Early Care and Education Quality

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Early Childhood
Effectiveness/Quality

Introduction

Early education programs improve children's readiness for kindergarten, and their effects can—but do not invariably—last into elementary school and beyond.[1] This evidence, alongside the practical realities of family life in the U.S. today, has led to a focus on identifying the active ingredients that best ensure high-quality experiences for young children that best promote their development.[2]

In this chapter, we explain how quality in early education programs is typically defined, review evidence on both summary measures of quality and specific quality elements/inputs, and describe the track record of policy efforts to promote quality in early education settings. We focus primarily on center-based, publicly funded early education settings for preschoolers (aged 3–5). However, we include evidence, when available, on care for infants and toddlers 0–3 where appropriate and on other kinds of care types.

Just as in K-12, the quality of children's experiences in early education programs varies widely. Also as in K-12, young children learn more in higher-quality programs. To date, large-scale, policy-level efforts to improve quality through accountability and incentives have increased quality along multiple dimensions, but there is scant evidence that these efforts have also improved child outcomes. The field has multiple evidence-based "good bets" for improving quality in existing programs and for creating/scaling new programs, such as implementing targeted curricula supported by coaching. However, these "good bets" have not yet been widely implemented.

Key findings

Key finding #1: *High-quality early education lacks a single definition, but it can be conceptualized in terms of structural inputs, interactions between students and teachers, and instructional quality.*

Structural inputs include factors such as class sizes, child–teacher ratios, teacher education/experience, and teacher compensation. Interactional quality includes emotional support and organization, while instructional quality refers to what is taught and how. Structural quality is typically the easiest of the dimensions to address via policy and to monitor.

Key finding #2: *Just as in K-12, the quality of children's experiences in early education programs varies widely.*

Most licensed programs in the U.S. have solid structural factors such as class sizes, child–teacher ratios, and screenings, but there is variation across states. Compensation, education, and training requirements are typically lower for early education teachers than for K-12 teachers. In the preschool years, average quality is good in terms of classroom organization and emotional climate, but instructional quality tends to be lower on average (i.e., at just above or just below adequate). Programs for younger children (0–3) tend to be of lower quality, on average, than those for preschoolers.[3]

Key finding #3: *Structural quality inputs usually improve interactional and instructional quality, but they do not always do so.*

Factors such as smaller class sizes and better-trained teachers make a higher-quality learning experience more likely, but these factors alone are not sufficient to guarantee such a learning experience.

Key finding #4: An evidence-based curriculum implemented with coaching appears to be a "good bet" for improving instruction in preschool classrooms and children's readiness for kindergarten.

Curricula that are focused on particular domains of child learning and that have a scope and sequence have repeatedly outperformed curricula that purport to cover all skill areas but that lack a scope and sequence. This is particularly the case when curricula are supported by regular in-classroom mentoring by an expert mentor. However, these more effective curricula are not commonly used.

Key finding #5: *More marginalized groups have less access to high-quality early education programs.*

Such groups include children from families with low incomes, children of color, children who speak a home language other than English, and children with disabilities.

Key finding #6: *Policy-level efforts to regulate and improve early education quality through licensing standards, accountability systems, and accreditation have had some success in improving many dimensions of quality.*

However, the evidence that these efforts have improved child outcomes is limited.

Evidence

Key finding #1: *High-quality early education lacks a single definition, but it can be conceptualized in terms of structural inputs, interactions between students and teachers, and instructional quality.*

Quality in early childhood education has generally been conceptualized along two dimensions: structural quality and process quality. Structural quality refers to foundational inputs such as class sizes, teacher-child ratios, teacher training and education requirements, teacher compensation, and the length of the instructional day/year.[4] Process quality refers to interactional quality, meaning the warmth of teacher–child relationships and peer relationships, as well as classroom instructional quality.[5] Based on conceptual frameworks/theory and available research, researchers have commonly referred to structural quality as setting the stage for high process quality to occur; however, it does not guarantee that it will occur.[6]

Recently, a team of researchers offered a new conceptual model of process quality in the preschool years specifically, with a delineation of interactional quality and instructional quality.[7] These researchers' working definitions for these dimensions are as follows:

- "INTERACTIONAL QUALITY refers to the quality of children's interactions with teachers and other children in the classroom and the ways in which the classroom climate is positive, responsive, and predictable. It includes teachers' warmth and sensitivity, as well as their overall classroom management and organizational skills.
- INSTRUCTIONAL QUALITY refers to what is being taught in the classroom and how."

In Table 1, we summarize specific elements of quality often hypothesized as subdomains of these larger dimensions in research[8] and often emphasized in early education standards and rating systems such as those of the National Association for the Education of Young Children (NAEYC) and the National Institute for Early Education Research (NIEER). We intend this table to be illustrative only and to focus on the preschool years. A fully exhaustive list of all potential quality inputs for all early education ages is beyond the scope of this review. Note, too, that for simplicity of presentation in Table 1, we combine process and instructional quality but differentiate them in our evidence discussion following recent developments in the field.[9] Process/instructional quality inputs refer to those hypothesized to more directly affect the teaching and learning environment experienced by children. Structural elements have more indirect links.

More recent research has also highlighted cultural responsiveness and inclusion for students with disabilities as understudied but potentially important quality inputs.[10] Cultural responsiveness captures the degree to which children's home cultures are reflected and focused on in classroom practice.[11] Inclusion refers to the degree to which children with disabilities are fully included in learning experiences and the classroom community.[12] In Table 1, we group cultural responsiveness as a process element and inclusion as a structural element, but we acknowledge that inclusion encompasses teaching strategies that are very much process oriented.[13]

Regarding measurement, structural quality elements have proven much easier to assess than other quality dimensions.[14] Many structural quality inputs are commonly available in administrative data or in program documents, or they can be obtained via surveys of teachers or administrators. Other quality elements have typically required observations of classrooms in action by trained, reliable observers who rate the classrooms according to the criterion of the focal measure(s). Researchers sometimes use survey data as proxies for process quality. For example, studies have asked teachers about how often they teach

certain content or how much time they spend on particular learning formats.[15]

In general, measures of these quality inputs have focused on the whole-class level, averaging across individual children's experiences. However, research has shown that quality can vary across individual young children in the same preschool classroom and by child demographic characteristics.[16] The inclusion of variation at the individual child and demographic subgroup levels accordingly is a newer direction in the field.[17]

Table 1: Example preschool quality elements/inputs

Structural quality elements	**Process/instructional quality elements**
Compensation	Curriculum
School day and year length	Teacher coaching
Class size	Assessments
Teacher-child ratios	Alignment with Kindergarten
Inclusion for Students with disabilities	Cultural Responsiveness
Universal Screening	
Age mix (i.e., 3's and 4's versus single-age classrooms)	
Suspension/expulsion policies	
Protected time for teacher planning	

Note: This table is based on Chaudry et al. (2021) and Weiland et al. (2023).[18]

Key finding #2: *Just as in K-12, the quality of children's experiences in early education programs varies widely.*

- Unsurprisingly given the fragmented approach to early education in the U.S., programs vary widely in quality. To illustrate some of the policy variation that helps drive this variation, in Figure 1, we display quality proxies for 60 state-funded PreK programs in the 2022–2023 school year. As shown,

- The vast majority of programs (>90%) have early learning standards, have some kind of curriculum approval process and require child assessment.

However, there is considerable variation in other inputs and markers of quality. For example, in 2023, just over half of the 60 state-funded Pre-K programs required a BA minimum for lead teachers; just over 30% required pay parity between state Pre-K teachers in public schools and K-12 teachers; 44% provided a list of approved curricula for programs to choose from; and 29% required regular coaching for Pre-K teachers.

As discussed below, these proxies are imperfect. Many state curriculum lists, for example, include curricula that have been regularly outperformed by other options.[19] Nonetheless, these data help illustrate how programs in the same category—state-funded Pre-K—differ greatly across the country in their policies and implementation.

Just like state-funded Pre-K programs, community-based providers, private providers, and family child care homes vary widely in their policies and quality inputs.[20] Overall, Head Start is more uniform in its policies than state-funded Pre-K programs are, but there is

variation in important factors such as dosage and teacher education in Head Start.[21] Some of the variation in Head Start is planned, according with its mission of being responsive to local needs.

Figure 1: Quality metrics of state-funded Pre-K programs[22]

	No. of programs
Early learning and development standards	58
Curriculum approval process and supports	56
Child assessment	57
Teacher-child ratio of 1:10 or lower	48
Teacher has specialized Pre-K training	47
Class size of 20 or lower	46
Continuous quality improvement	42
Screening and referral	41
Five days per week	37
BA minimum for teachers	31
Pay parity: public school Pre-K and K-12	28
Assistant teacher CDA	19
Teacher and staff 15 hours training/year; individual PD plan; coaching	19
Full day	18
List of approved domain-specific curricula	13
Pay parity: CBO Pre-K and K-12	6

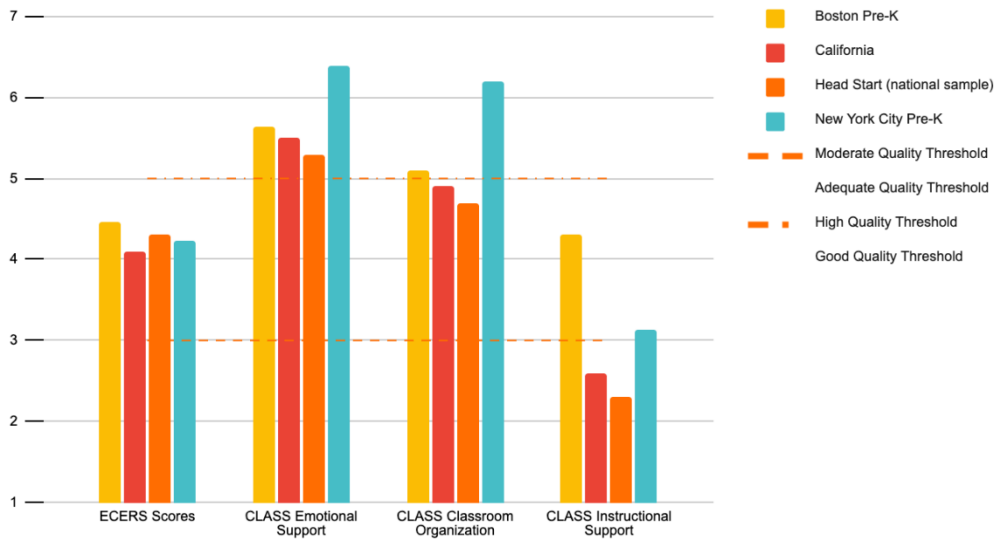
Note: The number of programs meeting standards for the NIEER's 10 benchmarks come from the NIEER 2023 State Preschool Yearbook. Other quality indicators were taken from the 2022 NIEER State Preschool Yearbook appendices (the 2023 NIEER State Preschool Yearbook Appendices were not yet available when this table was compiled).

Unsurprisingly given this policy variation in inputs, there is variation in the quality of young children's experiences within early learning programs. To illustrate this variation, in Figure 2, we display the quality scores for four large-scale systems from two different observational tools in classrooms serving (4-year-old) children, preschool-age children (3- and 4-year-olds), or both across sectors (see the figure notes for details). On the two measures shown, "3" is considered adequate, and "5" is good. On the largely structural measure of quality shown in the figure (scores from the Early Childhood Environmental Rating Scales (ECERS)),[23] these large-scale programs averaged approximately 4. The process quality scores on the Classroom Assessment Scoring System (CLASS)[24] were more variable, but for two dimensions (Emotional Support and Classroom Organization), the systems were close to or over 5. For Instructional Support, the scores were much lower, with only Boston's Pre-K program averaging over 4.

