One of the factors associated with high-quality early care and education is the qualifications of teachers and caregivers working with young children (Ackerman, 2004; Burchinal et al., 2000). While there has been some examination of the characteristics of teachers and caregivers who foster positive early education experiences, and the relationship between teachers' and caregivers' education and the quality of the care children receive (Early, Bryant, Pianta, Clifford, Burchinal, Ritchie, Howes, et al., 2006; Early, Maxwell, Burchinal, Bender, Ebanks, Henry, et al., 2007; Mims, Scott-Little, Lower, Cassidy, & Hestenes, 2008; Vu, Jeon, & Howes, 2008), the evidence is limited. This is due, in part, to the large variation in teacher and caregiver preparation pathways and requirements, making it difficult to examine the specific effects of teacher education and credentials on teacher practice. Moreover, there is a dearth of evidence examining the qualifications of infant/toddler teachers and caregivers and their associations with program quality and child outcomes. This brief summarizes the findings from an evidence review conducted to address the research question: *What evidence do we have from the research literature about associations between infant/toddler teacher and caregiver preparation (e.g., education, credentials, etc.) and improvements in quality and child outcomes?*

## Methodology

The research team began by identifying terms that might best capture evidence on the question of interest. The goal of this review was to synthesize research about which core competencies and credentials have the strongest associations with program quality and outcomes for infants and toddlers. First, we conducted a

search using two major search engines, *EBSCO* and *PsyInfo*. Second, we reviewed Research Connections<sup>1</sup> to identify state reports that focused on associations between state credentials and observed quality and/or child outcomes.

The research team's goal was to gather all of the studies published between 2005 and 2015 that had examined the association between teacher and caregiver preparation (e.g., degree, credential, and certification) and program quality and child outcomes. Our primary interest was in studies focused on teachers and caregivers working with infants and toddlers. However, due to a dearth of existing evidence for this age group, the evidence review was expanded to include the broader early care and education workforce—those working with young children up through age 5. In addition, the review was expanded to include other training interventions, due to the limited evidence on the impact of infant/toddler workforce credentials, certificates, and degrees. Therefore, in this review, the following types of qualifications and training were included:

- educational attainment,
- completion of a higher education degree related to early care and education/child development,
- years of experience, and
- participation in training outside of higher education.

The criteria included studies conducted in the United States that had been published in peer-reviewed journals between 2005 and 2015,<sup>2</sup> or state or federal reports released between 2005 and 2015 that provided a detailed description of their methodological approach. Studies also had to have examined the association between teacher and caregiver qualifications and program quality and/or child outcomes. If a study only focused on a particular professional development or training and its relation to teacher and caregiver knowledge or skills and not the association between their knowledge and program quality or child outcomes, it did not meet the inclusion criteria.

We did an initial search of the relevant literature in preparation for an in-person expert panel meeting on October 28<sup>th</sup>, 2014. This search resulted in eight studies that met the criteria specified above. Next, we conducted a more comprehensive search of the *EBSCO* and *PsycInfo* databases for studies published in peer-reviewed academic journals since 2005.<sup>3</sup> This resulted in 5,618 total articles. We eliminated certain search terms, as they were pulling in articles that did not meet our criteria.<sup>4</sup> This refinement of the search terms resulted in 116 articles. We downloaded these 116 articles into a citation manager, and screened the article titles for relevancy. We removed articles from the list if they were a) conducted outside of the United States, or b) did not examine classroom quality or child outcomes. After this process, 44 articles remained for more detailed scrutiny, and from those, 21 articles were considered to match the inclusion criteria. Next, a search in Research Connections<sup>5</sup> and a request to states for reports resulted in 11 additional state reports,

<sup>1</sup> <http://www.researchconnections.org/childcare/welcome>

<sup>2</sup> As noted later in this methodology section, four national and federal reports published prior to 2005 were also included in the review, due to the small number of relevant published articles identified from the initial literature search that targeted the infant/toddler workforce.

<sup>3</sup> The full list of terms used in this search can be found in Appendix A.

<sup>4</sup> The search term “train\*” was removed first (an asterisk denotes that a resulting article could include the stem with any ending, such as training, trainer, trainee, etc.). This search term tagged articles that were related to staff training (i.e., training doctors or pre-service educators), which focused on the effects of these training programs on knowledge and skills, but not on program quality or child outcomes, and therefore the term was removed. We also removed the terms “infant\*” and “toddler\*”, which were contributing to a large pool of articles unrelated to caregiver credentials (e.g., medical articles). Finally, to further refine the search, we removed the terms “workshop\*” and “coach\*”, as these terms also contributed to a large number of articles that did not relate to early childhood teachers/caregivers.

<sup>5</sup> <http://www.researchconnections.org/childcare/welcome>.

which after screening included three relevant state reports. Lastly, a list of articles previously identified for another evidence review was also examined, resulting in three additional articles, for a total of 27 studies.

Of these 27 studies, only seven were specifically focused on infants/toddler teachers and caregivers. In an effort to incorporate more evidence on this specific workforce, four national and federal reports that conducted secondary analyses with national data on infant/toddler teachers and caregivers prior to 2005 were included in the evidence review. In total, 31 studies were identified for this literature review: nine studies were specific to infants and toddlers, nine examined children ages zero to 5, and 13 were specific to preschool-aged children (3 to 5 years old).

We created a summary table<sup>6</sup> to ensure that the same key pieces of information were collected from each article that was reviewed in depth, and to help summarize findings across the studies. The summary table was designed to capture information related to three different aspects: (1) the basic characteristics of the sample (e.g., program type, age range studied, whether associations were examined in relation to quality or child outcomes, and type of professional development examined); (2) the core competencies or content areas examined (e.g., language and literacy, general cognition, social and emotional development) that aligned with the content areas identified in the professional organizations and state credentials review; and (3) findings related to observed quality and child outcomes in analyses with and without covariates. We reviewed the summary table to verify the information presented and check it for completeness.

## Findings

### Measures used

Twenty-seven of the 31 studies in this review included observed quality measures. To examine observed program quality, most studies used one or more of the Environmental Rating Scales (Harms, Clifford, & Cryer, 1998; 19/31 studies). Some studies also used the Classroom Assessment Scoring System (CLASS; Pianta, La Paro, & Hamre, 2008; 8/31 studies), the Caregiver Interaction Scale (CIS; Arnett, 1989; 7/31 studies), and the Observational Record of Caregiving Environment (OCRE; NICHD Early Child Care Research Network, 1996; 5/31 studies). Covariates in examinations of observed quality included teacher and caregiver demographic characteristics, program characteristics, and teacher education/qualifications, with a few studies also including caregiving beliefs and practices.

Fifteen of the 31 studies examined child outcomes. Of those studies, the Peabody Picture Vocabulary Test (PPVT; Dunn & Dunn, 1997) was most often reported (8/15 studies), along with the Woodcock-Johnson Tests of Cognitive Abilities (Woodcock, 1997) to assess letter-word identification and pre-math applied problems skills (8/15 studies). Other measures commonly used in these studies included the Bayley Mental Development Index (MDI, Bayley, 1969, 1993), the Brief Infant Toddler Social Emotional Assessment (BITSEA; Briggs-Gowan & Carter, 2006), the Oral Written and Language Scales (OWLS; Carrow-Woolfolk, 1995), and the Bracken Basic Concept Scale (Bracken, 1984). Covariates for the studies that examined teacher and caregiver preparation in relation to child outcomes included child, family, and program characteristics, primarily.

Of the nine studies that focused specifically on infant and toddlers, eight included observed measures of quality and four examined child outcomes.

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<sup>6</sup> The summary table can be found in Appendix B.

## What does recent research say about teachers' degrees in relation to program quality and child outcomes?

The term “teacher” refers to an adult with primary care and teaching responsibilities for children and for the purposes of this review includes both center-based staff and family child care providers. Our primary interest was in teachers who cared for infants and toddlers, but since the evidence available is minimal, we also included studies focused on preschool-aged children to supplement the findings. Teacher degree refers to the formal education level of the teacher (e.g., associate or bachelor’s degree).

**Program quality. There is some evidence that higher education levels are associated with stronger program quality for infant/toddler teachers and caregivers** (e.g., Burchinal, Cryer, Clifford, and Howes, 2002; Clarke-Stewart, 2002; Vandell, Burchinal, O’Brien, and McCartney, 2002; Elicker, Wen, Kwon, & Sprague, 2013). For example, Burchinal et al. (2002) found that infant/toddler teachers and caregivers who had a bachelor’s degree in early care and education (ECE) or a related field had higher-quality classrooms, scoring higher on the ITERS compared to those with less than a BA degree in ECE. In another study, Clarke-Stewart et al. (2002) found that family child care providers serving infants and toddlers who had attended college scored higher on observed quality of care. **However, other evidence found no associations between teacher degree and program quality.** For example, several large-scale studies looking at the effects of infant/toddler teacher education did not find an association between teacher degree and program quality, although there was an effect seen of more formal education (with education being a continuous variable ranging from less than high school to a post master’s degree (e.g., Ed.D. or Ph.D.)) on more positive caregiving practices (NICHD, 1996; NICHD, 1999). In contrast to these findings, Honig et al. (2013) found that infant/toddler teachers and caregivers with lower education levels (i.e., high school diploma or less) responded more quickly to infant/toddlers’ distress,<sup>7</sup> compared to teachers with higher education levels.

**When examining the effect of teachers’ degree on program quality for preschool-aged children, the evidence is mixed.** Some studies found teacher and director education levels were associated with higher observed quality (Denny, Hallam, & Homer, 2012; Hallam, Bargreen, & Ridgley, 2013). Denny et al. (2012) found that teacher education level and years of experience were associated with higher scores on CLASS Instructional Support, and Hallam et al. (2013) found relationships between the director’s education level and program scores on the Family Day Care Rating Scale (FDCRS). Moreover, Mims et al. (2008) found higher teacher education predicted better observed classroom quality scores, on the Environmental Rating Scales, in child care centers. On the other hand, in a replicated secondary data analysis of several large scale data sets, Early et al. (2007) found that only 8 of 27 analyses provided evidence of an association between the highest degree attained by the lead teacher and observed classroom quality. Vu et al. (2008) found that program auspice<sup>8</sup> affected the relationships between teachers’ degrees and observed classroom quality (i.e., scores on the ECERS-R and CLASS subscales). For example, in school district and state preschool classrooms, no differences were found in observed quality between lead teachers with a BA and lead teachers with a California Child Development Permit (CCDP) and no BA. However, in other program auspices such as private centers, nonprofit centers, public Head Start, and general child care agencies, lead teachers with a BA were more effective than teachers with a CCDP and no BA at providing feedback for student learning and creating classrooms higher in sensitive teacher-child interactions.

**Child outcomes. Four recent studies were found that explored the association between infant/toddler teacher education and degree and child outcomes, and found positive correlations.** One study found

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<sup>7</sup> For purposes of this evidence review, teacher and caregiver responses to infant/toddler distress was considered a measure of caregiver behavior and part of observed quality.

<sup>8</sup> The term auspice in this study refers to the program’s funding source (i.e., private, for profit, private, non-profit, Head Start, Department of Education sponsored programs including school districts).

that children in classrooms with caregivers who had a BA degree had more advanced language skills on the Peabody Picture Vocabulary Test (PPVT) compared with children who had teachers who had less than a BA degree (Burchinal et al., 2002). Furthermore, Burchinal et al. (2016) found that higher levels of teacher education were associated with higher levels of language, pre-literacy and math skills for children in early care and education programs. Additionally, there is evidence that more formal education (i.e., education ranging from less than a high school diploma to an advanced graduate degree) is connected with better child outcomes including school readiness, language comprehension, and a reduction in behavior problems (NICHD, 1999). However, this relation to outcomes was seen only for children at 36 months; while a reduction in behavior problems was seen with children at 24 months who had teachers with more formal education, associations were not found with other child outcomes. Lastly, a fourth study found that in family child care homes, infants' and toddlers' cognitive performance was higher when their caregivers had attended college (Clarke-Stewart et al., 2000).

