

Executive Summary

This report evaluates the extent to which early childhood quality measures used in Arkansas align with student outcomes, including ECE child assessments and kindergarten readiness. Our review of commonly used ECE quality measures in Arkansas and the broader research base finds that no single measure captures multiple dimensions of readiness. Observational measures, such as those focused on adult–child interactions, align with developmental processes that support long-term learning, while direct academic assessments more strongly predict later academic performance but reflect narrower domains. Structural and environmental indicators contribute indirectly by shaping classroom conditions. The findings suggest that Arkansas’s current measurement system includes many necessary components for alignment, and clear guidance could further support consistent and appropriate use. The report identifies opportunities to clarify the purpose of each tool, strengthen alignment across birth-to-grade-2 systems, and support the use of complementary measures to inform policy and practice.

Key Findings:

- No single measure captures kindergarten readiness; a multi-measure approach is needed across developmental domains.
- Measures serve different roles: observational tools capture classroom processes that support learning, direct assessments are more strongly related to later test scores, and structural indicators shape the conditions for learning.
- Relationships between measures and child outcomes are often modest or indirect, reflecting differences in what they are designed to measure.
- Arkansas has the key components of an aligned system; strategic planning can strengthen how measures are used together.

Introduction

Early care and education (ECE) plays a critical role in shaping children's academic and developmental trajectories (Institute of Medicine and National Research Council, 2015). Early childhood is a critical time, with children developing skills including language, early literacy and numeracy, and social-emotional competencies. These skills are associated with later academic success and long-term educational outcomes (e.g., Duncan et al., 2007; Ricciardi et al., 2021).

Given the wide range of ways children are developing, measuring early learning is complex. Kindergarten readiness is a multidimensional construct that includes cognitive, social-emotional, and physical domains, and no single assessment captures all aspects of children's development (Institute of Medicine and National Research Council, 2015; Snow, 2006; Williams et al., 2019). Different types of measures, including classroom observation tools, developmental assessments, and academic screeners, differentially relate to distinct domains of early learning (Burchinal et al., 2021; Soliday Hong et al., 2019).

In Arkansas, recent policy changes and investments have increased attention to how the quality of early learning is evaluated. While this creates opportunities to better understand and support children's development, it also raises important questions about how these measures align and how they should be used together.

In this brief, we examine how commonly used ECE quality measures align with later student outcomes, including kindergarten readiness, and identify opportunities to strengthen alignment across the birth-to-grade-2 system.

Approach

Our analysis focuses on two key questions:

- How does research define kindergarten readiness, and what does this imply for valid measurement?
- How do commonly used early childhood measures align with later student outcomes, and where are there gaps in alignment?

To address these questions, we draw on developmental theory, empirical research, and a review of the early childhood measurement tools currently used in Arkansas. We examine multiple types of measures, including classroom observation tools, child assessments, and structural indicators, and assess how each aligns with later outcomes based on existing evidence.

This analysis focuses on system alignment, examining whether the measures used in Arkansas capture the skills and environments associated with children’s later success and are used in ways consistent with their intended purpose.

How Different Measures Relate to Later Outcomes

Research shows that ECE quality measures vary in how they relate to child outcomes, in part because different tools are designed to capture different aspects of early learning environments and development (Burchinal, 2018; Burchinal et al., 2021; Soliday Hong et al., 2019; Von Suchodoletz et al., 2023). This section summarizes how different types of measures align with later outcomes, drawing on developmental theory and empirical evidence.

Measures of adult–child interactions, such as classroom observations, are designed to assess the quality of interactions between teachers and children (Hamre, 2014; Pianta et al., 2016). High-quality interactions are theorized to support children’s development across multiple domains, including language, self-regulation, and social-emotional skills (Hamre et al., 2014). Empirical evidence suggests that these measures are associated with child outcomes, particularly in language and literacy, though these relationships are generally small to moderate in size and vary across contexts (Burchinal et al., 2021; Finders et al., 2021; Goble et al., 2019; Goble & Pianta, 2017; Gordon & Peng, 2020; Guerrero-Rosada et al., 2021; Hamre et al., 2014; Hatfield et al., 2016; Markowitz et al., 2020; Mashburn et al., 2008; Moffett et al., 2021; Perlman et al., 2016; Pianta et al., 2020; Wang et al., 2024; Zheng et al., 2023). These tools are particularly helpful at providing actionable feedback for early educators rather than predicting individual child outcomes (Burchinal, 2018).