Overall, the wide variation in policies and in the quality of experiences of young children in early learning settings necessitates nuance in discussions of early care and education (ECE). The models for delivering ECE vary greatly in the U.S.

When weighing the evidence on the effects of public preschool, for example, it is important to be clear regarding what kind of preschool program children experienced.

Figure 2: Observational quality scores in four large-scale preschool systems



Note: This figure appeared in our research brief on preschool quality measurement.[25] Site data come from Boston Public Schools school-based Pre-K classrooms for 4-year-olds (N=83 classrooms);[26] California center-based arrangements including Head Starts, public and private preschool, and private child care centers serving 3- and 4-year-olds (N=248 classrooms);[27] New York universal (UPK) providers including school-based Pre-K, independent Pre-K centers, and New York City Early Education Centers for 4-year-olds (N=1,869 providers);[28] and a national sample of 370 Head Start classrooms serving 3- and 4-year-olds.[29]

Key finding #3: *Structural quality inputs usually improve interactional and instructional quality, but they do not always do so.*

Having explained how quality is defined and how it varies in the U.S., we now turn to the decades of research that has examined the relationship between the quality of ECE settings and the learning and development of young children. This research has included studies of summary measures of quality and individual quality inputs. Overall, this research has mainly been descriptive and correlational, but as we summarize, there have been randomized controlled trials (RCTs) of some elements, particularly preschool curricula.

One challenge in this area of research is that in real-world programs, inputs tend to be bundled together—e.g., teacher pay and teacher education tend to be linked—making it difficult to determine their separate value add. Even when a study can isolate the effects of a particular input, it often cannot answer how the effects of that input may vary by levels of other important inputs. For example, due to policy in a given program, all lead Pre-K teachers may have to have, at minimum, a BA. Accordingly, a study of preschool class size in such a program cannot identify whether the effects of having a smaller class vary based on teacher education level. This real-world constraint matters because in regard to

preschool quality elements, synergistic effects are likely—that is, the whole may be more than the sum of the individual parts.

With this important context front and center, we turn first to the evidence on structural quality and then to that on process/instructional quality.

Structural quality evidence

Summary measures of structural quality. For research on summary measures of structural quality, many studies use composite scores, subscale scores, or factor analysis-derived scores[30] from the ECERS.[31] Across these studies, in Head Start programs, community-based preschool programs, and Pre-K programs in public schools, the ECERS-R total score and structural quality scales/composites have shown a mix of small positive and null associations with preschool children's gains in language, literacy, mathematics, executive function (EF), and social-emotional skills.[32] There has been no clear pattern by child skill domain. For example, although an 11-state PreK study found that higher total ECERS-R scores predicted child vocabulary gains (but not literacy, mathematics, or social-emotional skill gains), work in Boston Pre-K[33] and San Francisco Pre-K[34] found null associations for child language measures in terms of both the ECERS-R total score and subscale composites of structural measures only. However, this evidence is entirely correlational and may reflect the roles played by omitted factors rather than these structural measures of quality.

Specific structural quality inputs

Preservice teacher education and training. The evidence linking preservice teacher education and training to overall quality and children's learning is correlational and mixed. As researchers have pointed out, studies of community child care programs in the 1990s generally found consistent links between higher teacher education and both higher classroom quality and higher child school readiness skills.[35] However, since the 2000s, as both public Pre-K programs and teacher training programs expanded, the evidence has been more mixed. Some studies have shown links between higher levels of preschool teacher education and higher instructional quality, but the findings of other studies have mostly been null.[36] Similarly, regarding links between teacher education and gains in children's kindergarten readiness skills, some studies suggest benefits, whereas others obtain null findings.[37] This recent, more mixed pattern is generally found in state-funded PreK programs (in both public schools and community-based settings) and in Head Start programs, where other inputs are less variable than in child care programs, i.e., other supports may compensate for lower teacher education.[38]

Notably, multiple leading institutions in the field recommend a BA minimum for lead preschool teachers, including the National Academies of Sciences, Engineering, and Medicine and the NIEER.[39] In 2022, 33 out of 62 state Pre-K programs required a BA for lead teachers and 19 required a child development associate (CDA) credential or equivalent for assistant teachers.[40] Part of the rationale for higher teacher education requirements also concerns workforce retention and compensation as well as professionalizing the field. When teacher education requirements are lower for preschool than for K-12, preschool teachers may be incentivized out of early childhood programs. That is, because education and compensation tend to be highly coupled, a preschool teacher who meets K-12

requirements is likely to move into K-12 teaching if there is a large compensation benefit from doing so.[41]

Teacher compensation

As the Workforce chapter highlights, early educators are frequently compensated at a considerably lower level than their K-12 counterparts, fueling turnover. This can be the case even in systems that require a BA minimum for Pre-K and K-12 teachers. For example, K-12 teachers in Michigan average $58K in annual salary. Although Michigan state Pre-K teachers are required to have a BA, until recent reforms, they were paid 31% less than K-12 teachers in public school settings ($40K). In community-based settings, Pre-K teachers were paid 43% less ($33K) than their K-12 counterparts.[42] These kinds of pay gaps by sector and setting are common across the U.S.[43]

Some correlational research has linked higher early educator compensation with lower turnover,[44] higher classroom quality, and higher school readiness skills.[45] Other correlational research has revealed negative links between higher teacher turnover and preschoolers' language gains (but not literacy, mathematics, or social skill gains) in Head Start.[46] However, as others have noted, a challenge in this literature is that early educator compensation is often confounded with other program characteristics. For example, programs that pay higher wages tend to attract and hire more highly trained staff and offer more teacher supports and development opportunities.[47] The only experimental study of early educator compensation found that a relatively small financial incentive ($1,500 per teacher) led to a large drop in teacher turnover for teachers at child care centers, with no effect for teachers in school-based programs.[48] Notably, lead teachers in school-based programs earned nearly twice the annual salary of those in child care programs. The effect of the incentive on classroom quality and child gains was outside the scope of the study.

Dosage

Another important structural characteristic is dosage, i.e., whether a program is full day or half day, whether a program is full week vs. part week, and whether wraparound care is offered. Here, the correlational evidence is mixed, with two experimental studies pointing in the direction of larger benefits for children's learning with increased preschool dosage. For example, one correlational study found that attending full-day versus half-day preschool in centers near or in public schools was associated with improved school readiness across language, mathematics, social-emotional, and physical development indicators.[49] However, a correlational Head Start study found no difference in academic and social-emotional skills by full-day vs. half-day dosage.[50] The first of the two RCTs of half-day vs. full-day preschool found larger impacts for children randomized into an 8-hour/day preschool program for 45 weeks than for children randomized into a 2.5-3 hour/day program for 41 weeks.[51] However, the two groups were not equivalent at baseline, which means that the findings are only suggestive. A more recent RCT study in public school-based PreK in a Colorado district without such design flaws found larger impacts on children's vocabulary and literacy skills for preschoolers randomized to a six-hour school day, five days per week than for those randomized to a three-hour day, four days per week.[52] Detailed time use data from the study revealed that across the school year, children in full-day classrooms spent an estimated 177 hours more in instructional activities than did their half-day peers.[53]

Class sizes and teacher-child ratios

For class sizes and teacher-child ratios, the correlational evidence is mixed. Some studies suggest small, positive associations between smaller class sizes and smaller teacher-child ratios and higher classroom quality and improved cognitive, language, and social emotional learning for preschoolers; others have null findings.[54] There is no clear pattern suggesting that these findings differ by sector (i.e., Head Start, child care, Pre-K programs). A small experimental study of 10 schools and 22 classrooms in Chicago Pre-K found benefits of smaller class sizes (i.e., 15 max vs. 20 max) for children's literacy skills but no impacts on child vocabulary or mathematics, nor on classroom quality.[55]

Inclusion

Preschool programs vary widely in their policies and supports for the inclusion of students with disabilities. Approximately two-thirds of preschoolers with disabilities attend preschool alongside their typically developing peers.[56] Overall, as reviewed by the lead author of this chapter, experimental and observational studies of children's interactions in inclusive versus segregated settings have found that children with disabilities engaged in more positive peer interactions, fewer negative peer interactions, and more advanced levels of play in inclusive versus non-inclusive groups.[57] Children with disabilities appear to benefit in terms of their language, literacy, mathematics, social-emotional, and EF skills in inclusive settings.[58] Evidence also suggests that typically developing children appear to make the same gains in inclusive settings as in non-inclusive settings,[59] with some evidence of improved knowledge about and attitudes toward disabilities in inclusive settings.[60]

Other structural quality elements

There is much less evidence on the other structural quality elements that we highlighted in Table 1. Moreover, the evidence that exists is largely correlational/descriptive and should be viewed with caution.

Screening: Most public preschool programs require children to be screened for disabilities and vision/hearing (i.e., 41/60 state-funded Pre-K programs did so in 2022–2023 in public school or community-based settings; all Head Start programs require it).[61] Screening has long been shown to be beneficial for detecting developmental differences and needs for supports.[62] However, we are not aware of studies that have examined differences in classroom quality or child learning by whether or not screening is required in preschool.

Mixed-age classrooms: Some programs serve 3- and 4-year-olds in the same classroom, while others serve single-year age groups only. Correlational evidence has shown lower-quality teacher–child interactions in mixed-aged classrooms in Head Start and public PreK programs.[63] Research suggests that 4-year-old children also appear to make fewer academic gains in mixed-aged Head Start classrooms of 3- and 4-year-olds than do children in 4-year-old-only Head Start classrooms.[64]

Suspension and expulsion: Children from historically marginalized groups and children with disabilities are more likely than their peers to be suspended and expelled from early learning programs.[65]

Many states have policies aimed at curbing preschool suspension/expulsion, but they have largely not been evaluated.[66]

Protected planning time: Preschool and K-12 teachers in unionized public schools generally have protected planning time, while ECE teachers outside public schools do not. In a recent study of Boston UPK classrooms located in community-based settings, the lack of protected planning time was identified as a barrier to instructional quality.[67]

Process and instructional quality evidence

Process quality summary measures. The most commonly used measure of process quality is CLASS.[68] Versions are available by child age group (e.g., Pre-K and school aged) and setting (e.g., schools and family child care homes). Trained assessors observe a typical day in the classroom or code from videos of a typical day. CLASS measures the quality of interactions between teachers and children and between children and their classmates in three areas: Emotional Support, Classroom Organization, and Instructional Support. Many U.S. programs use CLASS to gauge quality, in either formative or high-stakes systems. As an example of the latter, CLASS is used to allocate public funding in Head Start and in some state quality rating systems.[69]

As we highlighted in a previous research brief, CLASS has several key strengths.[70] For example, because it is widely used, it provides a common metric for understanding the strengths and weaknesses of early learning programs around the country. Furthermore, CLASS can and has been used to highlight disparities in access to quality programs by sector, family income, geography (i.e., rural vs. urban), and race/ethnicity. Interventions based on the CLASS theoretical model and classroom quality measure have been shown to improve teacher practice in state-funded Pre-K in public school and community-based settings.[71] However, an RCT of coaching on CLASS in Head Start, public-school Pre-K, and community-based programs found small benefits on children's inhibitory control but none for literacy or language.[72] In correlational studies, the associations between the CLASS domains and children's academic gains in preschool are usually modest or null, with no consistent patterns by program type/setting.[73] Some studies have found Instructional Support to be a statistically significant predictor of preschoolers' gains in language, literacy, mathematics, and inhibitory control skills.[74] However, meta-analyses across a broad range of preschool program types/settings have found no associations between Instructional Support and children's gains in academic and developmental outcomes.[75] Some researchers have also examined whether the association between process quality and children's gains in preschool is nonlinear or whether there are thresholds of process quality that must be met to see corresponding gains in students' skills.[76] This modeling approach has also yielded mixed results, including moderate-sized[77] and null or small associations between the CLASS domains and gains in student outcomes at higher levels of quality.[78]