**Five additional studies were found that examined associations between teacher degree and child outcomes for preschool-aged children, with three of the studies finding direct effects of degree on outcomes** (Son, Kwon, Jeon, & Hong, 2013; Kim, Chang, & Kim, 2011; McWayne, Hahs-Vaughn, Cheung, & Wright, 2012). In one study, higher teacher education levels were associated with higher early reading scores for preschool-aged Head Start children (Son et al., 2013). Another study found that teachers' having both a BA degree and professional training (e.g., Child Development Associate (CDA) or special education teaching degree) was associated with higher math scores for preschool-aged English language learners (ELL), compared to teachers who had less than a BA or no other training (Kim et al., 2011). However, this finding was only true for teachers of ELL children, not for those of native-English-speaking preschool children. Additionally, for those teachers who had less than a BA degree, if they had another type of training or certificate (e.g., CDA, or special education teaching degree), the children in their care who were ELL had better math skills than ELL children in classrooms with teachers with no additional specialized training to work with young children. McWayne et al. (2012) found that higher teacher education was associated with more overall stability and improvements in school readiness skills for children with average social and pre-academic skills. When examining children with lower social and pre-academic skills, the authors found children made more improvements in school readiness skills when they had teachers with some college versus those that had an associate degree. Gerde and Powell (2009) looked at Head Start children's language growth, and found an indirect effect between teachers' education level and children's language skills through book-reading practices. Lastly, Tout, Starr, Isner, Cleveland, Albertson-Junkans, Soli, and Quinn (2011) evaluated the Minnesota quality rating and improvement system, Parent Aware, and found that teacher training and education (e.g., the qualifications of administrators, teachers, and family child care providers, including the attainment of specific degrees, credentials or training) predicted print knowledge among children, but only when not controlling for other types of quality indicators. When other quality indicator categories were included in the model (such as "tracking learning," "teacher training and education," and "teaching materials and strategies"),<sup>9</sup> no single predictor of quality accounted for a significant amount of variance.

**Family outcomes.** While not a direct focus of this evidence review, we did find reports of associations between infant/toddler teacher and caregiver preparation and family outcomes, including relationships with families. Specifically, Elicker et al. (2013) found that infant/toddler teachers and caregivers with a BA or higher had parents who displayed more positive parenting behaviors, but this was moderated by the quality of the parent-caregiver relationships: this effect of a BA degree on parenting behaviors was only seen

<sup>9</sup> Minnesota's Quality Rating and Improvement System has four areas of quality in which programs can earn points: family partnerships, teaching materials and strategies (e.g., curriculum and materials), tracking learning (e.g., assessments and tools to track children's learning), and teacher training and education.

when there was an existing positive parent-caregiver relationship. On the other hand, when comparing the quality of the parent-caregiver relationships, teachers with a CDA or Associate degree had more positive relationships with parents, compared to those with a BA.

## What does research say about teachers' major/concentration in ECE or child development (CD) in relation to observed quality and child outcomes?

For this analysis, we included studies that examined the association between teachers' and caregivers' major/concentration in either ECE or CD, and child outcomes. This could include having a degree such as an associate or bachelor's degree in ECE or CD, or it could mean having specialized training in ECE or CD outside of the degree (e.g., CDA).

**Program quality.** Two studies exploring infant/toddler teachers' and caregivers' major/concentration in ECE or CD found positive associations with observed quality. **Having a major or concentration in ECE or CD was shown to be associated with less authoritarian beliefs, and safer and more stimulating environments (NICHD, 1996), as well as higher overall program quality (Clarke-Stewart et al., 2002).** However, a third study did not find an association between major/concentration in child development and observed positive caregiving practices (NICHD, 2000).

**When looking more broadly at ECE programs for both infants/toddlers and preschoolers, there is less evidence that an ECE/CD major or concentration is associated with observed quality.** Gerde et al. (2009) found that teachers' preparation in ECE led to greater use of book-focused utterances<sup>10</sup> in large-group literacy instruction for preschool-aged children. Torquati, Raikes and Huddleston-Casas (2007) examined the effect of having a CDA on observed quality and found differences between teachers and caregivers working with infants and toddlers and those working with preschool-aged children. While having a CDA was associated with observed quality in preschool classrooms, it was not associated with quality in infant/toddler classrooms. In addition, Early et al. (2006) found no correlations between the content of a teacher's major and classroom quality.

**Child outcomes.** Similar to the findings of major/concentration in ECE/CD on program quality, there is limited evidence on the effects on child outcomes. **Only three studies were found that examined child outcomes in relation to teachers' majors or concentrations, and these had mixed results.** While one study did not find an association between major/concentration and more positive caregiving practices (NICHD, 1996), another study found that training in ECE was associated with better language comprehension and school readiness skills for infants and toddlers. For preschool-aged children, Son et al. (2013) found that teachers with a concentration in ECE/CD provided higher social-emotional practices in their classrooms compared to teachers did not have a concentration in ECE/CD. Additionally, Early et al. (2006) found some associations between teachers' years of education and the content of their major and children's math skills.

## What does research say about state credentials on observed quality and child outcomes?

**There is insufficient available evidence to support conclusions about the associations between state infant/toddler credentials and observed quality or child outcomes in the studies reviewed.** Though many states have required credentials for ECE professionals, few have examined the relationships between acquiring that credential and classroom quality or child outcomes. Only one study was found that examined

<sup>10</sup> The authors for this study define book-focused utterances as "defining and discussing new words, asking questions, responding to children's spontaneous comments, and expanding the text with additional information related to the book" (p. 6).

the association between an infant/toddler credential and observed quality. Shivers (2011) examined the associations between providers obtaining the Tennessee infant/toddler credential and overall environmental quality (ITERS-R and FDCRS) and found that quality scores significantly increased after completing the credential. Providers also showed more sensitivity and less harshness and detachment in their provider-child interactions after completing the credential. There were no studies examining the association between a state credential and child outcomes.

## What does research say about teacher training on observed quality and child outcomes?

**The limited evidence suggests a positive association between teacher and caregiver training (especially onsite training or consultation, and training with a fixed curriculum) and observed quality; no associations were found with child outcomes.** Three studies were found that focused on the associations between training for infant/toddler teachers and caregivers, outside of higher education, and child outcomes. Halle, Forry, Hair, Westbrook, and Dwyer (2009) found that teachers' and caregivers' professional development is related to more indicators of quality in home-based settings than center-based settings. Home-based caregivers who participated in early childhood trainings outside of higher education in the last 12 months were more likely than their peers who did not participate in the trainings to provide cognitively stimulating materials and language and literacy activities to infants and toddlers.

Moreno, Green, and Koehn (2015) found that participants who received the most intensive amount of professional development intervention (48-hour course outside of higher education, plus 15 hours of one-on-one coaching) showed the most consistent pattern of desirable outcomes, particularly in their category of "support for language and literacy." The authors examined differences in outcomes for students who participated in a 48-hour training course and either had zero, five, or 15 hours of one-on-one coaching, with students who were enrolled in a community college course or received no intervention at all. Fifteen hours of onsite one-on-one coaching consultation, coupled with a 48-hour training course outside of higher education, was found to have a larger effect on caregiver-child interactions/quality than just training or coursework alone.

Campbell and Milbourne (2005) found that adding onsite consultation (3 one-hour visits) to a five-session professional development program was related to Infant/Toddler Environment Rating Scale (ITERS) score improvements in the consultation group compared to the no-consultation group. The authors suggest that consultation may have been more effective for caregivers with more experience. Fukkink and Lont (2007) conducted a meta-analysis looking at 17 studies on early childhood (i.e., ages zero to 5) teacher trainings completed outside of higher education. The authors found that trainings with a fixed curriculum had a larger effect size than trainings without a fixed curriculum on caregiver-child interactions and quality. Several of the studies in the meta-analysis tested child outcomes, and while aggregated effect sizes were positive, there were no statistically significant differences in outcomes.

## Summary

The United States has a substantial paid workforce working with infants and toddlers. However, we currently know very little about what professional development supports this workforce needs in order to deliver high-quality practices that will enhance child well-being. Our evidence review confirmed that we have a very small amount of research literature that speaks to the associations between teacher and caregiver preparation and quality and child outcomes, specifically for the infant/toddler workforce. We found only nine studies that addressed this age range. Reviewing this limited research, there is some evidence for positive associations between infant/toddler teacher and caregiver preparation and quality, but less evidence of associations with child outcomes. Furthermore, the collective evidence for associations between infant/toddler workforce preparation and outcomes is still mixed.

If we extend our focus to the wider preschool age range, we find a total of 31 recent studies that are applicable. Expanding the investigation to teachers and caregivers of children ages zero to 5 does not help to clarify the associations between preparation and outcomes; the findings continue to be mixed. More research is clearly needed that focuses specifically on infant/toddler teachers and caregivers. Progress will be greater when this research goes beyond broad summaries like degrees completed and considers the requirements of the degrees (such as content of coursework).

Unfortunately, the literature review provided insufficient evidence from which to draw conclusions regarding the associations between state credentials and program quality or child outcomes. We found only one study that examined the association between a state credential and observed program quality. With at least 28 states offering an infant/toddler or early childhood credential (PDW Center, 2014),<sup>11</sup> it is important to understand how the specific requirements and core competencies addressed as part of the credentials are associated with observed quality and child outcomes. Such work is clearly needed, perhaps focusing on credentials and certificates at differing levels of stringency.

Finally, the limited evidence suggests a positive association between teacher/caregiver training (especially onsite training or consultation, and training with a fixed curriculum) and observed quality teacher/caregiver practices; no associations were found between training and child outcomes.

### **Implications for policy and practice**

Important recent early childhood policy initiatives place a particular emphasis on improving the quality of infant/toddler care (such as the quality set aside for infant toddler care in CCDBG) and increasing access to high-quality care (as in the Early Head Start-Child Care Partnerships). It is therefore a particularly important time to be able to inform these initiatives with guidance on how best to improve quality in early care and education for infants and toddlers and to set benchmarks for high-quality programs.

In order to inform the development of high-quality ECE programs and efforts to improve quality in existing programs for infants and toddlers, it is important to be able to provide guidance on the professional qualifications of teachers and caregivers that support high-quality interactions. Yet, our review of the existing research points to only a limited research base to provide guidance on how best to do that.

### **Implications for future research**

Current data sources do not make it easy to look for minimum or baseline levels of preparation associated with quality care and child outcomes. To address the limitations of the current research evidence, it would be useful to identify additional sources of data that would permit analysis of associations between infant/toddler teacher and caregiver preparation (in terms of training, education, credentials, and demonstrated competencies) and quality and/or child outcomes. Possible sources include national and state data sets (for example, data from states' quality rating and improvement systems).

Much of the literature focuses on educational degrees or educational attainment without more refined assessment of individual competencies at different levels of educational attainment, or content of coursework. As noted earlier, research needs to move beyond broad summaries like degrees completed and consider the requirements of the degrees (such as content of coursework) that are associated with change in practice and change in child outcomes. Similarly, it is important to understand how the specific requirements and core competencies addressed as part of state and national credentials are associated with observed quality and child outcomes.