Child assessments, including direct assessments of early academic skills, show the most consistent relationships with later test scores (Duncan et al., 2007; Ricciardi et al., 2021). These measures often assess concrete academic skills in early literacy and numeracy that align closely with early elementary

standards (Duncan et al., 2007). As a result, they may provide one of the clearest available indication of later *academic* performance (Claessens & Engel, 2013; Duncan et al., 2007; McCormick et al., 2021). However, they reflect a narrower set of skills and do not capture broader aspects of development that also support long-term learning (Hunter et al., 2018; Institute of Medicine and National Research Council, 2015; Williams et al., 2019). Importantly, direct assessments across domains, including social-emotional, self-regulation, and physical development, are also associated with later academic and developmental outcomes (Bai et al., 2021; Cameron et al., 2012; Devlin et al., 2024; Dinehart & Manfra, 2013; Ernst et al., 2022; Grissmer et al., 2010; Jones et al., 2015; McClelland et al., 2007; Moffitt et al., 2011; Ruffini et al., 2024).

Observational child development measures, like the TS GOLD and the Work Sampling System, capture children's progress across multiple domains through ongoing observation in classroom settings (Ackerman, 2020; Meisels et al., 2008; Miller-Bains et al., 2017; Russo et al., 2019). These tools provide a comprehensive view of development and are useful for instructional planning and monitoring growth over time (Shields et al., 2016). Evidence suggests they align with children's skills at a given point in time (Meisels et al., 2008; Meisels et al., 2010; Miller-Bains et al., 2017; Russo et al., 2019), but their ability to predict later outcomes is more limited (Burchinal, 2018; Gallant, 2009; Shields et al., 2016). This is in part because observational measures often show limited differentiation across developmental domains and rely on subjective judgments reported by teachers that can vary across raters and classroom contexts (Ackerman, 2020; Gallant & Moore, 2008; Miller-Bains et al., 2017; Russo et al., 2019). As a result, these tools are particularly well suited for understanding children's development within classroom contexts and supporting instruction, but are less precise for predicting individual child outcomes or making comparisons across settings.

Structural and environmental indicators, such as child-teacher ratios, staff qualifications, and program administration, contribute to the conditions that make learning possible (Early et al., 2007; Madill et al., 2015; Slot, 2018). Research shows that these indicators are associated with the conditions for safe, stable, and well-functioning learning environments (Hanno et al., 2021; Manning et al., 2019; Slot, 2018). However, their relationships with child outcomes are generally indirect, operating through their influence on classroom experiences and interactions rather than directly affecting children's learning (Brunsek et al., 2020; Egert et al., 2018; Markussen-Brown et al., 2017). Systematic

reviews of empirical evidence further suggest that structural features such as staff qualifications and child–teacher ratios show small or inconsistent direct associations with child outcomes, with stronger effects observed when they are linked to improvements in instructional quality and teacher–child interactions (Bowne et al., 2017; Dalgaard et al., 2022; Perlman et al., 2017). Additionally, widely used global quality measures such as the Early Childhood Environment Rating Scale (ECERS) capture features of the learning environment but show relatively weak and inconsistent associations with children’s academic outcomes, particularly for ECERS domains not directly capturing teacher–child interactions (Gordon et al., 2013; McDoniel et al., 2022; Sabol & Pianta, 2014).

Taken together, this evidence suggests that no single type of measure provides a complete picture of early learning or later success. Each type of measure captures a different aspect of the system, and understanding how they work together is essential for interpreting results and informing policy.

Alignment in Arkansas’s Current System

Arkansas currently uses a range of ECE quality measures that reflect multiple dimensions of children’s development. Together, these measures represent key components of a broader early childhood measurement system. Interpreting results can be complex, as children’s development reflects experiences across multiple settings and changes rapidly during early childhood, meaning that point-in-time measures provide only a snapshot of development and may not fully capture longer-term outcomes.