Instructional quality summary measures

The field has also approached quality assessment and improvement from a domain-specific approach, collecting summary measures of the degree to which instruction is aligned with the science of learning and development in specific content areas. For example, in language and literacy, the Early Language and Literacy Classroom Observation

(ELLCO)[79] is an observational tool focused on classrooms' physical literacy environment (i.e., the availability, display, and arrangement of materials such as books, print sources, and writing instruments) and language and literacy instruction (i.e., the depth and length of developmentally appropriate language, reading, and writing activities). This instrument has been shown to effectively identify variation in the type and dosage of language and literacy instruction that children experience in private, Head Start, public PreK, and university lab school settings,[80] and research has also shown that it is an effective professional development (PD) tool (also across many setting/program types).[81] However, the evidence on the association between ELLCO scores and children's language and literacy gains is mixed. In particular, the quality of the language and literacy environment has been linked to null to small gains in children's emergent literacy outcomes (b ranging from 0.00 to 0.07)[82] and to modest gains in children's vocabulary.[83] A comprehensive meta-analysis found that PD programs that included the ELLCO tool led to moderate to large improvements in classroom literacy (average g = 0.76) and modest effects on children's language and literacy outcomes (average g = 0.14).[84]

Another content-oriented observational quality measure is the Classroom Observation of Early Mathematics Environment and Teaching (COEMET), which focuses specifically on the quality of mathematics instruction in preschool classrooms. It captures the specific content of instruction (i.e., numeral recognition, addition and subtraction strategies), the amount of time spent on mathematics instruction, and the quality of mathematics teaching strategies. For this tool, research has reported evidence of predictive validity for mathematics achievement and EF competencies in urban public school districts.[85] Studies that have found large effects of mathematics-specific curriculum, PD, and coaching on preschoolers' mathematics skills have also shown large effects on COEMET subscales (g ranging from 0.78 for the quality of mathematics activities to 1.23 for the mathematics culture in the classroom).[86]

Time use summary measures

Classroom time use is another summary measure that signals instructional differences across classrooms and that can predict young children's learning gains.[87] Researchers have found systematic differences in the proportion of time that preschool classrooms allocate to learning activities (e.g., language, literacy, and mathematics instruction) and learning formats (i.e., whole class, small groups, and centers). The evidence pertaining to how time is used in early education centers focuses on preschool classrooms, including public and private school, center-based, and Head Start programs. On average, classrooms spend a larger proportion of time in arts, language, and literacy activities than in other content areas.[88] For example, time spent on literacy and language ranged from 14% to 46% of the observed instructional block across studies, while time spent on mathematics activities ranged from 4% to 21%. For learning formats, most studies in this area suggest that children spend approximately one-third of their day in whole-group or large-group activities, one-third of the school day in free-choice activities or interest centers, and the remaining one-third in routines and meals.[89] There is variation here as well. For example, across studies, the percentages have ranged from 4% to 28% for small-group activities and from 1% to 16% for individual learning activities.

Regarding links between time use measures and preschoolers' learning, some studies have found that more time spent on whole-group learning than on free-choice or

independent learning predicted child learning gains in language and literacy.[90] However, findings can differ by child learning domain. For example, other studies have found that more time spent in free-choice learning and less time spent in whole-group learning in preschool was associated with higher gains in social-emotional skills[91] and in mathematics.[92] For content areas, several studies have found links between more time spent on language and literacy and children's gains in those skill areas.[93] In studies that have created summary measures of time use, being in a classroom with a "light academic profile" (i.e., more free play) appears to be associated with smaller gains in literacy and mathematics skills compared to the gains achieved under other instructional profiles, such as those with more time dedicated to whole-group or individual instruction.[94] Research in this area is correlational, and accordingly, the findings should be viewed with caution.

Key finding #4: *Evidence-based curriculum implemented with coaching appears to be a "good bet" for improving instruction in preschool classrooms and children's readiness for kindergarten.*

Curriculum

Most public preschool programs use some kind of formal curriculum, with over 200 published preschool curricula available in the U.S.[95] Some preschool curricula, called global or comprehensive curricula, purport to cover all child skill areas. Others target one or two areas (i.e., a literacy-specific curriculum). Most public preschool programs use either Creative Curriculum or HighScope, which are two global curricula.[96] There have been many RCTs and quasi-experimental trials over the last 20 years that have compared the effects of different curricular approaches in Pre-K in public schools, Head Start, and community-based centers. These studies have found that global curricula sometimes improve classroom process quality more than teacher-created curricula do and approximately equally as well as domain-specific curricula do.[97] However, domain-specific curricula lead to increased time and quality of instruction in the targeted skill area. Domain-specific curricula also tend to produce more child learning gains in the targeted area[98] and sometimes in other skill areas as well.[99] One reason why domain-specific curricula may be more effective is that they tend to include a specified scope and sequence for activities that follows the science of how children learn in a particular skill area. Many comprehensive curricula lack a specified scope and sequence.

Recognizing this evidence, some localities/researchers have had success in combining different domain-specific curricula to cover multiple child learning domains, in Pre-K in public schools, Head Start, and community-based centers.[100] In practice, this has meant providing teachers with guidance on how to coherently integrate the selected curriculum via centrally created sample schedules, training supports, and coaching. In general, more successful curriculum studies have included training and coaching focused on curriculum implementation (and not only on general best teaching practices), i.e., features that have supported fidelity of implementation.[101]

Regarding whether preschool curriculum effects differ by child demographics, the evidence is mixed. Some studies find larger impacts on children from marginalized groups, while others find that all children benefit equally from a given curricular approach.[102] The National Academies of Sciences, Engineering, and Medicine report on preschool curricula summarized this evidence as suggesting that there is a "potential for curricula, particularly some domain-specific curricula, to have greater effects for marginalized groups".[103] According to the same report, the evidence promisingly suggests that with supports, a broad range of early educators, defined in terms of training, education, and sector, implement preschool curricula approximately equally well.[104]

In-service professional development

A common quality support for early educators is in-service PD, which often takes the form of trainings and in-classroom coaching by an expert mentor. Just as in the K-12 literature, there is little evidence that one-shot workshops/trainings on their own change early educators' practices or improve young children's skills, whether in Pre-K in public schools, Head Start, or community-based centers.[105] Multiple large-scale RCTs have shown that coaching on general best practices improves quality in preschool classrooms but does not affect children's school readiness skills.[106] However, coaching when tied explicitly to implementing domain-specific curricula has been shown in multiple randomized trials across Pre-K in public schools, Head Start, and community-based settings to improve both classroom quality and children's school readiness.[107]

One recent review suggested that the features that make PD for early educators more effective include sufficient intensity, an emphasis on evidence-based teacher practices, and active teacher engagement.[108] More research comparing PD dosages, types, contents, and formats is needed.

Child assessments

Regular assessments of children's skills and progress have been another common investment meant to improve quality in early education classrooms. Head Start and most state PreK programs require teachers to complete formative assessments on children's development at multiple points in the year.[109] Many of these assessments require teachers to observe children in the classroom and to rate each child's skill level across school readiness domains. There are also some direct assessments in which a teacher directly tests a child in a given domain (e.g., letter knowledge and letter sounds), but they are less commonly used. The psychometric validity of some formative assessment systems has been called into question.[110] For both types of assessment, to the best of our knowledge, no studies have examined the degree to which assessments improve classroom quality or child learning.

Curriculum alignment with kindergarten. Another element of process and instructional quality is the degree of alignment between children's preschool and early elementary experiences, particularly their kindergarten experiences. As others have detailed, this includes alignment of curriculum content and learning formats.[111] Some descriptive research has found that kindergarten instruction can be repetitive with the skills that

children already have and that more advanced instruction can promote children's learning in kindergarten.[112] To date, the strongest studies of the alignment question have been mathematics curriculum studies in which there was randomization to a mathematics curriculum enhancement in Pre-K and then re-randomization to an aligned mathematics condition in kindergarten. These studies (in Pre-K in public schools, Head Start, and community-based centers) found lasting benefits only for children who experienced the aligned Pre-K and kindergarten condition.[113]

Cultural responsiveness

According to a National Academies of Sciences, Engineering, and Medicine preschool curriculum report, cultural responsiveness refers to an "asset-based approach to classroom cultural diversity".[114] As the report also points out, Head Start and some states emphasize cultural responsiveness in their early learning program standards,[115] and interviews with 31 leaders in the field also point to a broad consensus on the important cultural relevance of early childhood curricula and classroom practice.[116] However, although there are examples of culturally responsive practices, empirical research linking cultural responsiveness to improved classroom quality or child learning outcomes in the early education years is currently lacking.[117]

Key finding #5: *More marginalized groups have less access to high-quality early education programs.*

As discussed in this chapter, families do not have equal access to the types of care for their young children that they would prefer due to factors such as high costs, limited supply, and poor fit with work schedules. As we review below, even when families can access the type of care that they prefer, children of color, children with disabilities, dual language learners, and children from families with low incomes often experience lower-quality programs than do their peers.

Race/ethnicity and home language gaps in quality

Studies in public preschool programs have found that White and monolingual children generally attend classrooms with higher process and structural quality compared to the classrooms attended by their Black and Hispanic peers. There are, however, two studies that found no variation in process and structural quality by school racial/ethnic composition, nor in the quality of the language environment based on children's dual language learner status.[118] Evidence from public Pre-K programs in 11 states showed that, on average, White children attend classrooms with higher CLASS scores compared to the classrooms of their Black (0.65 standard deviation (s.d.)) and Hispanic (0.37 SD) peers, with differences concentrated in classroom Emotional and Instructional Support dimensions of quality. In particular, classrooms with a larger proportion of Black and Hispanic children have shown lower emotional support (-0.66 SD and -0.24 SD, respectively) and lower instructional support (-0.33 SD and -0.31 SD, respectively). This same study showed gaps as large as 0.35 SD between the structural quality of classrooms with a larger proportion of dual language learners and the structural quality of classrooms with a majority of monolingual children.[119] A study including private and public UPK providers in Georgia found that classrooms with a high concentration of Black children had lower Emotional (-

0.35 SD) and Instructional Support (-0.28 SD) scores, as measured by CLASS, than did classrooms with a higher concentration of White children.[120] These findings are consistent with evidence from the New York UPK program, where the Black–White gaps in quality were as large as 0.37 s.d. for Emotional Support and 0.42 s.d. for Instructional Support and the Hispanic–White gaps reached 0.16 s.d. and 0.36 s.d., respectively.[121]

Income-based quality gaps.

There are also large gaps in quality by family income. Based on a nationally representative sample of ECE center-based providers serving children from birth to 5 years old, a team of researchers concluded that children attending centers located in areas with a high poverty density were less likely to be in classrooms with small teacher–child ratios. [122] These classrooms were also more likely to be served by teachers with fewer years of education and to be in centers where fewer benchmarks of workforce support (e.g., PD opportunities and coaching) were met. Similarly, in North Carolina, licensed ECE programs in affluent neighborhoods were more likely than programs in neighborhoods where residents had lower incomes to obtain higher quality ratings.[123] A study of Georgia's UPK program found that programs located in higher-poverty ZIP codes had more experienced teachers but lower levels of emotional support and instructional support than did those located in lower-poverty ZIP codes.[124] In New York City, lower-quality Pre-K programs were disproportionately found in poorer neighborhoods.[125]

Disability-based quality gaps

Evidence on the quality of center-based settings serving children with disabilities is scarce. However, caregivers of young children ages 0 to 5 with disabilities have reported greater difficulties finding high-quality early education that meets their children's unique needs, higher costs of care, and an increased administrative burden to coordinate care across service providers.[126] Specifically, compared with caregivers of children ages 0 to 5 who do not have a disability, a larger proportion of caregivers of children with disabilities experienced difficulty finding care (34% of parents of children with disabilities reported difficulties vs. 25% of parents of children without disabilities) based on findings from the 2016 Early Childhood Program Participation (ECPP) Survey and the 2016–2018 National Survey of Children's Health (NSCH).[127] Beyond the availability of slots, interview data from the same study revealed that parents were concerned about child care providers' experience or knowledge with regard to serving children with disabilities. For example, parents reported a lack of providers where teachers were fluent in American Sign Language; concerns about children's well-being and physical safety due to large teacher–child ratios; or concerns about institutional policies that did not align with the principle of inclusion, such as barring children from specific activities or inappropriately holding children back with younger peers. A study of 33 Midwestern classrooms with children ages 3–5 found that teachers reported a high level of self-efficacy with respect to including children with disabilities and expressed positive attitudes toward the benefits of inclusion. However, these teachers also expressed the need for training and support on specific inclusion practices.[128]

Sector quality differences

As highlighted in the introductory chapter, early education quality differs by sector. For

example, a study with a nationally representative sample found evidence of lower quality in community-based centers on indicators such as book reading frequency, television dosage, and observed structural quality than in public-school PreK and Head Start.[129] The study also found that family child care homes scored lower than centers on structural quality metrics for 4-year-olds.