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<sup>11</sup> The National Center on Child Care Professional Development Systems and Workforce Initiatives (PDW Center) conducted a review of infant/toddler state credentials and certificates, which can be found here: [https://childcareta.acf.hhs.gov/sites/default/files/public/PDW\\_IT\\_Credential\\_Overview.pdf](https://childcareta.acf.hhs.gov/sites/default/files/public/PDW_IT_Credential_Overview.pdf)

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## Appendix A

**Table 1.** Full set of original search terms (results = 5618)

<p>“child care” OR “Head Start” OR pre-kindergarten OR “early childhood education” OR “early care” OR preschool OR pre-k OR “child-care” OR prekindergarten OR “day care” OR “early childhood program” OR infant* OR toddler*</p>
<p>AND</p>
<p>CDA OR “Child Development Associate” OR “state credential” OR (credential NEAR (teacher OR staff OR caregiver OR provider)) OR ((teacher* OR staff OR caregiver* OR provider*) NEAR “education level”) OR “teachers’ education” OR “associate* degree” OR “bachelor* degree” OR “master* degree” OR ((teacher OR staff OR director OR caregiver OR provider) NEAR qualification*) OR workshop* OR “college course*” OR coach* OR train*</p>
<p>AND</p>
<p>“motor development” OR “physical development” OR “physical well-being” OR nutrition OR “wellness” OR “health” OR “safety” OR “social and emotional” OR (teacher NEAR relationship*) OR (peer NEAR relationship*) OR “emotional development” OR “psychosocial development” OR social-emotional OR “self-concept” OR “language development” OR literacy OR pre-literacy OR reading OR language OR “phonemic awareness” OR “approaches toward learning” OR “approaches to learning” OR “executive function*” OR engagement OR attention OR task orientation OR cognit* OR achievement OR academic OR math OR “general knowledge” OR science OR “social studies” OR “school readiness” OR “school-readiness” OR “child outcomes” OR “ OR ECERS OR ECERS-R OR “environment rating scale” OR FCCERS OR FCCERS-R OR FDCRS OR ITERS OR ITERS-R OR “Caregiver Interaction Scale” OR “caregiver interaction profile” OR “Observational Record of the Caregiving Environment” OR “Classroom Assessment Scoring System” OR “teacher-child interaction*” OR “process quality”</p>
<p>NOT</p>
<p>“critical discourse analysis”</p>

# Appendix B: Infant/Toddler Workforce Competencies/Credentials Literature Summary Table

## Publication Information and Study Methodology

Citation	Age Range	Document type	Focus on child outcomes	Focus on program quality	Degree in ECE examined	CDA or state credential examined	Degree or certificate examined	Training approach or curriculum used
Campbell, P. H., & Milbourne, S. A. (2005). Improving the quality of infant–toddler care through professional development. <i>Topics in Early Childhood Special Education, 25</i> (1), 3-14.	Infant/Toddler	Research Article	No	Yes	No	No	No	First Beginnings professional development program with added onsite consultation for the consultation group, and a comparison no-consultation group
Clarke-Stewart, K. A., Vandell, D. L., Burchinal, M., O'Brien, M., & McCartney, K. (2002). Do regulable features of child-care homes affect children's development? <i>Early childhood research quarterly, 17</i> (1), 52-86.	Infant/Toddler	Research Article	Yes	Yes	Yes	No	Yes	None
Elicker, J., Wen, X., Kwon, K.-A., & Sprague, J. B. (2013). Early Head Start relationships: Association with program outcomes. <i>Early Education and Development, 24</i> (4), 491–516.	Infant/Toddler	Research Article	Yes	No	Yes	Yes	Yes	None
Halle, T., Forry, N., Hair, E., Westbrook, T., & Dwyer, K. (2009). Associations between provider training and education and other quality indicators in low-income children's primary care arrangements at 24 months of age. OPRE Research Brief #2009-18. Washington, DC.: Child Trends and the US Department of Health and Human Services, Administration for Children and Families, Office of Planning, Research, and Evaluation.	Infant/Toddler	Research Brief	No	Yes	No	No	Yes	None
Honig, A.S., Kim, Y., Ray, K., & Yang, H.Y. (2013). Teacher education and soothing strategies with infants and toddlers. <i>Early Child Development and Care, 183</i> (7), 895-898.	Infant/Toddler	Research Article	Yes	No	No	No	Yes	None
Moreno, A. J., Green, S., & Koehn, J. (2015). The effectiveness of coursework and onsite coaching at improving the quality of care in infant–toddler settings. <i>Early Education and Development, 26</i> (1), 66–88.	Infant/Toddler	Research Article	No	Yes	Yes	No	Yes	Expanding Quality for Infants and Toddlers (EQ), coursework plus onsite coaching
NICHD Early Child Care Research Network. (1996). Characteristics of Infant Child Care: Factors Contributing to Positive Caregiving. <i>Early Childhood Research Quarterly, 11</i> (3), 269-306.	Infant/Toddler	Research Article	No	Yes	Yes	No	Yes	None
NICHD Early Child Care Research Network. (1999). Child outcomes when child care center classes meet recommended standards for quality. <i>American Journal of Public Health, 89</i> (7), 1072-1077.	Infant/Toddler	Research Article	Yes	Yes	Yes	No	Yes	None
Shivers, E. (2011). <i>Tennessee's Infant and Toddler Credential: Pilot evaluation report</i> . Phoenix, AZ: Indigo Cultural Center, Institute for Child Development Research and Social Change.	Infant/Toddler	State Report	No	Yes	No	Yes	No	None

NOTES: Row shading corresponds to the age range addressed by the resource.

## Publication Information and Study Methodology Cont.

Citation	Age Range	Document type	Focus on child outcomes	Focus on program quality	Degree in ECE examined	CDA or state credential examined	Degree or certificate examined	Training approach or curriculum used
Burchinal, M. R., Cryer, D., Clifford, R. M., & Howes, C. (2002). Caregiver training and classroom quality in child care centers. <i>Applied Developmental Science, 6</i> (1), 2-11.	Infant/Toddler and Preschool	Research Article	Yes	Yes	Yes	Yes	Yes	Training attended through workshops at a child care center, in the community, or at a professional meeting.
Burchinal, M.R.; Soliday Hong, S.L.; Sabol, T.L.; Forestieri, N.; Peisner-Feinberg, E.; Tarullo, L., & Zaslow, M. (2016). <i>Developing ratings in quality rating and improvement systems: Secondary data analyses to illustrate psychometric properties of scale development</i> . OPRE Report # 2016-26. Washington, DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services.	Infant/Toddler and Preschool	Research Article	Yes	Yes	Yes	Yes	Yes	None
Doherty, G., Forer, B., Lero, D. S., Goelman, H., & LaGrange, A. (2006). Predictors of quality in family child care. <i>Early Childhood Research Quarterly, 21</i> (3), 296-312.	Infant/Toddler and Preschool	Research Article	No	Yes	Yes	Yes	Yes	None
Fukkink, R. G., & Lont, A. (2007). Does training matter? A meta-analysis and review of caregiver training studies. <i>Early Childhood Research Quarterly, 22</i> (3), 294-311.	Infant/Toddler and Preschool	Literature Review	Yes	Yes	No	No	No	Meta-analysis of 17 studies, trainings varied and included workshops, coaching, mentoring, video feedback, etc.
Marshall, N. L., Ed, D., Dennehy, J., Robeson, W. W., Ed, D., Roberts, J., & Ph, D. (2010). Boston Quality Inventory 2010 : Community Early Care and Education Programs. Wellesley Centers for Women, Wellesley College, Wellesley, MA	Infant/Toddler and Preschool	State Report	No	Yes	No	Yes	Yes	None
Mims, S. U., Scott-Little, C., Lower, J. K., Cassidy, D. J., & Hestenes, L. L. (2008). Education level and stability as it relates to early childhood classroom quality: A survey of early childhood program directors and teachers. <i>Journal of Research in Childhood Education, 23</i> (2), 227-237.	Infant/Toddler and Preschool	Research Article	No	Yes	Yes	No	Yes	None
National Institute of Child Health and Human Development (NICHD) Early Child Care Research Network. (2000). Characteristics and quality of child care for toddlers and preschoolers. <i>Applied Developmental Science, 4</i> (3), 116-135.	Infant/Toddler and Preschool	Research Article	No	Yes	Yes	No	Yes	None
Torquati, J. C., Raikes, H., & Huddleston-Casas (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. <i>Early Childhood Research Quarterly, 22</i> , 261-275.	Infant/Toddler and Preschool	Research Article	No	Yes	Yes	Yes	Yes	None
Tout, K., Starr, R., Isner, T., Cleveland, J., Albertson-Junkans, L., Soli, M., & Quinn, K. (2011). Evaluation of parent aware: Minnesota's quality rating and improvement system pilot.	Infant/Toddler and Preschool	State Report	Yes	No	Yes	Yes	Yes	None
Denny, J. H., Hallam, R., & Homer, K. (2012). A multi-instrument examination of preschool classroom quality and the relationship between program, classroom, and teacher characteristics. <i>Early Education and Development, 23</i> (5), 678-696.	Preschool	Research Article	No	Yes	Yes	No	No	None
Early, D. M., Maxwell, K. L., Burchinal, M., Bender, R. H., Ebanks, C., Henry, G. T., ... Vandergrift, N. (2007). Teachers' Education, Classroom Quality, and Young Children's Academic Skills: Results From Seven Studies of Preschool Programs. <i>Child Development, 78</i> (2), 558-580.	Preschool	Research Article	Yes	Yes	Yes	No	Yes	None

NOTES: Row shading corresponds to the age range addressed by the resource.

## Publication Information and Study Methodology Cont.

Citation	Age Range	Document type	Focus on child outcomes	Focus on program quality	Degree in ECE examined	CDA or state credential examined	Degree or certificate examined	Training approach or curriculum used
Early, D., Bryant, D. M., Pianta, R. C., Clifford, R. M., Burchinal, M., Ritchie, S., Howes, C., & et al. (2006). Are teachers' education, major, and credentials related to classroom quality and children's academic gains in pre-kindergarten? <i>Early Childhood Research Quarterly</i> , 21(2), 174-195.	Preschool	Research Article	Yes	Yes	Yes	Yes	Yes	None
Gerde, H. K., & Powell, D. R. (2009). Teacher education, book-reading practices, and children's language growth across one year of Head Start. <i>Early Education and Development</i> , 20(2), 211-237.	Preschool	Research Article	Yes	No	Yes	No	Yes	None
Hallam, R. A., Bargreen, K. N., & Ridgley, R. (2013). Quality in family child care settings: The relationship between provider educational experiences and global quality scores in a statewide quality rating and improvement system. <i>Journal of Research in Childhood Education</i> , 27, 393-406.	Preschool	Research Article	No	Yes	Yes	Yes	Yes	None
Heisner, M., Lederberg, A. (2011). The impact of Child Development Associate training on the beliefs and practices of preschool teachers. <i>Early Childhood Research Quarterly</i> , 26(2), 227-236.	Preschool	Research Article	No	No	No	Yes	No	None
Kim, S., Chang, M., & Kim, H. (2011). Does teacher educational training help the early math skills of English language learners in Head Start? <i>Children and Youth Services Review</i> , 33(5), 732-740.	Preschool	Research Article	Yes	No	Yes	Yes	Yes	None
Le, V., Schaack, D. D., & Setodji, C. M. (2015). Identifying baseline and ceiling thresholds within the qualistar early learning quality rating and improvement system. <i>Early Childhood Research Quarterly</i> , 30, 215-226.	Preschool	Research Article	Yes	Yes	Yes	No	Yes	None
LoCasale-Crouch, J., Konold, T., Pianta, R., Howes, C., Burchinal, M., Bryant, D., ... & Barbarin, O. (2007). Observed classroom quality profiles in state-funded pre-kindergarten programs and associations with teacher, program, and classroom characteristics. <i>Early Childhood Research Quarterly</i> , 22(1), 3-17.	Preschool	Research Article	No	Yes	Yes	Yes	Yes	None
McWayne, C. M., Hahs-Vaughn, D. L., Cheung, K., & Wright, L. E. G. (2012). National profiles of school readiness skills for Head Start children: An investigation of stability and change. <i>Early Childhood Research Quarterly</i> , 27(4), 668-683.	Preschool	Research Article	Yes	No	No	No	Yes	None
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? <i>Applied Developmental Science</i> , 9(3), 144-159.	Preschool	Research Article	No	Yes	Yes	No	Yes	None
Son, S.-H. C., Kwon, K.-A., Jeon, H.-J., & Hong, S.-Y. (2013). Head Start Classrooms and Children's School Readiness Benefit from Teachers' Qualifications and Ongoing Training. <i>Child &amp; Youth Care Forum</i> , 42(6), 525-553.	Preschool	Research Article	Yes	Yes	Yes	No	Yes	None
Vu, J. A., Jeon, H.-J., & Howes, C. (2008). Formal education, credential, or both: Early childhood program classroom practices. <i>Early Education and Development</i> , 19(3), 479-504.	Preschool	Research Article	No	Yes	No	Yes	Yes	None