Table 1 summarizes these key tools, their intended purposes, and the strength of evidence of their alignment with later outcomes. Overall, this table shows that measures vary not only in how strongly they relate to later outcomes, but also in what they are designed to capture. These differences have important implications for how results are best interpreted and used to inform practice and policy.

Areas of alignment.

Arkansas’s current approach reflects several areas of alignment with research on early learning. First, the use of classroom observation tools to assess adult–child interactions aligns with developmental theory emphasizing the role of responsive, instructionally rich environments in supporting children’s

Table 1 – Arkansas Measures and Evidence of Alignment

Measure	Domain	Purpose	Alignment	Notes
CLASS	Adult-child interactions	Program improvement, coaching	Moderate. Aligns with developmental mechanisms; small to moderate associations with outcomes.	Requires training; limited variation in funded settings; designed for improvement.
ERS & PAS/BAS	Environment, materials, health/safety, leadership	QRIS rating, technical assistance	Indirect. Predicts setting quality; weak associations with academic gains.	QRIS focuses on ‘capacity to educate’ vs. instruction.
KRIC	Developmental checklist	Parent guidance, monitoring	Limited. Few studies linking to outcomes; rater subjectivity.	Implementation varies; transition tool vs. monitoring.
TS GOLD	Observational assessment	Planning, formative assessment	Moderate. Adequate population-level; weaker individual prediction.	Reliability depends on training; not for high-stakes.
ATLAS K	Early literacy and math	Monitoring, support, intervention	Strong for specific domains. High validity for reading/math; weak for broad domains.	Focused on constrained skills; meets LEARNS mandate; limited ECE access.
Structural	Ratios, credentials, curriculum	Licensing, QRIS	Indirect. Weak direct associations; operates via process quality.	Policy indicators; not proxies for development.

Notes. CLASS = Classroom Assessment Scoring System; ERS = Environment Rating Scales (ECERS/ITERS/FCCERS); PAS/BAS = Program/Business Administration Scale; KRIC = Kindergarten Readiness Indicator Checklist; TS GOLD = Teaching Strategies GOLD; ATLAS = K-2 Arkansas Teaching, Learning and Assessment System Kindergarten Screener; QRIS = Quality Rating and Improvement System.

development. Second, the inclusion of early-grade academic assessments provides information on children’s mastery of foundational literacy and numeracy skills that are strongly related to later academic outcomes. Finally, Arkansas’s use of multiple measures across early childhood settings allows different aspects of readiness to be captured across the system.

Areas of potential misalignment or gaps.

At the same time, there are opportunities to strengthen alignment across measures. One challenge is that different tools are designed for different purposes, and their intended use may not always be clearly defined across contexts. For example, some measures are intended to support instructional improvement, while others provide information on children’s skills or outcomes.

Table 2 shows how these measures align across key domains of kindergarten readiness, and emphasizes the point that no single measure captures all aspects of development. Therefore, it is important

to use a combination of measures to get a more comprehensive understanding of children's readiness for school.

Academic assessments tend to focus on discrete skills while early childhood measures often emphasize broader developmental processes. Without clear connections across these measures, it can be difficult to interpret results or understand how early learning experiences relate to later developmental and academic growth.

Variation in how measures are implemented and interpreted across settings may also affect how consistently results can be compared. Differences in training, observation practices, and how measures are used can influence how results are interpreted.

Taken together, Arkansas's current system includes many of the key components of an aligned measurement approach, and clearer guidance on how measures are intended to be used and how they relate to one another could strengthen their role in supporting both practice and policy.

Implications for Policy and Practice

The findings of this analysis suggest several considerations for how quality measures are used within Arkansas's broader ECE measurement system.

Clarify the intended purpose of each measure.

Different tools are designed to capture different aspects of early learning and are most effective when used for their intended purpose. Measures of classroom interactions are well suited for supporting instructional improvement and professional learning, while direct assessments provide information on children's academic skills at specific points in time. Clarifying how each measure is intended to be used can support more consistent interpretation by stakeholders and reduce the risk of drawing conclusions that extend beyond what a given tool is designed to measure.

Use multiple measures to capture a more complete picture of early learning.