Importantly, these sector differences tend to persist even in mixed-delivery Pre-K systems, in which there has been some attempt to equalize policies and investments across care types (i.e., across Pre-K classrooms in public schools and in community-based programs).[130] Specifically, research has shown that 1) where there were quality and investment differences in these systems, they tended to favor public schools; and 2) within these systems, families marginalized by race/ethnicity, home language, and/or income were more likely than their peers to select into community-based settings.[131] Interestingly, mixed-delivery Pre-K systems with more similar policies by sector had fewer differences in quality and child gains.

For children younger than 4, the evidence on quality differences by setting type is more scant and more mixed. For example, at age 2, family child care homes scored lower than centers on reading frequency, observed and reported structural quality measures, safety, and teacher education and training, and had more television dosage. However, family child care homes also reported more frequent visits to cultural and scientific sites of interest compared to centers.[132] Underscoring the quality challenges for younger children, even within the same sector, teachers of young children (i.e., toddlers) show higher turnover rates than do preschool teachers. At least in part, this is likely due to lower compensation.[133]

Overall, more research is needed to 1) identify the causes of these differential enrollment patterns across demographic groups, 2) determine the best policy levers for ensuring equally high-quality experiences across settings, and 3) examine the causal effects of enrollment in different settings on children's development and learning.

Key finding #6: *Policy-level efforts to regulate and improve early education quality through licensing standards, accountability systems, and accreditation have had some success in improving many dimensions of quality.*

Policymakers have implemented a range of policies to improve quality in ECE settings. Below, we summarize three of the most widespread policy initiatives—regulations, accountability via quality rating systems, and accreditation—and review evidence on their effects on child development, system-level intended outcomes such as population-level quality improvement, and unintended outcomes such as increased operating costs.

Regulations

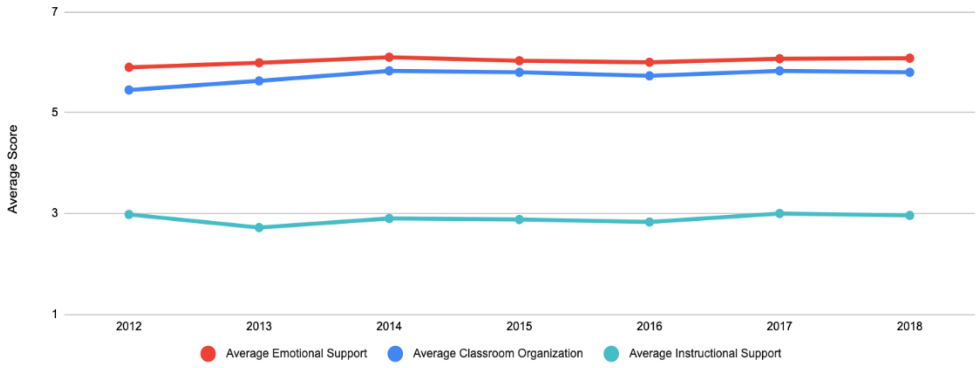
Federal and state policymakers have used regulations, including licensing, as a lever for ECE quality improvement. The primary purpose of licensing standards is to set a floor for programs to be considered safe environments for young children and to enforce the requirements for providers to legally offer child care services based on state, local, or tribal law.[134] Licensing is a complex process with the potential to offer information about programs along a defined quality continuum, given that all states and U.S. territories have systems in place dedicated to monitoring compliance. These systems are generally funded

through a combination of federal and state resources.[135] To obtain and renew a license, programs generally need to meet a set of standards for their physical environment, administration, operations, personnel, and community engagement. All licensed programs are visited regularly to ensure continued compliance with standards.

Despite the comprehensive data collected by licensing and monitoring systems, the impacts of and challenges in implementation (e.g., potential systematic differences in compliance across communities, responsiveness to rapid demographic changes, or new directions in developmental and education sciences) and the child-level effects of these nationwide policies are understudied. However, researchers have examined the effects of more stringent state regulations on the quality of services. Evidence has shown that the implementation of stringent regulations can increase the structural quality of services in nonprofit and for-profit licensed child care centers serving children aged 0–5, specifically via improvements in the conditions necessary to keep children safe (i.e., physical space and supervision), improved requirements for staff characteristics and ratios, and increases in directors' education and administrative skills.[136] However, increased regulations can also decrease teacher wages. For example, in nonprofit and for-profit licensed child care centers serving children aged 0–5, increasing education requirements by one year and raising the hours of training required at the time of hire by 100 hours resulted in wage decreases of 9% and 16%, respectively, due to the increases in costs required for programs to meet these new quality requirements.[137] To the best of our knowledge, studies have not yet examined how licensing standards relate to centers' process or instructional quality.

In Head Start, as others have reviewed, there have been multiple regulatory changes aimed at improving program quality and children's development via the Head Start reauthorization process.[138] For example, in 1998, the Head Start with the Community Opportunities, Accountability, and Training and Educational Services (COATES) Act raised the minimum teacher education requirement to an AA degree for 50% of Head Start teachers nationally. In addition, an increased proportion of federal Head Start funding was set aside for quality improvements. In the 2007 reauthorization, the teacher education requirement increased to 50% of Head Start teachers with at least a BA. In 2011, Head Start also started requiring observational quality assessments using CLASS, with the lowest-scoring programs losing funding.[139] Research on these changes overall is descriptive and somewhat limited; hence, it should be interpreted with caution.[140] It is also difficult to isolate the impacts of any particular policy/resource change since there were multiple overlapping changes. On the positive side, Head Start exceeded the education requirement thresholds nationally and well ahead of schedule, with little change in teacher demographics. However, CLASS scores have remained relatively flat, as we showed in prior work and reprint here in Figure 3.[141]

Figure 3: Head Start Grantees' CLASS scores, 2012–2018



Note: 2019 and 2020 data are not available due to the COVID-19 pandemic. This figure is reprinted from Weiland and Guerrero Rosada (2021).

Quality rating and improvement systems

Quality rating and improvement systems (QRISs) are a widespread policy strategy designed to improve the quality of early childhood education settings through two mechanisms: a) tiered financial incentives supporting program operations and PD; and b) information about program quality that is publicly available to families. Combined, these mechanisms aim to improve quality at the system level, once early education programs are rated and engage in improvement activities. Currently, 44 states, the District of Columbia, and the Commonwealth of the Northern Mariana Islands have fully implemented at least one QRIS. Four states (South Dakota, Kansas, Wyoming, and West Virginia) have a QRIS in development phases, and there is no public information on the Missouri and Mississippi systems.[142] Two states (Maine and Tennessee) have mandatory participation for all licensed programs, and nine additional states (Colorado, Illinois, Louisiana, North Carolina, Oklahoma, Pennsylvania, South Carolina, Vermont, and Virginia) automatically rate licensed programs, with participation rates of 99–100%. Among the remaining states with voluntary participation, participation ranges from 9% (Iowa) to 96% (Utah). These figures might change rapidly as QRISs continuously evolve to increase participation and coverage. Importantly, research with nationally representative data has shown that QRIS participation is lower in predominantly Black communities and higher in low-income communities and across centers that blend funding mechanisms, potentially due to child care subsidy incentives.[143] Most states (all but 11 with QRISs) use tiered reimbursements, meaning that a higher reimbursement rate is allocated to higher-rated programs as an incentive to improve quality.[144]

QRISs rate programs on a variety of structural or process quality indicators that are either conceptually or empirically associated with children's development. Although QRISs vary widely in terms of the scoring strategy and weights that the systems attribute to quality indicators, most systems measure the extent to which the physical environment and learning materials are developmentally appropriate, staff qualifications, teacher–child ratios, the use of assessments to inform instruction, and opportunities for family

involvement, among others. Twenty programs include a standardized observational measure as part of their scoring system (14 require a specific Environmental Rating Scale (ERS) tool and 6 require the CLASS-PreK).

Quasi-experimental research shows that licensed programs serving children aged 0–5 respond to QRISs by improving on the structural and process quality metrics captured by these systems and that lower-rated programs experience enrollment declines,[145] with parents opting for programs with higher ratings.[146] However, the associations between QRIS ratings and children's development and learning are null and inconsistent; notably, however, the available evidence focuses only on preschool-aged children.[147] Some studies have examined whether the components captured by these systems are more consistently associated with children's gains than are QRIS overall ratings.[148] However, the existing research on QRISs and children's development remains correlational, and the findings of this research should be viewed with caution.

Accreditation

Accreditation from the NAEYC is a nationally recognized endorsement of high quality. The accreditation process entails self-assessment by centers, direct observations, and guided improvement across ten areas of quality, including relationships with children, curriculum, teaching approaches, child assessment, nutrition and health, staff qualifications, relationships with children's families, relationships with the community, the physical environment, and program leadership and management. Centers that have decided to pursue accreditation initiate the process and assume the administrative costs of membership and assessment. Although all centers are assessed in reference to a predefined set of quality standards, each program receives support from NAEYC in developing and implementing an improvement plan based on its baseline conditions. Accreditation status is valid for five years. Notably, centers tend to select into NAEYC accreditation. However, it can be a policy lever; Boston, for example, has pursued NAEYC accreditation for all its UPK programs as part of its strategy to increase quality.[149]

Descriptive studies have found that local licensing policies and state regulations relate to centers' likelihood of pursuing and obtaining NAEYC accreditation. In particular, the stringency of state licensing standards is positively associated with the total number of preschool programs involved in the NAEYC accreditation process.[150] NAEYC accreditation can also affect program quality through centers' organizational climate, work conditions, or staff selection. A study examining differences in the quality of work experiences for staff in accredited vs. nonaccredited early education centers serving children aged 0–5 across 33 states found that staff in accredited centers reported higher scores on domains such as professional growth, innovativeness, goal consensus, and clarity.[151] There is correlational evidence that accredited centers have lower staff turnover and pay staff higher salaries than do nonaccredited centers.[152] Moreover, experimental evidence shows that NAEYC-accredited providers are more likely to interview job applicants with specific early education work experience, higher education levels, and other professional credentials, while QRIS participants are not.[153]

NAEYC accreditation is also hypothesized to increase classroom quality and thereby improve child outcomes. Some research shows that programs can obtain NAEYC accreditation but fall short of meeting guidelines for a developmentally appropriate

preschool curriculum, as measured by a widely used instrument of structural quality (ECERS-R).[154] However, other work has shown positive associations with improved structural and instructional quality and with gains in the vocabulary scores of 4-year-olds.[155] Overall, most of the evidence on NAEYC accreditation is correlational; hence, it should be interpreted with caution.