NOTES: Row shading corresponds to the age range addressed by the resource

## Evidence of Association between Workforce Competencies/Credentials and...

Citation	Age range	Evidence of association between workforce competencies/credentials and observed quality in analyses without covariates	Evidence of association between workforce competencies/credentials and observed quality in multivariate analyses	Evidence of association between workforce competencies/credentials and child outcomes in analyses without covariates	Evidence of association between workforce competencies/credentials and child outcomes in multivariate analyses
Campbell, P. H., & Milbourne, S. A. (2005). Improving the quality of infant–toddler care through professional development. <i>Topics in Early Childhood Special Education, 25</i> (1), 3-14.	Infant/ Toddler	Not applicable	ITERS scores increased for the consultation group and decreased for the no-consultation group. Other factors did not have main effects on ITERS scores (level of caregiver education, years of experience, training group, and person who provided the consultation). Caregiver level of education and years of experience approached significance. The consultation group showed more “observable change” in setting quality than the no-consultation group at levels that approached statistical significance when the two groups were compared (“observable change” was an ITERS score improving from pre- to post on quality such as from “Inadequate” (<3.0) to “Adequate” ( between 3.0 and 4.99). The consultation group showed more improvements on a greater number of ITERS subscale mean scores than the no-consultation group.	Not applicable	Not applicable
Clarke-Stewart, K. A., Vandell, D. L., Burchinal, M., O’Brien, M., & McCartney, K. (2002). Do regulable features of child-care homes affect children’s development? <i>Early childhood research quarterly, 17</i> (1), 52-86.	Infant/ Toddler	Not applicable	Block of regulable features (caregiver’s education, training, recent training, # of children in home, noncompliance with group size points, and licensing status) predicted both positive caregiving rating and CC-HOME. Caregivers with higher levels of education and specialized training within the last year received higher scores on positive caregiving rating and CC-HOME. CC-HOME was more strongly related to caregiver education and compliance with group size points at 36 months than at younger ages. Caregiving quality was lower for those that had not graduated high school than those who did; and was also higher among caregivers who had attended college than those who didn’t. Relations between caregiving training and observed quality of care were no longer significant for positive caregiving rating or the CC-HOME when caregiver belief were included. Nonregulable features did not mediate the effect of caregiver education or training on the CC-HOME.	Not applicable	Caregivers with higher levels of education and training within the past year had children who scored higher on cognitive tests. Associations between cognitive ability and the block of regulable variables, specifically caregiver education, were still significant when nonregulable variables were controlled. Child outcomes were not significantly related to whether or not the home was licensed, to how much specialized training the caregiver had, to the number of children enrolled, or whether the home was in compliance with group size cut-offs. Children whose caregivers had attended college scored higher on cognitive tests at 24 and 36 months than those who had not attended college. Associations between child outcomes and observed quality of care were tested, controlling for variables of site, child’s age, family variables, regulable and non-regulable child care variables. Associations with observed quality of care were significant for all five child outcomes.
Elicker, J., Wen, X., Kwon, K.-A., & Sprague, J. B. (2013). Early Head Start relationships: Association with program outcomes. <i>Early Education and Development, 24</i> (4), 491–516.	Infant/ Toddler	Not applicable	Level of education moderated the relationship between the quality of parent-caregiver relationships and observed parenting behavior. Families with a positive relationship with a caregiver with a BA or higher showed more positive parenting.	Not applicable	No significant findings

NOTES: Row shading corresponds to the age range addressed by the resource.

**Evidence of Association between Workforce Competencies/Credentials and...Cont.**

Citation	Age range	Evidence of association between workforce competencies/ credentials and observed quality in analyses without covariates	Evidence of association between workforce competencies/ credentials and observed quality in multivariate analyses	Evidence of association between workforce competencies/ credentials and child outcomes in analyses without covariates	Evidence of association between workforce competencies/credentials and child outcomes in multivariate analyses
<p>Halle, T., Forry, N., Hair, E., Westbrook, T., &amp; Dwyer, K. (2009). Associations between provider training and education and other quality indicators in low-income children's primary care arrangements at 24 months of age. OPRE Research Brief #2009-18. Washington, DC.: Child Trends and the US Department of Health and Human Services, Administration for Children and Families, Office of Planning, Research, and Evaluation.</p>	<p>Infant/ Toddler</p>	<p>Provider training predicts more indicators of quality than provider education in home-based settings. Home-based providers who attended ECE training in last 12 months tend to be in settings with a larger child-adult ratio, more developmentally appropriate materials, and more language/literacy activities than home-based providers who did not attend trainings. Home-based providers who had a high school degree or less who were more likely to endorse controlling behavior-management practices than those with a BA degree or more. Providers who had less than a high school degree were less likely than those with a BA degree or more to provide at least 2 language/literacy activities twice a day. Children with center-based providers with less than a high school degree tend to be in settings with higher ratios than those in settings with providers with a BA degree or more. Children with center-based providers who attended training in the last 12 months are in settings that provide more enriching outings.</p>	<p>Not applicable</p>	<p>Not applicable</p>	<p>Not applicable</p>
<p>Honig, A.S., Kim, Y., Ray, K., &amp; Yang, H.Y. (2013). Teacher education and soothing strategies with infants and toddlers. <i>Early Child Development and Care</i>, 183 (7), 895-898.</p>	<p>Infant/ Toddler</p>	<p>Not applicable</p>	<p>Not applicable</p>	<p>Not applicable</p>	<p>The high school education group differed from the graduate education group but not from the mid-level education group in terms of infant distress duration. Due to sample size, the high school education or less group was compared to teachers with any college education. Level of distress and duration of distress was lower for infants/toddlers whose teachers had a high school education or less compared with children whose teachers had some college or were college graduates. With teacher education as a co-variate, there was no significant relationship between teachers education and child distress. The youngest group of infants (0-12 months) received more positive caregiver responses when distressed compared with children age 13-24 months and children 25-36 months. There was no relationship between distress and child gender.</p>

NOTES: Row shading corresponds to the age range addressed by the resource.

Evidence of Association between Workforce Competencies/Credentials and...Cont.

Citation	Age range	Evidence of association between workforce competencies/credentials and observed quality in analyses without covariates	Evidence of association between workforce competencies/credentials and observed quality in multivariate analyses	Evidence of association between workforce competencies/credentials and child outcomes in analyses without covariates	Evidence of association between workforce competencies/credentials and child outcomes in multivariate analyses
Moreno, A. J., Green, S., & Koehn, J. (2015). The effectiveness of coursework and onsite coaching at improving the quality of care in infant-toddler settings. <i>Early Education and Development, 26</i> (1), 66-88.	Infant/Toddler	Not applicable	Examined changes in self-efficacy, knowledge, and Emotional-Behavioral Support (EBS) and Support for Language and Literacy (SLL). <b>Self-efficacy:</b> negative views of child care and professional status not significant covariates in these outcomes. <b>Knowledge:</b> None of the covariates were significant. EQ course plus 15 hours of coaching had small effect on participants' knowledge. <b>EBS and SLL:</b> professional status approached significance $p=.08$ for EBS. Professional status was the only significant covariate for SLL $p<.05$ . EQ0 group (EQ coursework plus 0 hours of coaching) showed increases that were moderate increases between pre and follow up, EQ15 group (EQ coursework plus 15 hours of coaching) showed significant increases in SLL between pre and posttest and pretest and follow up.	Not applicable	Not applicable
NICHD Early Child Care Research Network. (1996). Characteristics of Infant Child Care: Factors Contributing to Positive Caregiving. <i>Early Childhood Research Quarterly, 11</i> (3), 269-306.	Infant/Toddler		<u>Correlations:</u> Caregivers with more formal education had more specialized training pertaining to children, held less authoritarian child-rearing beliefs, and were in settings that were rated as more safe, clean, and stimulating. Higher positive caregiving ratings and frequencies were observed in programs in which caregivers had more formal education and held more nonauthoritarian child-rearing beliefs. Observed caregiving was not significantly correlated with specialized training pertaining to children. <u>Multiple regression analyses:</u> Caregivers' formal education, years of experience, and specialized training did not add to the prediction of observed positive caregiving for 6-month olds. For in-home sitter care and child care homes positive caregiving was associated with nonauthoritarian beliefs, and specialized training in child development. In centers, more formal education were associated with more frequent positive caregiving behaviors.	Not applicable	Not applicable
NICHD Early Child Care Research Network. (1999). Child outcomes when child care center classes meet recommended standards for quality. <i>American Journal of Public Health, 89</i> (7), 1072-1077.	Infant/Toddler	Classes with older children were more likely to meet quality standards than were classes for infants and toddlers. Levels of caregiver training and education were higher in older children's classes.	At 24 months of age, ratio of income to needs and maternal education were associated with the number of recommended standards met by child care centers. At 36 months of age, only maternal sensitivity was associated with the number of standards met.	Not applicable	Meeting standards for caregiver education and training was associated with higher school readiness and language comprehension scores and fewer behavior problems at 36 months of age. At 24 months, fewer behavior problems were reported for children in classes that met more standards. At 36 months, children in classes that met more standards displayed higher school readiness and language comprehension scores and fewer behavior problems.

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## Evidence of Association between Workforce Competencies/Credentials and...Cont.