Because no single measure captures all dimensions of readiness, combining information across tools can provide a more comprehensive understanding of children's development and learning environ-

Table 2 – Conceptual Alignment of Arkansas Measures with Kindergarten Readiness Domain

Measure	Academic Skills (Literacy/Math)	Social- Emotional Development	Self- Regulation and Executive Function	Health and Physical Development	Approaches to Learning	Alignment Summary
CLASS	Moderate	Moderate	Moderate	Not captured	Moderate	Captures classroom processes that support readiness-related mechanisms; modest to moderate direct prediction of child outcomes
ERS & PAS/BAS	Indirect	Indirect	Indirect	Direct/Strong	Indirect	The primary measure of physical environment, safety, and health; indirect link to learning.
KRIC	Limited (Checklist)	Broad Coverage (Subjective)	Broad Coverage (Subjective)	Broad Coverage (Subjective)	Broad Coverage (Subjective)	Broad checklist with limited validation and less well-established alignment with later outcomes; results may be influenced by rater subjectivity.
TS GOLD	Moderate	Moderate	Moderate	Moderate	Moderate	Multi-domain observational tool; alignment depends on implementation fidelity and rater consistency.
ATLAS	Strong	Not captured	Not captured	Not captured	Not captured	Predictive of later academic outcomes with a narrower focus on academic domains; currently only for K-2.
Structural Indicators	Indirect	Indirect	Indirect	Not captured	Indirect	Enable quality conditions but are not directly related to child outcomes

Notes. CLASS = Classroom Assessment Scoring System; ERS = Environment Rating Scales (ECERS/ITERS/FCCERS); PAS/BAS = Program/Business Administration Scale; KRIC = Kindergarten Readiness Indicator Checklist; TS GOLD = Teaching Strategies GOLD; ATLAS = K-2 Arkansas Teaching, Learning and Assessment System. *Indirect* indicates that the measure influences the domain through learning environments rather than directly assessing child skills. *Not captured* indicates the domain is outside the tool’s design and measurement scope. *Broad Coverage (Subjective)* indicates the tool asks about the domain, but reliability is limited by rater judgment.

ments. Using multiple measures together can help ensure that both academic skills and broader developmental processes are considered when informing policy and program decisions.

Strengthen alignment across early childhood and early elementary systems.

Differences in what is measured across early childhood and K–2 systems can make it difficult to connect early learning experiences with later outcomes. Strengthening alignment across these systems, including clearer connections between early childhood measures and early-grade expectations, can support more coherent interpretation of results and better inform instruction and policy decisions.

Support consistent implementation and use of measures.

Variation in how measures are implemented and interpreted across settings can affect how results are generated and used. Providing clear guidance, training, and support for how measures are administered and interpreted can help improve consistency and strengthen their usefulness for both practice and policy.

Overall, these considerations suggest that Arkansas’s existing measurement system provides a solid foundation for understanding early learning, and that continued efforts to clarify, connect, and support the use of these measures can further strengthen their role in improving outcomes for children.



For more information about this Policy Brief and other education issues in Arkansas contact us:

**Office for Education
Policy**

211 Grad Ed Building
Fayetteville, AR 72701
Phone: (479) 575-3773
Fax: (479) 575-3196
oepp@uark.edu

Visit Our Blog:

<https://oepp.uark.edu/>

Executive Director:

Sarah McKenzie, Ph.D.

Associate Director:

Denise Tobin Airola, Ph.D.

Report Author:

Hannah Denker, Ph.D.

Conclusion

Early childhood quality measures each capture different aspects of children's development and learning environments. When used together and interpreted in ways consistent with their intended purpose, these measures can provide a more complete understanding of early learning and its connection to later outcomes.

Arkansas's current system includes many of the key components needed to support this approach. Continued efforts to clarify how measures are used and how they relate to one another can strengthen their role in informing both practice and policy across a birth-to-grade-2 system.