Future directions

Given the broad consensus and evidence base showing that high-quality early education can benefit children in both the short run and the long run, there is increasing attention to identifying and measuring the active ingredients of effective, scalable early learning programs. Although most research in this area has focused on the preschool years, there is evidence of socioeconomic disparities in the quality of services for all ages. Some key areas for future research include improvements in defining and measuring quality in early learning settings; rigorous comparisons of the effects of different kinds of quality inputs on children and teachers; comprehensive studies of the early education experiences of younger children (aged 0–3); and evidence on new, potentially promising policy reforms in this area, including efforts to increase teacher pay, licensing and QRIS reforms, and new scholarship programs for early education teachers to increase their education and training.

Endnotes and references

[1] Cascio, E. U. 2021. Early Childhood Education in the United States: What, When, Where, Who, How, and Why. In The Routledge Handbook of the Economics of Education. Routledge. 30–72; Phillips, D. A., M. W. Lipsey, K. A. Dodge, R. Haskins, D. Bassok, M. R. Burchinal, and C. Weiland. 2017. Puzzling It Out: The Current State of Scientific Knowledge on Pre-Kindergarten Effects. Brookings Institute; Yoshikawa, H., C. Weiland, and J. Brooks-Gunn. 2016. When Does Preschool Matter? The Future of Children 21–35; Yoshikawa, H., C. Weiland, J. Brooks-Gunn, M. R. Burchinal, L. M. Espinosa, W. T. Gormley, … and M. J. Zaslow. 2013. Investing in Our Future: The Evidence Base on Preschool Education. Foundation for Child Development and Society for Research in Child Development.

[2] Weiland, C. 2018. Commentary: Pivoting to the "How": Moving Preschool Policy, Practice, and Research Forward. Early Childhood Research Quarterly 45: 188–192.

[3] Ruzek, E., M. Burchinal, G. Farkas, and G. J. Duncan. 2014. The Quality of Toddler Child Care and Cognitive Skills at 24 Months: Propensity Score Analysis Results from the ECLS-B. Early Childhood Research Quarterly 29(1): 12–21.

[4] Cascio (2021); Early, D.M., K. L. Maxwell, M. Burchinal, S. Alva, R. H. Bender, D. Bryant, and G. T. Henry. 2007. Teachers' Education, Classroom Quality, and Young Children's Academic Skills: Results from Seven Studies of Preschool Programs. Child Development 78. https://doi.org/10.1111/j.1467-8624.2007.01014.x; Mashburn, A. J., R. C. Pianta, B. K. Hamre, J. T. Downer, O. A. Barbarin, D. Bryant, … and C. Howes. 2008. Measures of Classroom Quality in Prekindergarten and Children's Development of Academic, Language, and Social Skills. Child Development 79: 732–749.

[5] Burchinal, M. 2018. Measuring Early Care and Education Quality. Child Development Perspectives 12(1): 3–9; Pianta, R. C., and B. K. Hamre. 2009. Conceptualization, Measurement, and Improvement of Classroom Processes: Standardized Observation Can Leverage Capacity. Educational Researcher 38(2): 109–119.

[6] Yoshikawa et al. (2013).

[7] Maier, M. F., J. Hsueh, and M. McCormick. 2020. Rethinking Classroom Quality: What We Know and What We Are Learning. MDRC.

[8] Chaudry, A., T. Morrissey, C. Weiland, and H. Yoshikawa. 2021. Cradle to Kindergarten: A New Plan to Combat Inequality. Russell Sage Foundation; Weiland, C., A. Chaudry, A. Shapiro, J. Berne, K. Hyland, N. Hamp, and A. Taylor. 2023. An Evidence-based Path to Expanding High-Quality Pre-K in Michigan. University of Michigan, Education Policy Initiative. https://edpolicy.umich.edu/sites/epi/files/2023-12/MI%20Pre-K%20for%20All%20Report_v8_0.pdf.

[9] Maier, Hsueh, and McCormick (2020).

[10] Weiland, C., and P. G. Guerrero Rosada. 2022. Widely Used Measures of Pre-K Classroom Quality: What We Know, Gaps in the Field, and Promising New Directions. MDRC.

[11] National Academies of Sciences, Engineering, and Medicine. 2024. A New Vision for High-Quality Preschool Curriculum. Washington, DC: The National Academies Press. https://doi.org/10.17226/27429.

[12] Division for Early Childhood/National Association for the Education for Young Children. 2009. Early Childhood Inclusion: A Joint Position Statement of the Division for Early Childhood (DEC) and the National Association for the Education of Young Children (NAEYC). University of North Carolina, FPG Child Development Institute; Odom, S. L., V. Buysse, and E. Soukakou. 2011. Inclusion for Young Children with Disabilities: A Quarter Century of Research Perspectives. Journal of Early Intervention 33: 344–356. http://dx.doi.org/10.1177/1053815111430094.

[13] Weiland, C. 2016. Impacts of the Boston Prekindergarten Program on the School Readiness of Young Children with Special Needs. Developmental Psychology 52: 1763.

[14] Yoshikawa et al. (2013).

[15] Bassok, D., M. Fitzpatrick, E. Greenberg, and S. Loeb. 2016. Within- and Between-Sector Quality Differences in Early Childhood Education and Care. Child Development 87: 1627–1645; Denker, H., and A. Atteberry. 2024. Where Has All the Time Gone? Describing Time Use in Full- vs. Half-Day Pre-Kindergarten. Early Childhood Research Quarterly 68: 235–246. https://doi.org/10.1111/cdev.1255; Markowitz, A. J., and A. Ansari. 2020. Changes in Academic Instructional Experiences in Head Start Classrooms from 2001–2015. Early Childhood Research Quarterly 53: 534–550.

[16] Sabol, T. J., N. L. Bohlmann, and J. T. Downer. 2018. Low-Income Ethnically Diverse Children's Engagement as a Predictor of School Readiness Above Preschool Classroom Quality. Child Development 89: 556–576; Weiland, C., L. Moffett, P. G. Rosada, A. Weissman, K. Zhang, M. Maier, and J. Sachs. 2023. Learning

Experiences Vary across Young Children in the Same Classroom: Evidence from the Individualizing Student Instruction Measure in the Boston Public Schools. Early Childhood Research Quarterly 63: 313–326.
[17] Weiland and Guerrero Rosada (2022).
[18] Chaudry et al. (2021); Weiland et al. (2023).
[19] National Academies of Sciences, Engineering, and Medicine (2024).
[20] Bassok et al. (2016); National Center on Early Childhood Quality Assurance. 2022. Trends in Child Care Licensing Requirements for 2020. https://childcareta.acf.hhs.gov/sites/default/files/new-occ/resource/files/center_licensing_trends_brief_2020_final.pdf.
[21] Head Start. n.d. Head Start Policy and Regulations. https://eclkc.ohs.acf.hhs.gov/policy/45-cfr-chap-xiii/1302-91-staff-qualifications-competency-requirements.
[22] Friedman-Krauss, A. H., W. S. Barnett, K. S. Hodges, K. A. Garver, T. M. Jost, G. Weisenfeld, and J. Duer. 2024. The State of Preschool 2023: State Preschool Yearbook. National Institute for Early Education Research.
[23] Harms, T., R. M. Clifford, and D. Cryer. 1998. Early Childhood Environment Rating Scale. New York, New York: Teachers College Press.
[24] Pianta and Hamre (2009).
[25] Weiland and Guerrero Rosada (2022). The thresholds for adequate quality (3) and good quality (5) to identify key thresholds associated with gains in child outcomes come from existing work. For example, see Burchinal, Margaret, Nathan Vandergrift, Robert Pianta, and Andrew Mashburn. 2010. Threshold Analysis of Association Between Child Care Quality and Child Outcomes for Low-Income Children in Pre-Kindergarten Programs. Early Childhood Research Quarterly 25(2): 166–176.
[26] Weiland, C., K. Ulvestad, J. Sachs, and H. Yoshikawa. 2013. Associations between Classroom Quality and Children's Vocabulary and Executive Function Skills in an Urban Public Prekindergarten Program. Early Childhood Research Quarterly 28(2): 199–209.
[27] Karoly, L., B. Ghosh-Dastidar, G. Zellman, M. Perlman, and L. Fernyhough. 2008. Prepared to Learn: The Nature and Quality of Early Care and Education for Preschool-Age Children in California. RAND Corporation.
[28] Latham, S., S. P. Corcoran, C. Sattin-Bajaj, and J. Jennings. 2021. Racial Disparities in Pre-K Quality: Evidence from New York City's Universal Pre-K Program. Educational Researcher 50(9): 607–617.
[29] Moiduddin, E., N. Aikens, L. Tarullo, J. West, and Y. Xue. 2012. Child Outcomes and Classroom Quality in FACES 2009. Office of Planning, Research, and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services.
[30] Psychometric studies have suggested that the ECERS-R measures between one and three quality factors that tend to group into structural vs. quality constructs (Cassidy et al., 2005; Gordon et al., 2013; Phillipsen et al., 1997; Pianta et al., 2005; Weiland et al., 2013). For example, Pianta et al. (2005) and Weiland et al. (2013) found support for (1) a process quality construct—Teaching and Interactions, (encouragement of children to communicate, the use of language to develop reasoning skills, general supervision of children, discipline, and staff–child interactions); and (2) a structural quality construct—Provisions for Learning (furnishings, room arrangement, gross motor equipment, art, blocks, dramatic play, and nature or science). Cassidy, D. J., L. L. Hestenes, A. Hegde, S. Hestenes, and S. Mims. 2005. Measurement of Quality in Preschool Child Care Classrooms: An Exploratory and Confirmatory Factor Analysis of the Early Childhood Environment Rating Scale-Revised. Early Childhood Research Quarterly 20: 345–360; Gordon, R. A., K. Fujimoto, R. Kaestner, S. Korenman, and K. Abner. 2013. An Assessment of the Validity of the ECERS-R with Implications for Measures of Child Care Quality and Relations to Child Development. Developmental Psychology 49: 146; Phillipsen, L. C., M. R. Burchinal, C. Howes, and D. Cryer. 1997. The Prediction of Process Quality from Structural Features of Child Care. Early Childhood Research Quarterly 12: 281–303; Pianta, R., C. Howes, M. Burchinal, D. Bryant, R. Clifford, D. Early, and O. Barbarin. 2005. Features of Pre-Kindergarten Programs, Classrooms, and Teachers: Do They Predict Observed Classroom Quality and Child–Teacher Interactions? Applied Developmental Science 9: 144–159; Weiland et al. (2013).
[31] Harms, Clifford, and Cryer (1998).
[32] Brunsek, A., M. Perlman, O. Falenchuk, E. McMullen, B. Fletcher, and P. S. Shah. 2017. The Relationship between the Early Childhood Environment Rating Scale and Its Revised Form and Child Outcomes: A Systematic Review and Meta-Analysis. PLOS One 12: e0178512; Gordon et al. (2013); Hong, S. L. S., T. J. Sabol, M. R. Burchinal, L. Tarullo, M. Zaslow, and E. S. Peisner-Feinberg. 2019. ECE Quality Indicators and Child Outcomes: Analyses of Six Large Child Care Studies. Early Childhood Research Quarterly 49: 202–217; Howes, C., M. Burchinal, R. Pianta, D. Bryant, D. Early, R. Clifford, and O. Barbarin. 2008. Ready to Learn? Children's Pre-Academic Achievement in Pre-Kindergarten Programs. Early Childhood Research Quarterly 23: 27–50; Mashburn et al. (2008); McDoniel, M. E., C. Townley-Flores, M. J. Sulik, and J. Obradović.

2022. Widely Used Measures of Classroom Quality Are Largely Unrelated to Preschool Skill Development. Early Childhood Research Quarterly 59: 243–253; Sabol, T. J., & Pianta, R. C. (2014). Do Standard Measures of Preschool Quality Used in Statewide Policy Predict School Readiness? Education Finance and Policy 9: 116–164; Weiland et al. (2013).