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Shivers, E. (2011). <i>Tennessee's Infant and Toddler Credential: Pilot evaluation report</i> . Phoenix, AZ: Indigo Cultural Center, Institute for Child Development Research and Social Change.	Infant/Toddler	Providers who participated in the TN Infant/Toddler Credential Pilot Project showed significant increases on the ITERS-R and FDCRS ( $p < .10$ ): ITERS-R Mean Score at Time 1=5.17 ITERS-R Mean Score at Time 2=5.48 FDCRS Mean Score at Time 1=5.73 FDCRS Mean Score at Time 2=6.01 There was a significant increase in provider-child interactions for: Sensitivity (CIS) ( $p < .001$ ): Time 1=3.82; Time 2=4.45. There was a significant decrease in provider-child interactions for Harshness (CIS) ( $p < .05$ ): Time 1=1.89; Time 2=1.66.	Analyses at Time 2: Providers who reported working with a mentor during a previous project scored higher on environment rating scores at Time 2 (.33; $p < .05$ ) and scored higher on Sensitivity (.34, $p < .05$ ) Analyses of associations among change in scores from Time 1 to Time 2: Providers who endorsed the General Self-Efficacy items at beginning of the program more likely to have greater increases in ITERS and FDCRS scores (.36; $p < .05$ ). Providers in the field for fewer years had higher increases in ITERS and FDCRS scores (-.36). Providers who had more education and worked in the field longer scored higher on Sensitivity at Time 2 (.42 education; .41 years in field; $p < .01$ ).	Not applicable	Not applicable
Burchinal, M. R., Cryer, D., Clifford, R. M., & Howes, C. (2002). Caregiver training and classroom quality in child care centers. <i>Applied Developmental Science, 6</i> (1), 2-11.	Infant/Toddler and Preschool	Not applicable	Both the highest level of training in ECE or a related field and attending workshops are associated with higher-quality classrooms as measured by the ECERS /ITERS. Adding percentage of children in classroom receiving subsidies as a covariate did not change the results.	Not applicable	Children's PPVT scores were higher if teachers had a bachelor's degree in ECE or a related field and if teachers had training at community workshops.
Burchinal, M.R.; Soliday Hong, S.L.; Sabol, T.L.; Forestieri, N.; Peisner-Feinberg, E.; Tarullo, L., & Zaslow, M. (2016). <i>Developing ratings in quality rating and improvement systems: Secondary data analyses to illustrate psychometric properties of scale development</i> . OPRE Report # 2016-26. Washington, DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services.	Infant/Toddler and Preschool	Not applicable	Validation of structural quality indicator in simulated QRIS: Four of the five selected structural quality variables were validated through showing reliable associations with process of ECE quality: teacher and director education, child:adult ratios, and curriculum. Translating the structural quality measures into QRIS indicators resulted in a strengthened association between teacher and director education with the ECERS.	Not applicable	Validation of QRIS based on structural and process indicators: Meta-analyses showed that a higher level of teacher education was a significant predictor of higher levels of language, pre-literacy, and math skills as continuous variables, and of pre-literacy skills as a categorized rating. A higher level of director education was related to higher levels of language, pre-literacy, and math skills as both continuous variable and a categorized rating.

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Doherty, G., Forer, B., Lero, D. S., Goelman, H., & LaGrange, A. (2006). Predictors of quality in family child care. <i>Early Childhood Research Quarterly, 21</i> (3), 296-312.	Infant/Toddler and Preschool	Not applicable	Two intentionality variables, highest college/university degree in ECE or related field; networks informally with other providers and uses library story hour had a positive relationship with FDCRS scores. Working with children and/or contributing to their development was negatively associated with FDCERS scores.	Not applicable	Not applicable
Fukkink, R. G., & Lont, A. (2007). Does training matter? A meta-analysis and review of caregiver training studies. <i>Early Childhood Research Quarterly, 22</i> (3), 294-311.	Infant/Toddler and Preschool	Not applicable	Trainings with a fixed curriculum had a larger effect size (0.66) than trainings without a fixed curriculum (0.22) on caregiver-child interactions/quality. On-site trainings also had a larger effect size (0.68) on caregiver-child interactions/quality than multi-site trainings (0.21). Programs that were delivered at multiple sites with larger numbers of trainees were negatively associated with outcomes. Learning gains were found in caregivers' knowledge, attitude and skills after completing the trainings, however, the aggregated effect sizes for caregivers' skills (0.40) were smaller than for caregivers' knowledge (0.43) and attitude (0.65).	Not applicable	In the few studies that tested child outcomes, aggregated effect sizes were positive and greater than one standard deviation from the mean, although not statistically significant. One study showed mixed results.
Marshall, N. L., Ed, D., Dennehy, J., Robeson, W. W., Ed, D., Roberts, J., & Ph, D. (2010). Boston Quality Inventory 2010 : Community Early Care and Education Programs. Wellesley Centers for Women, Wellesley College, Wellesley, MA	Infant/Toddler and Preschool	<b>Preschool classrooms:</b> Teachers with a BA or more were rated higher on the Curriculum Index, the Literacy Index, and the CLASS Emotional Support Index. Classrooms with teachers with CDAs or AAs scored higher on the Curriculum Index and Emotional Support Index than classrooms with teachers with only college courses. <b>Infant/toddler classrooms:</b> Teachers with a BA or more rated higher on the Curriculum Index, the Caregiving Index, and the Safety Index. Having a teacher with a CDA or AA was not related to quality in infant/toddler classrooms. <b>Family child care homes:</b> Providers with a BA or more were rated higher on the Curriculum Index, and the Caregiving Index. Having a provider with a CDA or Associate degree was unrelated to quality ratings.	Not applicable	Not applicable	Not applicable
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<p>Mims, S. U., Scott-Little, C., Lower, J. K., Cassidy, D. J., &amp; Hestenes, L. L. (2008). Education level and stability as it relates to early childhood classroom quality: A survey of early childhood program directors and teachers. <i>Journal of Research in Childhood Education, 23</i>(2), 227-237.</p>	<p>Infant/Toddler and Preschool</p>	<p>Teacher education level was positively correlated to observed quality at the first assessment point (<math>p &lt; .001</math>) and second assessment point (<math>p &lt; .01</math>). Teacher stability (those that were working with the same age group at both assessment points) was significantly correlated with observed quality (<math>p &lt; .001</math>). There was a significant difference in quality between those teachers who were working with the same age group at both assessment points compared to those who were working with different age groups (<math>p &lt; .001</math>). Directors with higher education levels had classrooms that rated higher on observed quality (<math>p &lt; .001</math>). In addition, directors who were enrolled in college courses in between the assessment points had programs that improved in observed quality ratings (<math>p &lt; .01</math>), even when controlling for directors' education level (<math>p &lt; .004</math>).</p>	<p>Not applicable</p>	<p>Not applicable</p>	<p>Not applicable</p>
<p>National Institute of Child Health and Human Development (NICHD) Early Child Care Research Network. (2000). Characteristics and quality of child care for toddlers and preschoolers. <i>Applied Developmental Science, 4</i>(3), 116-135.</p>	<p>Infant/Toddler and Preschool</p>		<p><u>Correlations:</u> Positive caregiving was higher when caregivers had higher levels of education and held more child-centered beliefs at all three ages (15, 24, and 36 months). Caregivers' child care experience and specialized training were not correlated with positive caregiving ratings at any of the ages. Correlations between positive caregiving ratings and caregivers' education and beliefs increased in size as children got older, but the differences across ages were not significant. <u>Multiple regression analyses:</u> Positive caregiving ratings were higher when caregiver had more child centered beliefs (at all 3 ages), higher levels of education and more experience (at 24 and 36 months), more specialized training (at 15 months). Ratings of positive caregiving were more strongly related to caregivers' education than frequencies were, particularly at 36 months.</p>	<p>Not applicable</p>	<p>Not applicable</p>

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Torquati, J. C., Raikes, H., & Huddleston-Casas (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. <i>Early Childhood Research Quarterly</i> , 22, 261-275.	Infant/ Toddler and Preschool	Not applicable	<b>Model 1- Predicting global observed quality and intention to stay:</b> Years of education (standardized path coefficient (spc)= .35) and CD training (spc= .25) significantly predicted teacher compensation, which predicted global observed quality (spc= .28). A CDA significantly predicted observed quality (spc= .65). <b>Model 2- Predicting interactional quality and intention to stay:</b> Years of education (spc= .31) significantly predicted teacher compensation, and teacher motivations for child care work predicted intention to stay in profession (spc= .67). <b>Models 1 &amp; 2 for teachers of infants and toddlers:</b> Years of education (spc= .38) and CD training (spc= .41) both predicted infant/toddler teacher compensation. <b>Models 1 &amp; 2 for preschool teachers:</b> A CDA predicted observed quality (ECERS-R)in preschool teachers (spc= .57). Years of education predicted compensation for teachers of preschoolers, (spc=.26), but this did not predict observed quality (ECERS-R). CD training was non-significant.	Not applicable	Not applicable
Tout, K., Starr, R., Isner, T., Cleveland, J., Albertson-Junkans, L., Soli, M., & Quinn, K. (2011). Evaluation of parent aware: Minnesota's quality rating and improvement system pilot.	Infant/ Toddler and Preschool	Not applicable	Not applicable	Teacher Training and Education predicted Print Knowledge in model that did not include the other quality category scores as predictors (B=.94; SE=.33, p<.01).	When all four quality indicator categories are included in the model (Tracking Learning, Teacher Training and Education, and Teaching Materials and Strategies) are correlated with each other (p<.0001), resulting in no single predictor accounting for significant amount of variance.
Denny, J. H., Hallam, R., & Homer, K. (2012). A multi-instrument examination of preschool classroom quality and the relationship between program, classroom, and teacher characteristics. <i>Early Education and Development</i> , 23(5), 678-696.	Preschool	Not applicable	ECERS-R was positively predicted by past ERS score, as well as teacher degree in ECE. ECERS-E positively predicted by past ERS score. (Director race also negatively predicted ECERS-E scores but it is not clear which way that dummy variable was coded). CLASS Emotional Support was positively predicted by past ERS scores. CLASS Instructional Support had three positive significant contributing variables: Teacher education level, teacher years experience, and accreditation. Student Engagement had three significant contributing variables: a higher percentage of children receiving subsidy was associated with lower Student Engagement, and more teacher years of experience and teacher degree in ECE were positively related to Student Engagement.	Not applicable	Not applicable