References

- Ackerman, D. J. (2020). Comparing the content of, and home language use policies for six GOLD®-based kindergarten entry assessments. *Early Education and Development*, 31(5), 676–700. <https://doi.org/10.1080/10409289.2020.1722939>
- Bai, P., Johnson, S., Trost, S. G., Lester, L., Nathan, A., & Christian, H. (2021). The relationship between physical activity, self-regulation and cognitive school readiness in preschool children. *International Journal of Environmental Research and Public Health*, 18(22), 11797. <https://doi.org/10.3390/ijerph182211797>
- Bowne, J. B., Magnuson, K. A., Schindler, H. S., Duncan, G. J., & Yoshikawa, H. (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(3), 407–428. <https://doi.org/10.3102/0162373716689489>
- Brunsek, A., Perlman, M., McMullen, E., Falenchuk, O., Fletcher, B., Nocita, G., Kamkar, N., & Shah, P. S. (2020). A meta-analysis and systematic review of the associations between professional development of early childhood educators and children's outcomes. *Early Childhood Research Quarterly*, 53, 217–248. <https://doi.org/10.1016/j.ecresq.2020.03.003>
- Burchinal, M. (2018). Measuring early care and education quality. *Child Development Perspectives*, 12(1), 3–9. <https://doi.org/10.1111/cdep.12260>
- 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>
- Cameron, C. E., Brock, L. L., Murrah, W. M., Bell, L. H., Worzalla, S. L., Grissmer, D., & Morrison, F. J. (2012). Fine motor skills and executive function both contribute to kindergarten achievement. *Child Development*, 83(4), 1229–1244. <https://doi.org/10.1111/j.1467-8624.2012.01768.x>
- Claessens, A., & Engel, M. (2013). How important is where you start? Early mathematics knowledge and later school success. *Teachers College Record: The Voice of Scholarship in Education*, 115(6), 1–29. <https://doi.org/10.1177/016146811311500603>
- Dalgaard, N. T., Bondebjerg, A., Klokke, R., Viinholt, B. C., & Dietrichson, J. (2022). Adult/child

- ratio and group size in early childhood education or care to promote the development of children aged 0–5 years: A systematic review. *Campbell Systematic Reviews*, 18(2), e1239.
- Devlin, B. L., Ellis, A., Zehner, T. M., Duncan, R. J., Elicker, J., Purpura, D. J., & Schmitt, S. A. (2024). Contributions of preschool behavioral self-regulation and social skills to growth in different domains of early math knowledge. *Journal of Experimental Child Psychology*, 241, 105867. <https://doi.org/10.1016/j.jecp.2024.105867>
- Dinehart, L., & Manfra, L. (2013). Associations between low-income children's fine motor skills in preschool and academic performance in second grade. *Early Education & Development*, 24(2), 138–161. <https://doi.org/10.1080/10409289.2011.636729>
- Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., Pagani, L. S., Feinstein, L., Engel, M., Brooks-Gunn, J., Sexton, H., Duckworth, K., & Japel, C. (2007). School readiness and later achievement. *Developmental Psychology*, 43(6), 1428–1446. <https://doi.org/10.1037/0012-1649.43.6.1428>
- Early, D. M., Maxwell, K. L., Burchinal, M., Alva, S., Bender, R. H., Bryant, D., Cai, K., Clifford, R. M., Ebanks, C., Griffin, J. A., Henry, G. T., Howes, C., Iriondo-Perez, J., Jeon, H.-J., Mashburn, A. J., Peisner-Feinberg, E., Pianta, R. C., Vandergrift, N., & Zill, N. (2007). Teachers' education, classroom quality, and young children's academic skills: Results from seven studies of preschool programs. *Child Development*, 78(2), 558–580. <https://doi.org/10.1111/j.1467-8624.2007.01014.x>
- Egert, F., Fukkink, R. G., & Eckhardt, A. G. (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(3), 401–433. <https://doi.org/10.3102/0034654317751918>
- Ernst, J. R., Grenell, A., & Carlson, S. M. (2022). Associations between executive function and early math and literacy skills in preschool children. *International Journal of Educational Research Open*, 3, 100201. <https://doi.org/10.1016/j.ijedro.2022.100201>
- Finders, J., Budrevich, A., Duncan, R. J., Purpura, D. J., Elicker, J., & Schmitt, S. A. (2021). Variability in preschool CLASS scores and children's school readiness. *AERA Open*, 7, 23328584211038938. <https://doi.org/10.1177/23328584211038938>
- Gallant, D. J. (2009). Predictive validity evidence for an assessment program based on the work sampling system in mathematics and language and literacy. *Early Childhood Research Quarterly*, 24(2), 133–141. <https://doi.org/10.1016/j.ecresq.2009.03.003>