[33] Weiland et al. (2013).

[34] McDoniel et al. (2022).

[35] Lin, Y. C., and K. A. Magnuson. 2018. Classroom Quality and Children's Academic Skills in Child Care Centers: Understanding the Role of Teacher Qualifications. Early Childhood Research Quarterly 42: 215–227.

[36] Early et al. (2007); Lin and Magnuson (2018); Pianta et al. (2005).

[37] Early et al. (2007); Lin and Magnuson (2018); Mashburn et al. (2008).

[38] Lin and Magnuson (2018).

[39] Friedman-Krauss et al. (2024); Institute of Medicine and National Research Council. 2015. Transforming the Workforce for Children Birth Through Age 8: A Unifying Foundation. Washington, DC: The National Academies Press. https://doi.org/10.17226/19401.

[40] Friedman-Krauss et al. (2023).

[41] Chaudry et al. (2021).

[42] Wu, J. H., T. Herbowicz, S. R. Miller, L. A. Van Egeren, and H. O. Akaeze. 2023. Great Start Readiness Program State Evaluation 2021–22 Annual Report. https://cep.msu.edu/upload/gsrp/GSRPpercent20Annual percent20Report percent202021-22.pdf .

[43] Friedman-Krauss et al. (2024).

[44] Hall, T., I. Fares, A. J. Markowitz, K. Miller-Bains, and D. Bassok. 2024. Compensation and Staffing Challenges in Child Care: Statewide Evidence from Pandemic Relief Applications. Education Finance and Policy 19: 524–537. https://doi.org/10.1162/edfp_a_00410.

[45] King, E. K., A. V. Johnson, D. J. Cassidy, Y. C. Wang, J. K. Lower, and V. L. Kintner-Duffy. 2016. Preschool Teachers' Financial Well-Being and Work Time Supports: Associations with Children's Emotional Expressions and Behaviors in Classrooms. Early Childhood Education Journal 44: 545–553; Torquati, J. C., H. Raikes, and C. A. Huddleston-Casas. 2007. Teacher Education, Motivation, Compensation, Workplace Support, and Links to Quality of Center-based Care and Teachers' Intention to Stay in the Early Childhood Profession. Early Childhood Research Quarterly 22: 261–275. doi:10.1016/j.ecresq.2007.03.004; Whitebook, M. 2013. Preschool Teaching at a Crossroads. Employment Research Newsletter 20(3): 2; Whitebook, M., and L. Sakai. 2003. Turnover Begets Turnover: An Examination of Job and Occupational Instability among Child Care Center Staff. Early Childhood Research Quarterly 18(3): 273–293. https://doi.org/10.1016/S0885-2006(03)00040-1.

[46] Markowitz, A. J. 2024. Within-Year Teacher Turnover in Head Start and Children's School Readiness. AERA Open 10: 23328584241245094.

[47] Whitebook and Sakai (2003).

[48] Bassok, D., J. B. Doromal, M. Michie, and V. Wong. 2021. The Effects of Financial Incentives on Teacher Turnover in Early Childhood Settings: Experimental Evidence from Virginia (Working Paper).

[49] Reynolds, A. J., B. A. Richardson, M. Hayakawa, E. M. Lease, M. Warner-Richter, M. M. Englund, ... M. Sullivan. 2014. Association of a Full-Day vs Part-Day Preschool Intervention with School Readiness, Attendance, and Parent Involvement. Journal of the American Medical Association 312: 2126–2134.

[50] Leow, C., and X. Wen. 2017. Is Full Day Better than Half Day? A Propensity Score Analysis of the Association between Head Start Program Intensity and Children's School Performance in Kindergarten. Early Education and Development 28: 224–239.

[51] Robin, K. B., E. C. Frede, and W. S. Barnett. 2006. Is More Better? The Effects of Full-Day vs Half-Day Preschool on Early School Achievement. Retrieved from http://nieer.org/research-report/is-more-better-the-effects-of-full-day-vs-half-day-preschool-on-early-school-achievement

[52] Atteberry, A., D. Bassok, and V. C. Wong. 2019. The Effects of Full-Day Prekindergarten: Experimental Evidence of Impacts on Children's School Readiness. Educational Evaluation and Policy Analysis 41: 537–562.

[53] Denker and Atteberry (2024).

[54] Bowne, J. B., K. A. Magnuson, H. S. Schindler, G. J. Duncan, and H. Yoshikawa. 2017. A Meta-Analysis of Class Sizes and Ratios in Early Childhood Education Programs: Are Thresholds of Quality Associated with Greater Impacts on Cognitive, Achievement, and Socioemotional Outcomes? Educational Evaluation and Policy Analysis 39: 407–428; Howes et al. (2008); Lin and Magnuson (2018); Mashburn et al. (2008); Perlman, M., B. Fletcher, O. Falenchuk, A. Brunsek, E. McMullen, and P. S. Shah. 2017. Child–Staff Ratios in Early Childhood

Education and Care Settings and Child Outcomes: A Systematic Review and Meta-Analysis. PLOS One 12: e0170256.
[55] Francis, J., and W. S. Barnett. 2019. Relating Preschool Class Size to Classroom Quality and Student Achievement. Early Childhood Research Quarterly 49: 49–58.
[56] U.S. Department of Education, Office of Special Education and Rehabilitative Services, Office of Special Education Programs. 2014. 36th Annual Report to Congress on the Implementation of the Individuals with Disabilities Education Act. Washington, DC.
[57] Weiland (2016).
[58] Green, K. B., N. P. Terry, and P. A. Gallagher. 2013. Progress in Language and Literacy Skills among Children with Disabilities in Inclusive Early Reading First Classrooms. Topics in Early Childhood Special Education 33: 249–259. http://dx.doi.org/10.1177/0271121413477498; Holahan, A., and V. Costenbader. 2000. A Comparison of Developmental Gains for Preschool Children with Disabilities in Inclusive and Self-Contained Classrooms. Topics in Early Childhood Special Education 20: 224–235. http://dx.doi.org/10.1177/027112140002000403; Odom, S. L., J. Vitztum, R. Wolery, J. Lieber, S. Sandall, M. J. Hanson, ... E. Horn. 2004. Preschool Inclusion in the United States: A Review of Research from an Ecological Systems Perspective. Journal of Research in Special Educational Needs 4: 17–49. http://dx.doi.org/10.1111/J.1471-3802.2004.00016.x; Phillips, D. A., and M. E. Meloy. 2012. High-Quality School-based Pre-K Can Boost Early Learning for Children with Special Needs. Exceptional Children 78: 471–490; Weiland (2016).
[59] Odom, Buysse, and Soukakou (2011); Weiland (2016).
[60] Diamond, K. E., and H. H. Huang. 2005. Preschoolers' Ideas about Disabilities. Infants and Young Children 18: 37– 46. http://dx.doi.org/10.1097/00001163-200501000-00005.
[61] Friedman-Krauss et al. (2024).
[62] Feldman, W. M., B. Sackett, R. Milner, and S. Gilbert. 1980. Effects of Preschool Screening for Vision and Hearing on Prevalence of Vision and Hearing Problems 6–12 Months Later. The Lancet 316: 1014–1016.
[63] Ansari, A., and R. C. Pianta. 2019. Teacher–Child Interaction Quality as a Function of Classroom Age Diversity and Teachers' Beliefs and Qualifications. Applied Developmental Science 23: 294–304.
[64] Ansari, A., K. Purtell, and E. Gershoff. 2016. Classroom Age Composition and the School Readiness of 3- and 4-Year-Olds in the Head Start Program. Psychological Science 27: 53–63.
[65] Gilliam, W. S., A. N. Maupin, C. R. Reyes, M. Accavitti, and F. Shic. 2016. Do Early Educators' Implicit Biases Regarding Sex and Race Relate to Behavior Expectations and Recommendations of Preschool Expulsions and Suspensions? Yale University Child Study Center; Giordano, K., V. L. Interra, G. C. Stillo, A. T. Mims, and J. Block-Lerner. 2021. Associations between Child and Administrator Race and Suspension and Expulsion Rates in Community Childcare Programs. Early Childhood Education Journal 49: 125–133; Zeng, S., C. P. Corr, C. O'Grady, and Y. Guan. 2019. Adverse Childhood Experiences and Preschool Suspension Expulsion: A Population Study. Child Abuse & Neglect 97.
[66] Chow, K. A., S. Smith, C. E. Park, T. Grindal, and N. A. C. Edge. 2024. Implementation of a Comprehensive State Effort to Reduce Exclusionary Discipline in Early Care and Education Settings: Arkansas's Policy. Early Childhood Research Quarterly 67: 330–342.
[67] Weiland, C., P. Guerrero Rosada, A. Taylor, L. Penfold, R. Kushner, C. Snow, Y. Xia, and M. McCormick. 2024. Scaling High Quality: An Implementation Study of Boston's Universal Pre-K Expansion to Community-based Programs. Manuscript under review.
[68] Pianta and Hamre (2009).
[69] Weiland and Guerrero Rosada (2022).
[70] Ibid.
[71] Early, D. M., K. L. Maxwell, B. D. Ponder, and Y. Pan. 2017. Improving Teacher–Child Interactions: A Randomized Controlled Trial of Making the Most of Classroom Interactions and My Teaching Partner Professional Development Models. Early Childhood Research Quarterly 38: 57–70; Pianta, R., B. Hamre, J. Downer, M. Burchinal, A. Williford, J. Locasale-Crouch, C. Howes, K. La Paro, and C. Scott-Little. 2017. Early Childhood Professional Development: Coaching and Coursework Effects on Indicators of Children's School Readiness. Early Education and Development 28: 956–975. https://doi.org/10.1080/10409289.2017.1319783.
[72] Pianta et al. (2017).
[73] Burchinal (2018).
[74] Hamre, B., B. Hatfield, R. Pianta, and F. Jamil. 2014. Evidence for General and Domain-Specific Elements of Teacher–Child Interactions: Associations with Preschool Children's Development. Child Development 85: 1257–1274; Mashburn et al. (2008).