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<p>Early, D. M., Maxwell, K. L., Burchinal, M., Bender, R. H., Ebanks, C., Henry, G. T., ... Vandergrift, N. (2007). Teachers' Education, Classroom Quality, and Young Children's Academic Skills: Results From Seven Studies of Preschool Programs. <i>Child Development</i>, 78(2), 558–580.</p>	<p>Preschool</p>	<p>Not applicable</p>	<p>Highest teacher degree: Only 8 of 27 analyses provided evidence of an association between the highest degree attained by the lead teacher and observed classroom quality. Two studies found that higher teacher education was associated with higher classroom quality, one found a negative association, and the rest had null findings. Among those with ECE/CD major, (a) highest teacher degree was only associated with higher quality classrooms in one study; (b) the other 4 studies where this question could be examined did not find any association between highest teacher degree among those with ECE/CD major and observed quality. (3) Among those with a Bachelor's degree: major in ECE/CD, major in education other than ECE/CD, or major in anything else: no associations with quality were found.</p>	<p>Not applicable</p>	<p>No study found an association between the teacher's highest degree and children's receptive language skills. Two studies found significantly higher prereading scores when teachers had a BA; one also found an association between the particular degree and prereading. Two studies found an overall association between the teacher's highest degree and prereading, but no significant pairwise differences. Three studies found no association between teachers' highest degree and prereading skills. One study found that teacher's highest degree was associated with higher premath skills, one found that children whose teachers did not have a BA scored higher on premath, and the other five studies found no association between teacher's highest degree and premath scores. For ECE/CD major, highest teacher degree: in one study, an overall association between teacher highest degree among those with an ECE/CD major was only associated with prereading scores but not in pairwise comparisons, and not associated with quality or child language or math. The other 3 studies did not find any association between highest teacher degree among those with ECE/CD major and child outcomes. Among those with a BA: major in ECE/CD, education, or in anything else: (a) In only one study, teacher's major was associated with higher children's receptive language, but not in pairwise comparisons. (b) In one study, when the teacher did not major in ECE/CD or education, children who were not poor scored lower on prereading skills compared with poor children; no differences were found between children who had teachers with a BA in ECE/CD or a BA in any type of education.</p>
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<p>Early, D., Bryant, D. M., Pianta, R. C., Clifford, R. M., Burchinal, M., Ritchie, S., Howes, C., &amp; et al. (2006). Are teachers' education, major, and credentials related to classroom quality and children's academic gains in pre-kindergarten? <i>Early Childhood Research Quarterly</i>, 21(2), 174-195.</p>	<p>Preschool</p>	<p>Not applicable</p>	<p>Teachers with more than a BA had higher ECERS-R Teaching &amp; Interaction than teachers with Associate's degree. No association between state certification and quality scores, but significant interaction between certification and class hours in predicting one measure of quality. As classroom hours increase, having a State certification to teach 4-yr-olds compared to those without predicted lower ECERS-R Provision for Learning scores (and marginally predicted lower ECERS-R Language &amp; Interaction scores). CDA (among those with Associate's not in EC or less) did not predict any quality outcomes.</p>	<p>Not applicable</p>	<p>Children whose teachers had more years of education gained more in math (WJ applied problems) over the pre-k year. Children whose teachers had a BA gained more in math (WJ AP) over the pre-k year compared to children whose teachers had an Associate's or less. Children whose teachers had a BA or higher gained more math skills (WJ AP) than children whose teachers had less than a BA. Children whose teachers majored in EC/ CD gained more in naming colors over the pre-k year than children whose teachers majored in another type of education. State certification was not associated with changes in child outcomes. Children whose teachers had a CDA (of those with an Associate's or less) had greater gains in rhyming and identifying letters, numbers, and colors than children of teachers without a CDA; children in classrooms with longer hours and teachers with a CDA had greater gains in WJ applied problems and number naming than children in classrooms with shorter hours and a teacher with a CDA.</p>
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Gerde, H. K., & Powell, D. R. (2009). Teacher education, book-reading practices, and children's language growth across one year of Head Start. <i>Early Education and Development, 20</i> (2), 211-237.	Preschool	Not applicable	Not applicable	Teachers' use of book-focused utterances was significantly and positively associated with teachers' level of formal education and preparation in ECE. Teachers' rate of change in their use of book-focused utterances across the year was higher for teachers who majored in ECE. That is, teachers with higher levels of education and ECE preparation were more likely to use more book-focused utterances more quickly across the preschool year. Children who were in classrooms where teachers used more book-focused utterances during large-group book reading made greater gains in receptive vocabulary across the preschool year than their peers in classrooms where teachers used fewer book-focused utterances during shared book reading. Children with lower initial ability in receptive vocabulary grew in their receptive vocabulary ability at a faster rate across the year in classrooms where teachers used more book-focused utterances than their peers who began the year with higher receptive vocabulary ability.	Not applicable
Hallam, R. A., Bargreen, K. N., & Ridgley, R. (2013). Quality in family child care settings: The relationship between provider educational experiences and global quality scores in a statewide quality rating and improvement system. <i>Journal of Research in Childhood Education, 27</i> , 393-406.	Preschool	Caregivers with a high school diploma were rated significantly lower on Space and Furnishings, and Learning Activities; whereas caregivers with some college scored significantly higher on the Learning Activities subscale than those with a high school diploma. Caregivers who had any type of specialized training scored higher on Space and Furnishings, Learning Activities, Language and Reasoning and the overall composite score. Caregivers with TECTA or CDA training scored significantly higher on Basic Care. There was a significantly positive relationship between having PD, TECTA, and CDA for each of the subscales and composite score.	Not applicable	Not applicable	Not applicable

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<p>Heisner, M., Lederberg, A. (2011). The impact of Child Development Associate training on the beliefs and practices of preschool teachers. <i>Early Childhood Research Quarterly, 26</i>(2), 227-236.</p>	<p>Preschool</p>	<p>After completing CDA, teachers increased Teacher Beliefs and Practices Survey (TBPS) - DAP Beliefs, and TBPS Instructional Activities Scale-Practices compared teachers not in a CDA program; Both groups (CDA and comparison) increased on the Early childhood Survey of Beliefs and Practices (ECSBP) Beliefs scale, and Practices scale with no significant differences; After CDA, teachers' developmentally inappropriate beliefs and practices decreased while the non-CDA teachers' scores did not decrease.</p>	<p>Not applicable</p>	<p>Not applicable</p>	<p>Not applicable</p>
<p>Kim, S., Chang, M., &amp; Kim, H. (2011). Does teacher educational training help the early math skills of English language learners in Head Start? <i>Children and Youth Services Review, 33</i>(5), 732-740.</p>	<p>Preschool</p>	<p>Not applicable</p>	<p>Not applicable</p>	<p>Not applicable</p>	<p>Initial model with all covariates: ELL children had lower math scores with teachers who had lower than a BA. Teacher training was significantly associated with higher math scores for ELL children with teachers with lower education levels. No relationship between state preschool certificates and ELL children's math scores. For the covariates, significant relationships were found between children's persistence, race, age, and parent education and early math performance. Final model with only significant covariates from first model: ELL preschoolers with teachers of low education had significantly lower math achievement compared with the other three groups (non-ELL preschoolers with teachers of high education and low education and ELL preschoolers with teachers of high education). Teacher professional training had a positive relationship with early math performance of ELL preschoolers with teachers of low education, after controlling for teacher certificates, children's persistence level, race, age, and parental education. ELL preschoolers with teachers of low education who had professional training demonstrated comparatively high math performance, compared with ELL preschoolers with teachers of low education without professional training. ELL children with teachers of low education who had a state preschool certificate had higher math scores than ELL children with teachers with low education without state certificates.</p>

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<p>Le, V., Schaack, D. D., &amp; Setodji, C. M. (2015). Identifying baseline and ceiling thresholds within the qualistar early learning quality rating and improvement system. <i>Early Childhood Research Quarterly, 30</i>, 215-226.</p>	Preschool	<p>More teacher ECE credits was associated with higher ECERS-R scores, but the threshold analyses showed that the relationship was significant only up until 12 ECE credits was reached, then the positive relationship ceased to be significant. There was no linear relationship between teacher experience and ECERS-R, but threshold analyses showed that 15 years of paid teaching experience needed to be reached before a significant association was observed, with a positive relationship thereafter.</p>	Not applicable	Not applicable	Not applicable
<p>LoCasale-Crouch, J., Konold, T., Pianta, R., Howes, C., Burchinal, M., Bryant, D., ... &amp; Barbarin, O. (2007). Observed classroom quality profiles in state-funded pre-kindergarten programs and associations with teacher, program, and classroom characteristics. <i>Early Childhood Research Quarterly, 22</i>(1), 3-17.</p>	Preschool	Not applicable	Not applicable	<p>Higher-quality profile (e.g., Profiles 1 &amp; 2- those characterized by positive emotional climate and high instructional support) were more likely to have teachers with more pre-K experience and lower child/staff ratio than Profile 4, and had lower proportions of children in poverty and higher level of maternal education. However, teachers in Profile 2 were more likely to have lower education and certification levels compared to other lower quality profiles where teachers were more likely to have a BA and specialized certifications (e.g., Profile 4-characterized by mediocre emotional climate and low instructional support). Mid-quality profiles generally had teachers with higher levels of degree and certification compared to teachers in classrooms in the higher-quality and lower-quality profiles. However, there do not appear to be differences in outcomes for the mid-range profiles.</p>	Not applicable

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McWayne, C. M., Hahs-Vaughn, D. L., Cheung, K., & Wright, L. E. G. (2012). National profiles of school readiness skills for Head Start children: An investigation of stability and change. <i>Early Childhood Research Quarterly, 27</i> (4), 668–683.	Preschool	Not applicable	Not applicable	Not applicable	Twenty percent of children changed in their configurations of strengths and needs over the preschool year, representing both improvements and declines in functioning. Higher levels of teacher experience were associated with the movement of (1) children with high social and average preacademic skills at the beginning of the year, and (2) children with average social and preacademic skills but high behavior problems at home at the beginning of the year to the highest performing group by the end of the year. Higher levels of teacher education promoted better school readiness at the end of the year for children with average social and preacademic skills but high behavior problems at home at the beginning of the year. However, children in the lowest performing group at the beginning of the year who had a teacher with only some college (compared to an associate's degree) were more likely to move to the average group by the end of the year. Observed classroom quality was unrelated to child profile stability and change over the year.
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? <i>Applied Developmental Science, 9</i> (3), 144-159.	Preschool	Not applicable	The teachers' education-training and experience block was significantly related to the global quality measures when added after state and program blocks. Teacher characteristics significantly predicted the CLASS Emotional Climate, ECERS-R Interactions, and ECERS-R Provisions scores. Teachers with a 4-year college degree and teaching certificate in early childhood were rated as creating a more positive emotional climate and providing more activities on the ECERS-R than teachers with no formal training in early childhood. Associations between teacher experience and the ECERS-R appear to be mediated through teachers' psychological characteristics. Teacher demographics did not account for significant variance for any of the activity setting indicators.	Not applicable	Not applicable

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Son, S.-H. C., Kwon, K.-A., Jeon, H.-J., & Hong, S.-Y. (2013). Head Start Classrooms and Children's School Readiness Benefit from Teachers' Qualifications and Ongoing Training. <i>Child &amp; Youth Care Forum</i> , 42(6), 525-553.	Preschool	Teacher qualifications and in-service training variables had unique relations with classroom environment dimensions: Teachers' ECE/CD major significantly related to social-emotional practices and provision for learning. Controlling for all teacher qualifications and inservice training variables, educational level itself was not a predictor of classroom environment dimensions. Teaching certification was not predictor of classroom environment. Coaching predicted provision for learning and parent involvement practices. Hours of specialized training did not predict classroom environment dimensions.	Not applicable	Not applicable	No significant direct path to children's outcomes except from teacher education level to early reading: children had higher scores on early reading measure when teachers had higher education levels, irrespective of classroom environment. Children's outcomes were indirectly influenced by teacher qualifications or inservice training: teachers with a major in ECE/CD provided higher quality social emotional practices than those who did not, and children in higher rated social emotional classrooms had higher scores on social skills, learning behaviors, and early math skills.

NOTES: Row shading corresponds to the age range addressed by the resource.

## Evidence of Association between Workforce Competencies/Credentials and...Cont.

Citation	Age range	Evidence of association between workforce competencies/credentials and observed quality in analyses without covariates	Evidence of association between workforce competencies/credentials and observed quality in multivariate analyses	Evidence of association between workforce competencies/credentials and child outcomes in analyses without covariates	Evidence of association between workforce competencies/credentials and child outcomes in multivariate analyses
Vu, J. A., Jeon, H.-J., & Howes, C. (2008). Formal education, credential, or both: Early childhood program classroom practices. <i>Early Education and Development</i> , 19(3), 479–504.	Preschool	Not applicable	<p><u>Multivariate analyses:</u> Private, non-profit and Head Start/General Child Care: ECERS-R scores higher with teachers w/ Master Teacher Permit or a BA plus a permit. Teachers w/ BAs plus permits had higher ECERS-R scores than teachers with Master Teacher Permits. Teachers w/ BAs had higher CLASS Quality of Feedback scores than teachers with other qualifications. School district and state preschool: no differences b/w lead teachers with different qualifications; no differences in AIS scores.</p> <p><u>Hierarchical linear modeling:</u> ECERS-R: ECERS-R scores where lead teachers had BA+ increased when level of program director permit increased. Across all of the auspices, ECERS-R Teaching and Interactions scores increased when each level of program directors' qualifications increased where teachers had a Teacher Permit. Significant effects of auspice and interaction effects between auspice and lead teachers' qualifications on Teaching and Interaction. CLASS and AIS outcomes: Relationship between lead teachers' CLASS scores and the mean level of program directors' qualification level were positive and stronger when lead teachers had higher qualifications. No significant effect of auspice on CLASS scores, no difference in AIS scores across different teacher qualifications.</p>	Not applicable	Not applicable
NOTES: Row shading corresponds to the age range addressed by the resource.					