- Gallant, D. J., & Moore, J. L., III. (2008). Ethnic-based equity in teacher judgment of student achievement on a language and literacy curriculum-embedded performance assessment for children in grade one. *Educational Foundations*, 22(1), 63–77. <https://files.eric.ed.gov/fulltext/EJ839498.pdf>
- Goble, P., & Pianta, R. C. (2017). Teacher–child interactions in free choice and teacher-directed activity settings: Prediction to school readiness. *Early Education and Development*, 28(8), 1035–1051. <https://doi.org/10.1080/10409289.2017.1322449>
- Goble, P., Sandilos, L. E., & Pianta, R. C. (2019). Gains in teacher-child interaction quality and children’s school readiness skills: Does it matter where teachers start? *Journal of School Psychology*, 73, 101–113. <https://doi.org/10.1016/j.jsp.2019.03.006>
- Gordon, R. A., Fujimoto, K., Kaestner, R., Korenman, S., & Abner, K. (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(1), 146–160. <https://doi.org/10.1037/a0027899>
- Gordon, R. A., & Peng, F. (2020). Evidence regarding the domains of the CLASS PreK in head start classrooms. *Early Childhood Research Quarterly*, 53, 23–39. <https://doi.org/10.1016/j.ecresq.2020.01.008>
- Grissmer, D., Grimm, K. J., Aiyer, S. M., Murrah, W. M., & Steele, J. S. (2010). Fine motor skills and early comprehension of the world: Two new school readiness indicators. *Developmental Psychology*, 46(5), 1008–1017. <https://doi.org/10.1037/a0020104>
- Guerrero-Rosada, P., Weiland, C., McCormick, M., Hsueh, J., Sachs, J., Snow, C., & Maier, M. (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. <https://doi.org/10.1016/j.ecresq.2020.07.009>
- Hamre, B. (2014). Teachers’ daily interactions with children: An essential ingredient in effective early childhood programs. *Child Development Perspectives*, 8(4), 223–230. <https://doi.org/10.1111/cdep.12090>
- Hamre, B., Hatfield, B., Pianta, R., & Jamil, F. (2014). Evidence for general and domain-specific elements of teacher–child interactions: Associations with preschool children’s development. *Child Development*, 85(3), 1257–1274. <https://doi.org/10.1111/cdev.12184>
- Hanno, E. C., Gonzalez, K. E., Jones, S. M., & Lesaux, N. K. (2021). Linking features of structural and process quality across the landscape of early education and care. *AERA Open*, 7,

23328584211044519.

- Hatfield, B. E., Burchinal, M. R., Pianta, R. C., & Sideris, J. (2016). Thresholds in the association between quality of teacher–child interactions and preschool children’s school readiness skills. *Early Childhood Research Quarterly*, 36, 561–571. <https://doi.org/10.1016/j.ecresq.2015.09.005>
- Hunter, L. J., Bierman, K. L., & Hall, C. M. (2018). Assessing noncognitive aspects of school readiness: The predictive validity of brief teacher rating scales of social–emotional competence and approaches to learning. *Early Education and Development*, 29(8), 1081–1094. <https://doi.org/10.1080/10409289.2018.1495472>
- Institute of Medicine and National Research Council. (2015). *Transforming the workforce for children birth through age 8: A unifying foundation*. National Academies Press. <https://doi.org/10.17226/19401>
- Jones, D. E., Greenberg, M., & Crowley, M. (2015). Early social-emotional functioning and public health: The relationship between kindergarten social competence and future wellness. *American Journal of Public Health*, 105(11), 2283–2290. <https://doi.org/10.2105/AJPH.2015.302630>
- Madill, R., Moodie, S., Zaslow, M., & Tout, K. (2015). *Review of selected studies and professional standards related to the predictors of quality included in the national survey of early care and education* ({OPRE} Report #2015-93b). Child Trends.
- Manning, M., Wong, G. T. W., Fleming, C. M., & Garvis, S. (2019). Is teacher qualification associated with the quality of the early childhood education and care environment? A meta-analytic review. *Review of Educational Research*, 89(3), 370–415. <https://doi.org/10.3102/0034654319837540>
- Markowitz, A. J., Bassok, D., & Player, D. (2020). Simplifying quality rating systems in early childhood education. *Children and Youth Services Review*, 112, 104947. <https://doi.org/10.1016/j.childyouth.2020.104947>
- Markussen-Brown, J., Juhl, C. B., Piasta, S. B., Bleses, D., Højen, A., & Justice, L. M. (2017). The effects of language- and literacy-focused professional development on early educators and children: A best-evidence meta-analysis. *Early Childhood Research Quarterly*, 38, 97–115. <https://doi.org/10.1016/j.ecresq.2016.07.002>
- Mashburn, A. J., Pianta, R. C., Hamre, B. K., Downer, J. T., Barbarin, O. A., Bryant, D., Burchinal, M., Early, D. M., & Howes, C. (2008). Measures of classroom quality in prekindergarten and children’s development of academic, language, and social skills. *Child Development*, 79(3), 732–