[75] Perlman, M., O. Falenchuk, B. Fletcher, E. McMullen, J. Beyene, and P. S. Shah. 2016. A Systematic Review and Meta-Analysis of a Measure of Staff/Child Interaction Quality (the Classroom Assessment Scoring System) in Early Childhood Education and Care Settings and Child Outcomes. PLOS One 11: e0167660.
[76] Burchinal et al. (2010); Guerrero-Rosada, P., C. Weiland, M. McCormick, J. Hsueh, J. Sachs, C. Snow, and M. Maier. 2021. Null Relations between CLASS Scores and Gains in Children's Language, Math, and Executive Function Skills: A Replication and Extension Study. Early Childhood Research Quarterly 54: 1–12; Weiland et al. (2013).
[77] Burchinal et al. (2010).
[78] Burchinal, M., L. Vernon-Feagans, V. Vitiello, M. Greenberg, and Family Life Project Key Investigators. 2014. Thresholds in the Association between Child Care Quality and Child Outcomes in Rural Preschool Children. Early Childhood Research Quarterly 29: 41–51; Weiland et al. (2013); Zaslow, M., R. Anderson, Z. Redd, J. Wessel, L. Tarullo, and M. Burchinal. 2010. Quality, Dosage, Thresholds, and Features in Early Childhood Settings: A Review of the Literature (OPRE Report 2011-5). Administration for Children & Families.
[79] Smith, M., and D. Dickinson. 2002. Early Language and Literacy Classroom Observation. Baltimore, MD: Brookes.
[80] Quinn, M. F., H. K. Gerde, and G. E. Bingham. 2022. Who, What, and Where: Classroom Contexts for Preschool Writing Experiences. Early Education and Development 33: 1439–1460.
[81] Arteaga, I., K. Thornburg, R. Darolia, and J. Hawks. 2019. Improving Teacher Practices with Children under Five: Experimental Evidence from the Mississippi Buildings Blocks. Evaluation Review 43: 41–76; Hallam, R., J. Grisham-Brown, X. Gao, and R. Brookshire. 2007. The Effects of Outcomes-Driven Authentic Assessment on Classroom Quality. Early Childhood Research & Practice 9; Piasta, S. B., K. S. Farley, S. A. Mauck, P. Soto Ramirez, R. E. Schachter, A. A. O'Connell, ... and M. Weber-Mayrer. 2020. At-Scale, State-Sponsored Language and Literacy Professional Development: Impacts on Early Childhood Classroom Practices and Children's Outcomes. Journal of Educational Psychology 112: 329; Wilcox-Herzog, A., M. McLaren, W. Ward, and E. Wong. 2013. Results from the Quality Early Childhood Training Program. Journal of Early Childhood Teacher Education 34: 335–349.
[82] Altun, D., F. Tantekin Erden, and C. E. Snow. 2018. A Multilevel Analysis of Home and Classroom Literacy Environments in Relation to Preschoolers' Early Literacy Development. Psychology in the Schools 55: 1098–1120; Yang, Q., K. Zimmermann, C. P. Bartholomew, K. M. Purtell, and A. Ansari. 2023. Preschool Classroom Age Composition and Physical Literacy Environment: Influence on Children's Emergent Literacy Outcomes. Early Education and Development 1–18. https://doi.org/10.1080/10409289.2023.2247953; Xu, Y., C. Chin, E. Reed, and C. Hutchinson. 2014. The Effects of a Comprehensive Early Literacy Project on Preschoolers' Language and Literacy Skills. Early Childhood Education Journal 42: 295–304.
[83] Wasik, B. A., and A. H. Hindman. 2011. Improving Vocabulary and Pre-Literacy Skills of At-Risk Preschoolers through Teacher Professional Development. Journal of Educational Psychology 103(2), 455–469. https://doi-org.proxy.lib.umich.edu/10.1037/a0023067.
[84] Egert, F., R. G. Fukkink, and A. G. Eckhardt. 2018. Impact of In-Service Professional Development Programs for Early Childhood Teachers on Quality Ratings and Child Outcomes: A Meta-Analysis. Review of Educational Research 88: 401–433.
[85] Clements, D. H., J. Sarama, M. E. Spitler, A. A. Lange, and C. B. Wolfe. 2011. Mathematics Learned by Young Children in an Intervention based on Learning Trajectories: A Large-Scale Cluster Randomized Trial. Journal for Research in Mathematics Education 42(2): 127–166. https://doi.org/10.5951/jresematheduc.42.2.0127; Clements, D. H., J. Sarama, C. Layzer, F. Unlu, and L. Fesler. 2020. Effects on Mathematics and Executive Function of a Mathematics and Play Intervention versus Mathematics Alone. Journal for Research in Mathematics Education 51: 301–333; McCormick, M. P., S. K. Mattera, M. F. Maier, S. Xia, R. Jacob, and P. A. Morris. 2022. Different Settings, Different Patterns of Impacts: Effects of a Pre-K Math Intervention in a Mixed-Delivery System. Early Childhood Research Quarterly 58: 136–154; Rojas, N. M., P. Morris, and A. Balaraman. 2020. Finding Rigor within a Large-Scale Expansion of Preschool to Test Impacts of a Professional Development Program. AERA Open 6. https://doi.org/10.1177/2332858420975399.
[86] Clements et al. (2011).
[87] Bratsch-Hines, M. E., M. Burchinal, E. Peisner-Feinberg, and X. Franco. 2019. Frequency of Instructional Practices in Rural Prekindergarten Classrooms and Associations with Child Language and Literacy Skills. Early Childhood Research Quarterly 47: 74–88; Cabell, S. Q., J. DeCoster, J. LoCasale-Crouch, B. K. Hamre, and R. C. Pianta. 2013. Variation in the Effectiveness of Instructional Interactions across Preschool Classroom Settings and Learning Activities. Early Childhood Research Quarterly 28: 820–830; Chien, N. C., C. Howes,

M. Burchinal, R. C. Pianta, S. Ritchie, D. M. Bryant, ... and O. A. Barbarin. 2010. Children's Classroom Engagement and School Readiness Gains in Prekindergarten. Child Development 81: 1534–1549; Early, D. M., I. U. Iruka, S. Ritchie, O. A. Barbarin, D. M. C. Winn, G. M. Crawford, ... and R. C. Pianta. 2010. How Do Pre-Kindergarteners Spend Their Time? Gender, Ethnicity, and Income as Predictors of Experiences in Pre-Kindergarten Classrooms. Early Childhood Research Quarterly 25: 177–193; Pianta, R. C., J. E. Whittaker, V. Vitiello, A. Ansari, and E. Ruzek. 2018. Classroom Process and Practices in Public Pre-K Programs: Describing and Predicting Educational Opportunities in the Early Learning Sector. Early Education and Development 29: 797–813; Weiland et al. (2023).

[88] Cabell et al. (2013); Connor, C. M., F. J. Morrison, B. J. Fishman, C. C. Ponitz, S. Glasney, P. S. Underwood, ... and C. Schatschneider. 2009. The ISI Classroom Observation System: Examining the Literacy Instruction Provided to Individual Students. Educational Researcher 38: 85–99; Early et al. (2010); Justice, L. M., H. Jiang, K. M. Purtell, T. J. Lin, and A. Ansari. 2022. Academics of the Early Primary Grades: Investigating the Alignment of Instructional Practices from Pre-K to Third Grade. Early Education and Development 33: 1237–1255; Pianta et al. (2018).

[89] Cabell et al. (2013); Early et al. (2010); Nores, M., A. Friedman-Krauss, and A. Figueras-Daniel. 2022. Activity Settings, Content, and Pedagogical Strategies in Preschool Classrooms: Do These Influence the Interactions We Observe? Early Childhood Research Quarterly 58: 264–277; Pianta et al. (2018).

[90] Ansari, A., and K. M. Purtell. 2017. Activity Settings in Full-Day Kindergarten Classrooms and Children's Early Learning. Early Childhood Research Quarterly 38: 23–32; Fuligni, A. S., C. Howes, Y. Huang, S. S. Hong, and S. Lara-Cinisomo. 2012. Activity Settings and Daily Routines in Preschool Classrooms: Diverse Experiences in Early Learning Settings for Low-Income Children. Early Childhood Research Quarterly 27: 198–209. https://doi.org/10.1016/j.ecresq.2011.10.001.

[91] Fuligni et al. (2012).

[92] Chien et al. (2010).

[93] Bratsch-Hines et al. (2019); Burchinal, M., Garber, K., Foster, T., Bratsch-Hines, M., Franco, X., & Peisner-Feinberg, E. (2021). Relating Early Care and Education Quality to Preschool Outcomes: The Same or Different Models for Different Outcomes? Early Childhood Research Quarterly 55: 35–51. https://doi.org/10.1016/j.ecresq.2020.10.005.

[94] Chien et al. (2010); Fuligni et al. (2012); Justice et al. (2021).

[95] National Academies of Sciences, Engineering, and Medicine (2024).

[96] Jenkins, J. M., and D. J. Duncan. 2017. Do Prekindergarten Curricula Matter? In The Current State of Scientific Knowledge on Pre-Kindergarten Effects. Edited by D. Phillips and K. Dodge. Brookings Institute. 37–44. Retrieved from https://www.researchgate.net/profile/Jade-Jenkins6/publication/317904908_Do_prekindergarten_curricula_matter/links/595e50a9a6fdccc9b17fd2f2/Do-pre-kindergarten-curriculamatter.pdf.

[97] Fantuzzo, J. W., V. L. Gadsden, and P. A. McDermott. 2011. An Integrated Curriculum to Improve Mathematics, Language, and Literacy for Head Start Children. American Educational Research Journal 48: 763–793; Jenkins, J. M., G. J. Duncan, A. Auger, M. Bitler, T. Domina, and M. Burchinal. 2018. Boosting School Readiness: Should Preschool Teachers Target Skills or the Whole Child? Economics of Education Review 65: 107–125. https://doi.org/10.1016/j.econedurev.2018.05.001; National Academies of Sciences, Engineering, and Medicine (2024).

[98] Clements, D. H., J. Sarama, C. B. Wolfe, and M. E. Spitler. 2013. Longitudinal Evaluation of a Scale-Up Model for Teaching Mathematics with Trajectories and Technologies: Persistence of Effects in the Third Year. American Educational Research Journal 50: 812–850. https://doi.org/10.3102/0002831212469270; Jenkins et al. (2018); Mattera, S., R. Jacob, and P. Morris. 2018. Strengthening Children's Math Skills with Enhanced Instruction: The Impacts of Making Pre-K Count and High 5s on Kindergarten Outcomes. MDRC. https://www.mdrc.org/publication/strengthening-children-s-math-skillsenhanced-instruction; Wakabayashi, T., F. Andrade-Adaniya, L. J. Schweinhart, Z. Xiang, B. A. Marshall, and C. A. Markley. 2020. The Impact of a Supplementary Preschool Mathematics Curriculum on Children's Early Mathematics Learning. Early Childhood Research Quarterly 53: 329–342. https://doi.org/10.1016/j.ecresq.2020.04.002.

[99] Sarama, J., A. A. Lange, D. H. Clements, and C. B. Wolfe. 2012. The Impacts of an Early Mathematics Curriculum on Oral Language and Literacy. Early Childhood Research Quarterly 27: 489–502. https://doi.org/10.1016/j.ecresq.2011.12.002; Weiland, C. and H. Yoshikawa. 2013. Impacts of a Prekindergarten Program on Children's Mathematics, Language, Literacy, Executive Function, and Emotional Skills. Child Development 84: 2112–2130. https://doi.org/10.1111/cdev.12099.

[100] Bierman, K. L., C E. Domitrovich, R. L. Nix, S. D. Gest, J. A. Welsh, M. T. Greenberg, ... and S. Gill. 2008. Promoting Academic and Social-Emotional School Readiness: The Head Start REDI Program. Child

Development 79(6): 1802–1817; Lonigan, C. J., B. M. Phillips, J. L. Clancy, S. H. Landry, P. R. Swank, M. Assel, H. B. Taylor, A. Klein, P. Starkey, C. E. Domitrovich, N. Eisenberg, J. Villiers, P. Villiers, and M. Barnes. 2015. Impacts of a Comprehensive School Readiness Curriculum for Preschool Children at Risk for Educational Difficulties. Child Development 86: 1773–1793. https://doi.org/10.1111/cdev.12460; Weiland and Yoshikawa (2013).

[101] Weiland, C., M. McCormick, S. Mattera, M. Maier, and P. Morris. 2018. Preschool Curricula and Professional Development Features for Getting to High-Quality Implementation at Scale: A Comparative Review across Five Trials. AERA Open 4: 2332858418757735.

[102] Clements et al. (2013); Dumas, D., D. McNeish, J. Sarama, and D. Clements. 2019. Preschool Mathematics Intervention Can Significantly Improve Student Learning Trajectories through Elementary School. AERA Open 5: 2332858419879446. https://doi.org/10.1177/2332858419879446; Finlon, K. J., C. E. Izard, A. Seidenfeld, S. R. Johnson, E. W. Cavadel, E. S. K. Ewing, and J. K. Morgan. 2015. Emotion-based Preventive Intervention: Effectively Promoting Emotion Knowledge and Adaptive Behavior among At-Risk Preschoolers. Development and Psychopathology 27: 1353–1365. doi: 10.1017/S0954579414001461; Flook, L., S. B. Goldberg, L. Pinger, and R. J. Davidson. 2015. Promoting Prosocial Behavior and Self-Regulatory Skills in Preschool Children through a Mindfulness-based Kindness Curriculum. Developmental Psychology 51: 44–51. https://doi.org/10.1037/a0038256.