## Study Findings/Conclusions

Citation	Age range	Findings/conclusions
Campbell, P. H., & Milbourne, S. A. (2005). Improving the quality of infant–toddler care through professional development. <i>Topics in Early Childhood Special Education, 25</i> (1), 3-14.	Infant/Toddler	<b>Mixed findings:</b> Adding onsite consultation (3 one-hour visits) to a 5-session PD program over a 3-month period was related to ITERS score improvements from Inadequate to Adequate, or Adequate to Good, for more Infant/Toddler classrooms in the consultation group compared to the no-consultation group, at levels approaching statistical significance. Some improvements over time were also seen in more ITERS subscale scores for the consultation group than for the no-consultation group. Consultation may have been more effective for caregivers with more experience. Other factors did not have main effects on ITERS scores (level of caregiver education, years of experience, training group, and person who provided the consultation). Caregiver level of education and years of experience approached significance.
Clarke-Stewart, K. A., Vandell, D. L., Burchinal, M., O'Brien, M., & McCartney, K. (2002). Do regulable features of child-care homes affect children's development? <i>Early childhood research quarterly, 17</i> (1), 52-86.	Infant/Toddler	<b>Evidence of positive associations:</b> CC-HOME scores were higher when caregivers were more educated, had higher levels of specialized training, and had received child-related training within the previous year. Caregivers provided more positive caregiving when they had higher levels of specialized training. These relationships did not vary with children's age. The difference on the CC-HOME between caregivers with and without a high school diploma was slightly larger than one standard deviation. The association between observed quality and caregiver education was stronger at 36 months than younger ages. The only nonregulable factor related to quality of care was beliefs about children. Caregivers with more child-centered beliefs received higher ratings of positive caregiving. Beliefs about children was also significantly related to caregivers' education and training, which suggests that regulating caregiver education and training could help improve child care quality. Caregivers' beliefs mediate the effects of their training in analyses that include both regulable and noregulable factors as predictors of observed quality of care. Children whose caregivers had higher levels of education and received specialized training in the past year scored higher on cognitive and language assessments. The association was significant even with nonregulable features controlled. Children's cognitive performance was higher when their caregivers had attended college.
Elicker, J., Wen, X., Kwon, K.-A., & Sprague, J. B. (2013). Early Head Start relationships: Association with program outcomes. <i>Early Education and Development, 24</i> (4), 491–516.	Infant/Toddler	<b>Evidence of positive associations:</b> Positive relationships with Early Head Start caregivers with more education predicted positive outcomes for both parents and children.
Halle, T., Forry, N., Hair, E., Westbrook, T., & Dwyer, K. (2009). Associations between provider training and education and other quality indicators in low-income children's primary care arrangements at 24 months of age. OPRE Research Brief #2009-18. Washington, DC.: Child Trends and the US Department of Health and Human Services, Administration for Children and Families, Office of Planning, Research, and Evaluation.	Infant/Toddler	<b>Mixed findings:</b> Providers' professional development is related to more indicators of quality in home-based settings than in center-based settings. Home-based providers who participated in early childhood trainings are more likely than their peers who did not participate to provide cognitively stimulating materials and language and literacy activities to low-income toddlers. Home-based providers who have less than a HS degree are more likely than their peers who have a BA or more to endorse controlling behavior management practices, and less likely to engage in language/literacy activities. For center-based providers, there were fewer associations. Center-based providers who participated in early childhood trainings provide more enriching outings than their peers who did not participate, and center-based providers who have achieved higher levels of educational attainment (e.g., BA or higher) have lower child-to-adult ratios. Few home-based providers participated in early childhood training in the last 12 months. Fewer associations were found between provider training and education and other indicators of quality within center-based settings.
Honig, A.S., Kim, Y., Ray, K., & Yang, H.Y. (2013). Teacher education and soothing strategies with infants and toddlers. <i>Early Child Development and Care, 183</i> (7), 895-898.	Infant/Toddler	<b>Evidence of negative association:</b> According to the study authors, the finding that the teacher of lower educational levels responded more quickly to infant/toddler distress episodes is puzzling. No assessment of teacher training workshops or courses was available in the study, and future research would need to control for training experience and then examine whether caregivers at differing formal education levels responded differently to child temperament and have different expectations for child autonomy for self-soothing strategies. It should be noted that the sample for this study is small (n= 35 teachers, and n= 146 infants/toddlers), with only 5 teachers having a college degree, and 20 having some college and/or a CDA).

NOTES: Row shading corresponds to the age range addressed by the resource.

## Study Findings/Conclusions Cont.

Citation	Age range	Findings/conclusions
Moreno, A. J., Green, S., & Koehn, J. (2015). The effectiveness of coursework and onsite coaching at improving the quality of care in infant-toddler settings. <i>Early Education and Development</i> , 26(1), 66-88.	Infant/Toddler	<b>Evidence of positive association:</b> The group with the most intensive intervention, 48 hr course plus 15 hours of one-on-one coaching, showed most consistent pattern of desirable outcomes, particularly for supports for language and literacy (SLL). EQ coursework plus 15 hours of coaching had a small effect on participants' knowledge, and was associated with moderate increases in supports for language and literacy between pre and posttest and between pretest and follow up. Professional status, which was a composite that included teacher degree, ECE focus, years of experience, and wages, was the only significant covariate for supports for language and literacy ( $p < .05$ ). Professional status approached significance for changes in environmental-behavioral support (EBS). Self-efficacy among caregivers/teachers was very high to begin with, and did not show significant changes over time based on any of the variables analyzed.
NICHD Early Child Care Research Network. (1996). Characteristics of Infant Child Care: Factors Contributing to Positive Caregiving. <i>Early Childhood Research Quarterly</i> , 11(3), 269-306.	Infant/Toddler	<b>No evidence of association:</b> Four factors were associated with infants receiving warm, sensitive, responsive care from caregivers: smaller group sizes and child-adult ratios, when caregivers had nonauthoritarian beliefs about child-rearing, and when physical environments were safe, clean, and stimulating. Caregivers' formal education and specialized training did not appear to contribute substantively to the frequencies or ratings of positive caregiving.
NICHD Early Child Care Research Network. (1999). Child outcomes when child care center classes meet recommended standards for quality. <i>American Journal of Public Health</i> , 89(7), 1072-1077.	Infant/Toddler	<b>Evidence of positive association:</b> Child outcomes were better when children attended classes that met the recommended child-staff ratio at 24 months and the recommended levels of caregiver training and education at 36 months. The more standards met, the better the outcomes in terms of school readiness, language comprehension, and behavior problems at 36 months. Associations between the 4 features and child outcomes were stronger at 36 months than at 24 months.
Shivers, E. (2011). <i>Tennessee's Infant and Toddler Credential: Pilot evaluation report</i> . Phoenix, AZ: Indigo Cultural Center, Institute for Child Development Research and Social Change.	Infant/Toddler	<b>Evidence of positive association:</b> Overall, environmental quality scores significantly increased after completing the TN I/T Credential. Providers' background characteristics such as number of years working in the early care and education field and previous work with a mentor were linked with greater increases on environment quality measures. Providers who scored lower on environment quality measures at Time 1 showed more change at Time 2. Providers were also showed more sensitivity and less harshness and detachment with regards to their provider-child interactions after completing the credential. Providers with more education and years in the field, and who had worked with a mentor previously scored higher on sensitivity.
Burchinal, M. R., Cryer, D., Clifford, R. M., & Howes, C. (2002). Caregiver training and classroom quality in child care centers. <i>Applied Developmental Science</i> , 6(1), 2-11.	Infant/Toddler and Preschool	<b>Evidence of positive association:</b> Results indicate that both formal college training in ECE or a related field and informal workshop training are independently related to better quality child care. Children in classrooms with those providers had more advanced language skills.
Burchinal, M.R.; Soliday Hong, S.L.; Sabol, T.L.; Forestieri, N.; Peisner-Feinberg, E.; Tarullo, L., & Zaslow, M. (2016). <i>Developing ratings in quality rating and improvement systems: Secondary data analyses to illustrate psychometric properties of scale development</i> . OPRE Report # 2016-26. Washington, DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services.	Infant/Toddler and Preschool	<b>Evidence of positive association:</b> Findings suggest that all but one of the selected structural classroom quality measures (teacher and director education, child:adult ratio, and curriculum) were related to observed process quality and/or gains in child outcomes.
Doherty, G., Forer, B., Lero, D. S., Goelman, H., & LaGrange, A. (2006). Predictors of quality in family child care. <i>Early Childhood Research Quarterly</i> , 21(3), 296-312.	Infant/Toddler and Preschool	<b>Evidence of positive association:</b> Results showed that intentionality, level of education in early childhood education or related field, and use of support services were associated with higher FDCERS scores.
Fukkink, R. G., & Lont, A. (2007). Does training matter? A meta-analysis and review of caregiver training studies. <i>Early Childhood Research Quarterly</i> , 22(3), 294-311.	Infant/Toddler and Preschool	<b>Mixed findings:</b> Training for ECE teachers and caregivers can have an impact on knowledge, skills and attitudes, but should be small in scale (at one site) and follow a fixed curriculum. There is limited evidence that trainings may have an effect on children's outcomes and behavior, but more research is needed.

NOTES: Row shading corresponds to the age range addressed by the resource.

## Study Findings/Conclusions Cont.

Citation	Age range	Findings/conclusions
Marshall, N. L., Ed, D., Dennehy, J., Robeson, W. W., Ed, D., Roberts, J., & Ph, D. (2010). Boston Quality Inventory 2010 : Community Early Care and Education Programs. Wellesley Centers for Women, Wellesley College, Wellesley, MA	Infant/Toddler and Preschool	<b>Evidence of positive association:</b> Findings showed that having an educator with a bachelors' degree or more was significantly associated with the quality of BQI-2010 infant, toddler and preschool classrooms and family child care homes.
Mims, S. U., Scott-Little, C., Lower, J. K., Cassidy, D. J., & Hestenes, L. L. (2008). Education level and stability as it relates to early childhood classroom quality: A survey of early childhood program directors and teachers. <i>Journal of Research in Childhood Education</i> , 23(2), 227-237.	Infant/Toddler and Preschool	<b>Evidence of positive association:</b> Findings lend support to the notion of the importance of teacher education and its effect on classroom quality. Even in the centers participating in this study, which are considered to be "above average" due to their voluntary participation in higher levels of regulation and licensing (i.e., QRIS), teacher education was an important factor associated with higher quality. Teacher education and stability was associated with observed classroom quality. Additionally, directors' education and course were associated with observed classroom quality.
National Institute of Child Health and Human Development (NICHD) Early Child Care Research Network. (2000). Characteristics and quality of child care for toddlers and preschoolers. <i>Applied Developmental Science</i> , 4(3), 116-135.	Infant/Toddler and Preschool	<b>Mixed findings:</b> Caregivers' education and beliefs were significant predictors of observed positive caregiving. Caregivers' specialized training in child care and child development was not strongly and consistently related to observed caregiving. In the multiple regression analysis at 36 months of age, the rating of positive caregiving was related to caregivers' education, experience, and beliefs but not significantly related to child-adult ratio or group size.
Torquati, J. C., Raikes, H., & Huddleston-Casas (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. <i>Early Childhood Research Quarterly</i> , 22, 261-275.	Infant/Toddler and Preschool	<b>Mixed findings:</b> Teacher education (CDA, child development coursework or training, years of education, teaching certificate) was associated with both teacher compensation and observed quality (ECERS-R), and compensation was associated with observed quality in models looking at preschool and infant/toddler teachers combined. Teacher education was not associated with interactional quality. However, when separating out infant/toddler teachers from preschool aged teachers, differences were seen between the two groups. For infant/toddler teachers, only having a CDA and years of education predicted compensation, but not observed or interactional quality. For preschool teachers, having a CDA predicted observed quality (ECERS-R), and child development coursework or training predicted compensation, but not quality. Motivations for child care work predicted both infant/toddler and preschool teachers' intention to stay.
Tout, K., Starr, R., Isner, T., Cleveland, J., Albertson-Junkans, L., Soli, M., & Quinn, K. (2011). Evaluation of parent aware: Minnesota's quality rating and improvement system pilot.	Infant/Toddler and Preschool	<b>Mixed findings:</b> There was no evidence for a positive relationship between Parent Aware quality category scores and child outcomes using the full model (including all four quality categories). In follow-up analyses, a series of models were run on each child outcome that included only one quality category predictor at a time. These models revealed some evidence of relations between quality category scores and the Print Knowledge scores in the predicted direction.
Denny, J. H., Hallam, R., & Homer, K. (2012). A multi-instrument examination of preschool classroom quality and the relationship between program, classroom, and teacher characteristics. <i>Early Education and Development</i> , 23(5), 678-696.	Preschool	<b>Evidence of positive association:</b> Teacher education level and years of experience was related to higher scores on CLASS Instructional Support. Teacher degree in ECE was related to higher ECERS-R scores and higher CLASS Student Engagement scores. Accreditation was associated with higher CLASS Instructional Support scores.
Early, D. M., Maxwell, K. L., Burchinal, M., Bender, R. H., Ebanks, C., Henry, G. T., ... Vandergrift, N. (2007). Teachers' Education, Classroom Quality, and Young Children's Academic Skills: Results From Seven Studies of Preschool Programs. <i>Child Development</i> , 78(2), 558-580.	Preschool	<b>Mixed findings:</b> No convincing evidence of an association between teachers' education or major and either classroom quality or children's academic gains. Most findings were null, and there was no clear pattern among statistically significant findings. The authors suggest three explanations: (1) Teacher preparation system may be inadequate to prepare teachers for preschoolers; (2) teachers may not receive sufficient support to implement effectively what they have learned; and (3) there may be a "short-term ripple" in the labor market for preschool teachers, since many of the datasets include teachers in publically funded classrooms that require a teacher to have a bachelor's degree, but do not pay high enough wages to keep the best teachers with a bachelor's degree in ECE rather than teaching higher elementary grades. Implications include (1) going beyond the easy-to-measure constructs of degree and major to understand more complex constructs of teacher quality, (2) recognize that teacher quality interacts with other components of the early care and education system, including adequate materials, curricular support, skilled teaching assistants, physical setting, and supportive administrators and supervisors; and (3) more precise descriptions of teacher competencies.
NOTES: Row shading corresponds to the age range addressed by the resource.		