749. <https://doi.org/10.1111/j.1467-8624.2008.01154.x>
- McClelland, M. M., Cameron, C. E., Connor, C. M., Farris, C. L., Jewkes, A. M., & Morrison, F. J. (2007). Links between behavioral regulation and preschoolers' literacy, vocabulary, and math skills. *Developmental Psychology*, 43(4), 947–959. <https://doi.org/10.1037/0012-1649.43.4.947>
- McCormick, M., Weiland, C., Hsueh, J., Pralica, M., Weissman, A. K., Moffett, L., Snow, C., & Sachs, J. (2021). Is skill type the key to the PreK fadeout puzzle? Differential associations between enrollment in PreK and constrained and unconstrained skills across kindergarten. *Child Development*, 92(4), e599–e620. <https://doi.org/10.1111/cdev.13520>
- McDoniel, M. E., Townley-Flores, C., Sulik, M. J., & Obradović, J. (2022). Widely used measures of classroom quality are largely unrelated to preschool skill development. *Early Childhood Research Quarterly*, 59, 243–253. <https://doi.org/10.1016/j.ecresq.2021.12.005>
- Meisels, S. J., Wen, X., & Beachy-Quick, K. (2010). Authentic assessment for infants and toddlers: Exploring the reliability and validity of the ounce scale. *Applied Developmental Science*, 14(2), 55–71. <https://doi.org/10.1080/10888691003697911>
- Meisels, S. J., Xue, Y., & Shablott, M. (2008). Assessing language, literacy, and mathematics skills with *work sampling for head start*. *Early Education & Development*, 19(6), 963–981. <https://doi.org/10.1080/10409280801971890>
- Miller-Bains, K. L., Russo, J. M., Williford, A. P., DeCoster, J., & Cottone, E. A. (2017). Examining the validity of a multidimensional performance-based assessment at kindergarten entry. *AERA Open*, 3(2), 233285841770696. <https://doi.org/10.1177/2332858417706969>
- Moffett, L., Weissman, A., Weiland, C., McCormick, M., Hsueh, J., Snow, C., & Sachs, J. (2021). Unpacking pre-k classroom organization: Types, variation, and links to school readiness gains. *Journal of Applied Developmental Psychology*, 77, 101346. <https://doi.org/10.1016/j.appdev.2021.101346>
- Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H., Houts, R., Poulton, R., Roberts, B. W., Ross, S., Sears, M. R., Thomson, W. M., & Caspi, A. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences*, 108(7), 2693–2698. <https://doi.org/10.1073/pnas.1010076108>
- Perlman, M., Falenchuk, O., Fletcher, B., McMullen, E., Beyene, J., & Shah, P. S. (2016). A systematic review and meta-analysis of a measure of staff/child interaction quality (the classroom assess-