[103] National Academies of Sciences, Engineering, and Medicine (2024).

[104] Ibid.

[105] Yoshikawa et al. (2013).

[106] Pianta et al. (2017); Piasta, S. B., L. M. Justice, A. A. O'Connell, S. A. Mauck, M. Weber-Mayrer, R. E. Schachter, ... and C. F. Spear. 2017. Effectiveness of Large-Scale, State-Sponsored Language and Literacy Professional Development on Early Childhood Educator Outcomes. Journal of Research on Educational Effectiveness 10: 354–378. https://doi.org/10.1080/19345747.2016.1270378; Yoshikawa, H., D. Leyva, C. E. Snow, E. Treviño, A. Rolla, M. C. Barata, C. Weiland, and M. C. Arbour. 2015. Experimental Impacts on Classroom Quality of an Initiative to Improve the Quality of Preschool Education in Chile: A Cluster-Randomized Trial. Developmental Psychology 51: 309–322.https://doi.org/10.1037/a0038785.

[107] Weiland et al. (2018).

[108] Hamre, B. K., A. Partee, and C. Mulcahy. 2017. Enhancing the Impact of Professional Development in the Context of Preschool Expansion. AERA Open 3(4): 2332858417733686.

[109] Friedman-Krauss et al. (2024).

[110] Russo, J. M., A. P. Williford, A. J. Markowitz, V. E. Vitiello, and D. Bassok. 2019. Examining the Validity of a Widely-Used School Readiness Assessment: Implications for Teachers and Early Childhood Programs. Early Childhood Research Quarterly 48: 14–25.

[111] McCormick, M., J. Hsueh, C. Weiland, and M. Banger. 2017. The Challenge of Sustaining Preschool Impacts: Introducing ExCEL P-3, a Study from the Expanding Children's Early Learning Network (Policy Brief). MDRC.

[112] Engel, M., A. Claessens, and M. A. Finch. 2013. Teaching Students What They Already Know? The (Mis)alignment between Mathematics Instructional Content and Student Knowledge in Kindergarten. Educational Evaluation and Policy Analysis 35: 157–178.

[113] Clements et al. (2013); Mattera et al. (2021).

[114] National Academies of Sciences, Engineering, and Medicine (2024).

[115] National Center on Early Childhood Development, Teaching, and Learning (NCECDTL). 2020. Preschool Curriculum Consumer Report. Office of Head Start, U.S. Department of Health and Human Services. https://eclkc.ohs.acf.hhs.gov/sites/default/files/featured_file/preschool-curriculumconsumer-report-032519.pdf.

[116] Reid, J. L., and S. L. Kagan. 2022. Reaching for Consensus about Preschool Curricula. Phi Delta Kappan 104(2): 50–55. https://doi.org/10.1177/00317217221130634.

[117] National Academies of Sciences, Engineering, and Medicine (2024).

[118] Iruka, I. U., K. Kainz, L. Kuhn, S. Guss, S. Tokarz, N. Yazejian, and S. Niño. 2023. Early Education Program Racial and Ethnic Composition and Associations with Quality and Children's Language and Social-Emotional Development. Early Education and Development 34(6): 1341–1360; Sawyer, B., S. Atkins-Burnett, L. Sandilos, C. Scheffner Hammer, L. Lopez, and C. Blair. 2018. Variations in Classroom Language Environments of Preschool Children Who Are Low Income and Linguistically Diverse. Early Education and Development 29(3): 398–416.

[119] Valentino, R. 2018. Will Public Pre-K Really Close Achievement Gaps? Gaps in Prekindergarten Quality between Students and across States. American Educational Research Journal 55(1): 79–116.

[120] Bassok, D., and E. Galdo. 2016. Inequality in Preschool Quality? Community-Level Disparities in Access to High-Quality Learning Environments. Early Education and Development 27(1): 128–144.
[121] Latham et al. (2021).
[122] Slicker, G., A. A. Whitaker, and J. Tang. 2023. Center-based Early Care and Education Programs and Quality Indicators: A Latent Class Analysis. Early Childhood Research Quarterly 63: 59–72.
[123] Hatfield, B. E., J. K. Lower, D. J. Cassidy, and R. A. Faldowski. 2015. Inequities in Access to Quality Early Care and Education: Associations with Funding and Community Context. Early Childhood Research Quarterly 30: 316–326.
[124] Bassok and Galdo (2016).
[125] Fuller, B., and T. Leibovitz. 2022. Do Preschool Entitlements Distribute Quality Fairly? Racial Inequity in New York City. Early Childhood Research Quarterly 60: 414–427.
[126] Booth-LaForce, C., and J. F. Kelly. 2004. Childcare Patterns and Issues for Families of Preschool Children with Disabilities. Infants and Young Children 17: 5–16; Shapiro, A., and D. Bassok. 2022. Supporting Young Children with Disabilities during the COVID-19 Pandemic: Evidence from Caregivers in Virginia. AERA Open 8: 23328584221134525.
[127] Novoa, C. 2020. The Child Care Crisis Disproportionately Affects Children with Disabilities. Center for American Progress.
[128] D'Agostino, S. R., and E. Horton. 2023. Examining Inclusive Preschool Teachers' Perspectives and Practices: A Mixed-Methods Investigation. Journal of Early Intervention 10538151231190627.
[129] Bassok et al. (2016).
[130] Garver, K., G. G. Weisenfeld, L. Connors-Tadros, K. Hodges, H. Melnick, and S. Plasencia. 2023. State Preschool in a Mixed Delivery System: Lessons from Five States. Learning Policy Institute. https://doi.org/10.54300/387.446; McCormick et al. (2022); Reid, J. L., S. A. Melvin, S. L. Kagan, and J. Brooks-Gunn. 2019. Building a Unified System for Universal Pre-K: The Case of New York City. Children and Youth Services Review 100: 191–205. https://doi.org/10.1016/j.childyouth.2019.02.030; Weiland, C., M. McCormick, J. Duer, A. Friedman-Krauss, M. Pralica, S. Xia, … and S. Mattera. 2024. The Mixed-Delivery Pre-K Opportunity Gap? Differences in Demographics, Quality, and Children's Gains in Community-based versus Public School Programs across Five Large-Scale Systems. Early Childhood Research Quarterly 68: 247–259.
[131] Garver et al. (2023); McCormick et al. (2022); Reid et al. (2019); Weiland et al. (2024).
[132] Bassok et al. (2016).
[133] Bellows, L., D. Bassok, and A. J. Markowitz. 2022. Teacher Turnover in Early Childhood Education: Longitudinal Evidence from the Universe of Publicly Funded Programs in Louisiana. Educational Researcher 51(9): 565–574.
[134] Lynch, K. E. 2022. The Child Care and Development Block Grant: In Brief (CRS Report R47312, Version 4). Congressional Research Service.
[135] Office of Child Care. 2024. Approved CCDF Plans 2022–2024. Recovered from: https://www.acf.hhs.gov/occ/form/approved-ccdf-plans-fy-2022-2024.
[136] Gallagher, J. J., R. Rooney, and S. Campbell. 1999. Child Care Licensing Regulations and Child Care Quality in Four States. Early Childhood Research Quarterly 14: 313–333. https://doi.org/10.1016/S0885-2006(99)00015-0; Hotz, V. J., and M. Xiao. 2011. The Impact of Regulations on the Supply and Quality of Care in Child Care Markets. American Economic Review 101: 1775–1805. https://doi.org/10.1257/aer.101.5.1775.
[137] Blau, D. M. 2007. Unintended Consequences of Child Care Regulations. Labour Economics 14: 513–538.
[138] Bassok, D. 2013. Raising Teacher Education Levels in Head Start: Exploring Programmatic Changes between 1999 and 2011. Early Childhood Research Quarterly 28: 831–842; Chaudry et al. (2021).
[139] Administration for Children and Families. 2016. Report on Head Start CLASS® Data Fiscal Years 2012–2015. https://eclkc.ohs.acf.hhs.gov/sites/default/files/pdf/class-2016.pdf.
[140] For examples of such descriptive studies that cover this time period, see Bassok (2013) and Markowitz and Ansari (2020).
[141] Weiland and Guerrero Rosada (2022).
[142] The Quality Compendium. 2024. A Catalogue and Comparison of Quality Improvement Systems (QRIS). https://qualitycompendium.org/create-a-report.
[143] Jenkins, J. M., J. K. Duer, and M. Connors. 2021. Who Participates in Quality Rating and Improvement Systems? Early Childhood Research Quarterly 54: 219–227.
[144] The Quality Compendium (2024).
[145] Bassok, D., T. S. Dee, and S. Latham. 2019. The Effects of Accountability Incentives in Early Childhood Education. Journal of Policy Analysis and Management 38: 838–866.

[146] Herbst, C. M. 2018. The Impact of Quality Rating and Improvement Systems on Families' Child Care Choices and the Supply of Child Care Labor. Labour Economics 54: 172–190.
[147] Auger, A., G. Farkas, M. R. Burchinal, G. J. Duncan, and D. L. Vandell. 2014. Preschool Center Care Quality Effects on Academic Achievement: An Instrumental Variables Analysis. Developmental Psychology 50: 2559; Brunsek et al. (2017); Sabol, T. J., S. L. Soliday Hong, R. C. Pianta, and M. R. Burchinal. 2013. Can Rating Pre-K Programs Predict Children's Learning? Science 341: 845–846; Vitiello, V. E., D. Bassok, B. K. Hamre, D. Player, and A. P. Williford. 2018. Measuring the Quality of Teacher–Child Interactions at Scale: Comparing Research-based and State Observation Approaches. Early Childhood Research Quarterly 44: 161–169.
[148] For example, using data from the Louisiana QRIS, researchers categorized programs as low or high quality based on CLASS scores, with some promising findings of predictive validity; Markowitz, A. J., D. Bassok, and D. Player. 2020. Simplifying Quality Rating Systems in Early Childhood Education. Children and Youth Services Review 112: 104947.
[149] Guerrero Rosada, P., C. Weiland, A. Taylor, L. Penfold, C. Snow, J. Sachs, and M. McCormick. 2021. Effects of COVID-19 on Early Childhood Education Centers: Descriptive Evidence from Boston's Universal Prekindergarten Initiative. Education Policy Initiative. https://epistage.fordschool.umich.edu/sites/epi/files/2021-07/BPS_ECE_COVID_Policy_Brief.pdf; Weiland, C., J. Sachs, M. McCormick, J. Hsueh, and C. Snow. 2021. Fast-Response Research to Answer Practice and Policy Questions. The Future of Children 31: 75–96.
[150] Apple, P. L. 2006. A Developmental Approach to Early Childhood Program Quality Improvement: The Relation between State Regulation and NAEYC Accreditation. Early Education and Development 17: 535–552. doi.org/10.1207/s15566935eed1704_2.
[151] Jorde Bloom, P. 1996. The Quality of Work Life in NAEYC Accredited and Nonaccredited Early Childhood Programs. Early Education and Development 7: 301–317. https://doi.org/10.1207/s15566935eed0704_1.
[152] Whitebook, M., L. M. Sakai, and C. Howes. 2004. Improving and Sustaining Center Quality: The Role of NAEYC Accreditation and Staff Stability. Early Education and Development 15: 305–326.
[153] Boyd-Swan, C., and C. M. Herbst. 2020. Influence of Quality Credentialing Programs on Teacher Characteristics in Center-based Early Care and Education Settings. Early Childhood Research Quarterly 51: 352–365.
[154] Zan, B. 2005. NAEYC Accreditation and High Quality Preschool Curriculum. Early Education and Development 16: 85–104.
[155] Weiland et al. (2021).

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