## Study Findings/Conclusions Cont.

Citation	Age range	Findings/conclusions
Early, D., Bryant, D. M., Pianta, R. C., Clifford, R. M., Burchinal, M., Ritchie, S., Howes, C., & et al. (2006). Are teachers' education, major, and credentials related to classroom quality and children's academic gains in pre-kindergarten? <i>Early Childhood Research Quarterly</i> , 21(2), 174-195.	Preschool	<b>Mixed findings:</b> Results showed that there were no significant correlations between years of education, content of teachers' major (early childhood education vs. other type of education), state certification, or CDA and classroom quality indicators. Teacher's education, major, and CDA credential were linked to academic gains over the pre-k year. Children whose teachers reported having more years of education and/or a Bachelor's degree (as opposed to an Associate's or no post-secondary degree) showed improvement in math skills over the academic year. Children taught by teachers who majored in early childhood or child development made more significant gains in naming colors than children whose teachers majored in another type of education. A teacher's CDA credential was associated with child gains in rhyming, identifying letters, numbers and colors.
Gerde, H. K., & Powell, D. R. (2009). Teacher education, book-reading practices, and children's language growth across one year of Head Start. <i>Early Education and Development</i> , 20(2), 211-237.	Preschool	<b>Mixed findings:</b> Teacher education alone did not predict growth in children's language skills; there was an indirect effect of teachers' professional preparation through book-reading practices. Both teachers' level of formal education and teachers' preparation in ECE was related to their use of more book-focused utterances during large-group book reading. For every increase in education level (meaning increase in degree earned, not years of education), there was an increase of nearly 14 book-focused utterances during large group reading. Further, if the degree was in ECE or a closely related field, there was an additional increase of over 10 book-related utterances, representing a total increase of over 24 book-related utterances when teachers had obtained a higher degree in ECE. Further, for teachers with a major in ECE (regardless of level of formal education), their rate of increase in their use of book-focused utterances over the year was higher than teachers without a major in ECE. Teachers with an AA in ECE had steeper growth rates in book-related utterances than teachers with a BA in a field unrelated to ECE; teachers with BAs in ECE had the steepest growth rates. Both teachers' highest level of formal education and a major in the field of ECE related negatively to teachers' use of behavior-focused utterances.
Hallam, R. A., Bargreen, K. N., & Ridgley, R. (2013). Quality in family child care settings: The relationship between provider educational experiences and global quality scores in a statewide quality rating and improvement system. <i>Journal of Research in Childhood Education</i> , 27, 393-406.	Preschool	<b>Evidence of positive association:</b> Caregivers with any type of specialized training in early childhood (PD, TECTA, CDA, etc.) had higher quality FDCERS scores compared to those with no specialized training (including those with college education in other fields). Those with a high school diploma or lower scored significantly lower than those with a 2-year college degree on Space and Furnishings, and Learning Activities, and composite scores.
Heisner, M., Lederberg, A. (2011). The impact of Child Development Associate training on the beliefs and practices of preschool teachers. <i>Early Childhood Research Quarterly</i> , 26(2), 227-236.	Preschool	<b>Evidence of positive association:</b> 120 ECE teachers participated in the study (76 in treatment group and 50 in comparison group). The treatment group were teachers enrolled in a CDA training program, and the comparison group were not enrolled in CDA training. Neither group had an AA or BA degree, nor had they had any EC coursework in the last 10 years. Through a pre- and posttest analysis of 2 self-reported measures/surveys, the CDA group showed significantly fewer developmentally inappropriate beliefs and self-reporting practices compared to the comparison group. Both groups showed increases in developmentally appropriate practices and beliefs.
Kim, S., Chang, M., & Kim, H. (2011). Does teacher educational training help the early math skills of English language learners in Head Start? <i>Children and Youth Services Review</i> , 33(5), 732-740.	Preschool	<b>Mixed findings:</b> Teachers' educational levels were not associated with early math skills for native English-speaking children, but were associated with early math skills for ELL children. ELL children in classrooms with teachers with lower than a bachelor's degree had lower math scores than children with teachers with a bachelor's degree or higher. Both teacher certification and professional training had a positive association with the early math skills of ELL children. Teachers' state-awarded preschool certificates were only significantly associated with children's early math gains for teachers with a low educational background. ELL children in classrooms with teachers with less than a bachelor's degree who participated in professional training had better math skills than ELL preschoolers with teachers without training.
Le, V., Schaack, D. D., & Setodji, C. M. (2015). Identifying baseline and ceiling thresholds within the qualistar early learning quality rating and improvement system. <i>Early Childhood Research Quarterly</i> , 30, 215-226.	Preschool	<b>Mixed findings:</b> Even when very few ECE credits had been attained, study results showed a positive relationship between ECE credits and the ECERS-R. This relationship was significant until a ceiling threshold of 12 credits was reached, then diminished thereafter. The relationship between teaching experience and the ECERS-R did not manifest itself until approximately 15 years of paid teaching experience was reached.
NOTES: Row shading corresponds to the age range addressed by the resource.		

## Study Findings/Conclusions Cont.

Citation	Age range	Findings/conclusions
LoCasale-Crouch, J., Konold, T., Pianta, R., Howes, C., Burchinal, M., Bryant, D., ... & Barbarin, O. (2007). Observed classroom quality profiles in state-funded pre-kindergarten programs and associations with teacher, program, and classroom characteristics. <i>Early Childhood Research Quarterly</i> , 22(1), 3-17.	Preschool	<b>No evidence of association:</b> The classrooms fit five distinct profiles of observed classroom quality, but the classrooms in the five profiles were not clearly differentiated by structural features of classrooms and programs. The highest quality and the poorest quality classrooms did not differ from one another on teacher education/certification (and other features like number of children in class, child/adult ratio, and location in a public school). Mid-range classrooms tended to have higher teacher education and credentials compared to the higher and lower quality range classrooms. The authors note that the mid-range profiles do not produce differences in terms of child outcomes. They suggest that “the association between teacher qualifications and observed quality is not at all clear or direct” (p. 14).
McWayne, C. M., Hahs-Vaughn, D. L., Cheung, K., & Wright, L. E. G. (2012). National profiles of school readiness skills for Head Start children: An investigation of stability and change. <i>Early Childhood Research Quarterly</i> , 27(4), 668–683.	Preschool	<b>Mixed findings:</b> For most of the children, having a teacher with a higher level of education is related to stability or improvement of school readiness skills across time. Higher levels of teacher experience were associated with the movement of (1) children with high social and average preacademic skills at the beginning of the year, and (2) children with average social and preacademic skills but high behavior problems at home at the beginning of the year to the highest performing group by the end of the year. Higher levels of teacher education promoted better school readiness at the end of the year for children with average social and preacademic skills but high behavior problems at home at the beginning of the year. However, children in the lowest performing group at the beginning of the year who had a teacher with only some college (compared to an associate’s degree) were more likely to move to the average group by the end of the year. Observed classroom quality was unrelated to child profile stability and change over the year.
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? <i>Applied Developmental Science</i> , 9(3), 144-159.	Preschool	<b>Evidence of positive association:</b> Analyses of teacher credentialing using the three-category system developed for this study did suggest that quality was higher for some (not all) indicators when teachers had some level of specialized training in early childhood, although the effects were small. Whether the teacher had a BA with specialized training in ECE seemed more related to observed quality than the degree itself.
Son, S.-H. C., Kwon, K.-A., Jeon, H.-J., & Hong, S.-Y. (2013). Head Start Classrooms and Children’s School Readiness Benefit from Teachers’ Qualifications and Ongoing Training. <i>Child &amp; Youth Care Forum</i> , 42(6), 525–553.	Preschool	<b>Mixed findings:</b> Teachers’ education level was directly associated with early reading skills but did not indirectly predict early reading through proximal classroom environment. While teachers with higher education may have more literacy related knowledge, the process through which this explicitly contributes to reading outcomes is not clear. ECE/CD major predicted higher quality social emotional environment which were related to early math and teacher-reported social skills and learning behaviors. Other indicators of teacher qualifications, teacher certification, and experience did not predict any classroom environment or childrens outcomes. One on one, ongoing coaching support rather than specialized training can be more effective to help teachers improve skills in curricular areas.
Vu, J. A., Jeon, H.-J., & Howes, C. (2008). Formal education, credential, or both: Early childhood program classroom practices. <i>Early Education and Development</i> , 19(3), 479–504.	Preschool	<b>Mixed findings:</b> Lead teachers in private, non-profit centers and teachers in Head Start/general child care classrooms without permits scored lower than those with a Master Teacher Permit or a BA or higher on both ECERS-R subscales and on the quality of feedback given to children. In these classrooms, teachers with BAs had higher scores than teachers at other credential levels. Lead teachers in school-district-sponsored classrooms with different credentialing levels did not differ on measures of classroom quality. For program directors and assistant teachers, there were no differences in terms of classroom quality when either group held different levels of credentials. In school district and state preschool classrooms, no differences were found between lead teachers with a BA and lead teachers with a permit and no BA. In other program auspices, lead teachers with a BA were more effective than teachers with a permit and no BA at providing feedback for student learning and creating classrooms higher in sensitive teacher-child interactions.
NOTES: Row shading corresponds to the age range addressed by the resource.		