- ment scoring system) in early childhood education and care settings and child outcomes. *PLOS ONE*, 11(12), e0167660. <https://doi.org/10.1371/journal.pone.0167660>
- Perlman, M., Fletcher, B., Falenchuk, O., Brunsek, A., McMullen, E., & Shah, P. S. (2017). Child-staff ratios in early childhood education and care settings and child outcomes: A systematic review and meta-analysis. *PLOS ONE*, 12(1), e0170256. <https://doi.org/10.1371/journal.pone.0170256>
- Pianta, R., Downer, J., & Hamre, B. (2016). Quality in early education classrooms: Definitions, gaps, and systems. *The Future of Children*, 26(2), 119–137. <https://doi.org/10.1353/foc.2016.0015>
- Pianta, R., Whittaker, J. E., Vitiello, V., Ruzek, E., Ansari, A., Hofkens, T., & DeCoster, J. (2020). Children’s school readiness skills across the pre-k year: Associations with teacher-student interactions, teacher practices, and exposure to academic content. *Journal of Applied Developmental Psychology*, 66, 101084. <https://doi.org/10.1016/j.appdev.2019.101084>
- Ricciardi, C., Manfra, L., Hartman, S., Bleiker, C., Dineheart, L., & Winsler, A. (2021). School readiness skills at age four predict academic achievement through 5th grade. *Early Childhood Research Quarterly*, 57, 110–120. <https://doi.org/10.1016/j.ecresq.2021.05.006>
- Ruffini, C., Berni, M., Pierucci, G., & Pecini, C. (2024). Executive functions as predictors of learning prerequisites in preschool: A longitudinal study. *Trends in Neuroscience and Education*, 36, 100239. <https://doi.org/10.1016/j.tine.2024.100239>
- Russo, J. M., Williford, A. P., Markowitz, A. J., Vitiello, V. E., & Bassok, D. (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. <https://doi.org/10.1016/j.ecresq.2019.02.003>
- 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(2), 116–164. https://doi.org/10.1162/EDFP_a_00127
- Shields, K., Cook, K., & Greller, S. (2016). *How kindergarten entry assessments are used in public schools and how they correlate with spring assessments* (REL 2017–182). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation; Regional Assistance, Regional Educational Laboratory Northeast & Islands. <http://ies.ed.gov/ncee/edlabs>
- Slot, P. (2018). *Structural characteristics and process quality in early childhood education and care: A literature review*.

- Snow, K. L. (2006). Measuring school readiness: Conceptual and practical considerations. *Early Education & Development*, 17(1), 7–41. https://doi.org/10.1207/s15566935eed1701_2
- Soliday Hong, S. L., Sabol, T. J., Burchinal, M. R., Tarullo, L., Zaslow, M., & Peisner-Feinberg, E. S. (2019). ECE quality indicators and child outcomes: Analyses of six large child care studies. *Early Childhood Research Quarterly*, 49, 202–217. <https://doi.org/10.1016/j.ecresq.2019.06.009>
- Von Suchodoletz, A., Lee, D. S., Henry, J., Tamang, S., Premachandra, B., & Yoshikawa, H. (2023). Early childhood education and care quality and associations with child outcomes: A meta-analysis. *PLOS ONE*, 18(5), e0285985. <https://doi.org/10.1371/journal.pone.0285985>
- Wang, S., Wang, X., Liang, L., & Xie, H. (2024). Teacher-child interaction domains measured by the CLASS and children's pre-literacy skills: A systematic review and meta-analysis. *Early Education and Development*, 35(3), 431–453. <https://doi.org/10.1080/10409289.2022.2159259>
- Williams, P. G., Lerner, M. A., Council on Early Childhood, Council on School Health, Sells, J., Alderman, S. L., Hashikawa, A., Mendelsohn, A., McFadden, T., Navsaria, D., Peacock, G., Scholer, S., Takagishi, J., Vanderbilt, D., De Pinto, C. L., Attisha, E., Beers, N., Gibson, E., Gorski, P., ... Weiss-Harrison, A. (2019). School readiness. *Pediatrics*, 144(2), e20191766. <https://doi.org/10.1542/peds.2019-1766>
- Zheng, Q., Zheng, X., Liu, N., Wang, F., & Zhao, Y. (2023). A meta-analysis of teacher–child interaction and early child outcomes from the perspective of CLASS. *Early Child Development and Care*, 193(15), 1620–1651. <https://doi.org/10.1080/03004430.2023.2273788>